

Phonological Features of Angry Register Expressions in Bikol-Naga: An Acoustic Analysis Across Age Groups

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Abstract

This study investigated the phonological characteristics of angry register expressions in Bikol-Naga as uttered by high school students, college students, teachers, and laborers. Utilizing Praat software for acoustic analysis, variations in pitch and intensity contours of selected angry words were examined. Findings indicate that while universal vocal signals of anger, such as elevated pitch and increased intensity, are present across all groups, culturally specific vocal components and controlled delivery patterns are also evident, particularly among older speakers and those in more formal professions. The analysis reveals how prosodic elements like pitch and intensity, alongside specific phonological features such as glottal stops and voiced velar fricatives, contribute to the expression and interpretation of anger in Bikol-Naga, aligning with existing research on emotional speech and language-specific phonology. This research contributes to a deeper understanding of the socio-phonetic variations of emotional speech in Philippine languages.

Keywords

Bikol-Naga, angry-register, phonological analysis, regional language, language diversity

INTRODUCTION

The intricate relationship between emotion and language is a cornerstone of human communication, with speech serving as a primary conduit for conveying affective states (Scherer, 2003). While universal acoustic correlates of emotion, such as changes in pitch and intensity, have been widely documented across languages (Juslin & Laukka, 2003), the precise manifestation of these features is often modulated by language-specific phonological systems and socio-cultural contexts (Sauter et al., 2010). Anger, a high-arousal emotion, consistently elicits discernible vocalic shifts, making it a critical focus for understanding the interplay of universal and culturally specific vocal signals (Bachorowski, 1999; Gobl & Ní Chasaide, 2003).

In the context of the Philippines, a nation renowned for its rich linguistic diversity, the study of emotional speech in regional languages remains a nascent field. Existing linguistic scholarship on Philippine languages, including Bikol, has primarily focused on structural aspects, such as distinctive accent patterns influencing semantic meanings (Stevens, 2013) and dialectal variations in phonology (McFarland, 1974). While these foundational works provide crucial insights into the phonetic and phonological landscapes of these languages, a significant research gap persists concerning the systematic acoustic analysis of emotional registers, particularly anger, across diverse demographic groups within specific regional languages. Previous studies have largely overlooked the nuanced acoustic characteristics of emotional expressions as they are produced by speakers of varying ages and socio-professional backgrounds (Scherer, 2003; Juslin & Scherer, 2010), leaving a void in our understanding of how these factors shape the vocalization of anger in a specific linguistic context like Bikol-Naga. While general patterns of emotional prosody have been widely studied across languages such as English and Mandarin (Banse & Scherer, 1996), there remains limited empirical evidence on how regional languages

and dialects—particularly those with fewer resources—encode emotions through voice.

Addressing this research gap is imperative for several reasons. Firstly, a detailed acoustic analysis of emotional speech contributes to the broader field of socio-phonetics, providing empirical evidence of how social variables (e.g., age, profession) interact with linguistic features to convey affective meaning. Secondly, and perhaps more critically, such studies play a vital role in the documentation and preservation of regional languages. Many indigenous languages in the Philippines, including Bikol-Naga, face varying degrees of endangerment due to the dominance of national and global languages (Eberhard et al., 2024; Lewis et al., 2016). By systematically analyzing the phonological features of emotional registers, this research contributes to a more comprehensive understanding of the language's dynamic usage, capturing aspects of its expressive capacity that are often overlooked in purely structural analyses. This granular documentation is crucial for linguistic revitalization efforts, curriculum development for mother-tongue-based education, and fostering a deeper appreciation for the unique communicative strategies embedded within these languages.

Therefore, this study aims to fill this critical gap by providing a comprehensive acoustic analysis of angry register expressions in Bikol-Naga. Specifically, it investigates how pitch and intensity contours, alongside other relevant phonological features, are manifested in the speech of high school students, college students, teachers, and laborers. By examining these variations across distinct demographic groups, this research seeks to illuminate the interplay of universal emotional signals and language-specific, socio-contextual modulations in the vocal expression of anger, thereby contributing to the broader understanding of language diversity and the ongoing efforts for regional language preservation in the Philippines.

RESEARCH METHOD

This study employed Praat software, a widely used tool in phonetic and phonological research, for the segmentation and acoustic analysis of angry register expressions in Bikol-Naga. Praat provides a comprehensive suite of features that allow researchers to analyze speech signals in detail, including pitch (F0), intensity, duration, formant frequencies, and prosodic patterns. These parameters are essential for identifying how emotional states such as anger are linguistically and acoustically manifested in speech. Through its built-in scripting capabilities and visualization tools—such as waveforms, spectrograms, and pitch contours—Praat enables precise measurement and comparison of vocal characteristics across speakers of different ages and socio-professional backgrounds.

Speech samples were collected from four distinct demographic groups: high school students, college students, teachers, and laborers. For each group, specific Bikol-Naga words identified as angry register expressions were analyzed for their pitch (Hz) and intensity (dB) variations. The selected words for high school students were *damasyo*, *nangistom*, and *magparapurusngak*. For college students, the words were *natigbak*, *nangisnit*, and *nangasti*. Teachers' speech samples included *gabso*, *tusmag*, and *siba*, while laborers' samples featured *lasulas*, *nguraspak*, and *malisputon*. Praat's phonological segmentations (represented as "Plates" in the original analysis) were meticulously examined to identify patterns in pitch movement, intensity peaks and drops, and the presence of specific phonetic features.

RESULT AND DISCUSSION

LRP1. High School Students

The analysis of high school students' angry register expressions revealed varying phonological patterns. For *damasyo*, a steady tone from 100 Hz to 200 Hz suggested a neutral to moderately assertive tone, with minimal pitch variations indicating emotional suppression. The intensity, reaching 81.76 dB, descended after its peak, suggesting a controlled vocal delivery despite the hard inflection. In contrast, *nangistom* exhibited a consistent rising tone from 100 Hz to 150 Hz, interpreted as neutral speech articulation due to its flat pitch, signifying a factual delivery without strong emotional attachment. The intensity curve for *nangistom* expanded from 61.38 dB to 79.09 dB, with a major decrease before rapidly increasing, and glottalization was noted during intensity decrease. The expression *magparapurusngak* displayed contrasting manifestations, with an initial pitch around 150 Hz that grew higher toward the utterance's end, indicating rising emotional tension. The contour showed grouped pitch points and clustering, suggesting glottalization or creaky voice due to irregular vocal fold vibrations. The intensity varied significantly (82.08 dB maximum, 62.79 dB minimum), implying sharp, rhythm-driven utterance with high emotional involvement, possibly frustration.

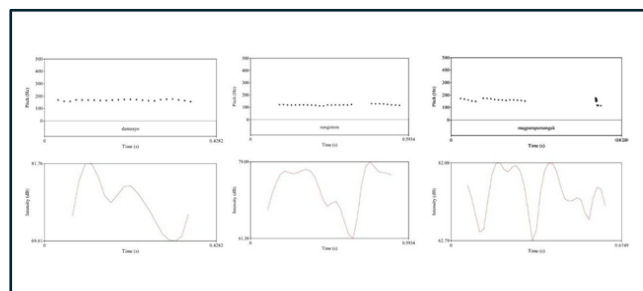


Plate 1

Praat Phonological Segmentations of High School Students' Angry Registers (*damasyo*, *nangistom*, *pusngak*)

LRP 2. College Students

College students' angry register expressions also demonstrated diverse phonological features. For *damasyo*, the pitch ranged from 100 Hz to 300 Hz, starting low, rising to a stressed central section, and ending with a drop below 200 Hz, with peak intensity at 84.17 dB for emphasis. The word ended with a natural descent for organic tone changes. *Parapusngak* (likely *magparapurusngak*) initiated with a primary tone of 150–180 Hz, briefly dropping before maintaining 200 Hz, portraying thought duration and concluding at 180 Hz. Its intensity started strong, weakened significantly mid-section, suggesting pauses or weak vocalization, then reached 81.2 dB before decreasing. The utterance *nangistom* showed two independent pitch segments (130–150 Hz and 180–160 Hz), with a split indicating hesitation or syllable length variation. Intensity for *nangistom* peaked at 82.55 dB, with an abrupt descent to 53.46 dB in the middle, matching the pitch break and suggesting a short pause or phrase change. The intensity then regained thrust, matching the rising pitch at the end, possibly indicating a terminal accent or tonal estrangement. Overall, the intensity pattern of *nangistom* showed substantial variations (82.08 dB to 62.79 dB), signifying changing loudness levels. Speakers delivered the word with a quick rise in volume before returning to a casual level to maintain speech rhythm. These findings align with research on emotional speech, which indicates that pitch shifts and voice intensity changes are characteristic of the angry register in Bikol-Naga. Scherer (2003) noted that pitch elevation and volume intensity are prominent signs of anger, and the data supported speakers using elevated pitch to convey frustration and dominance.

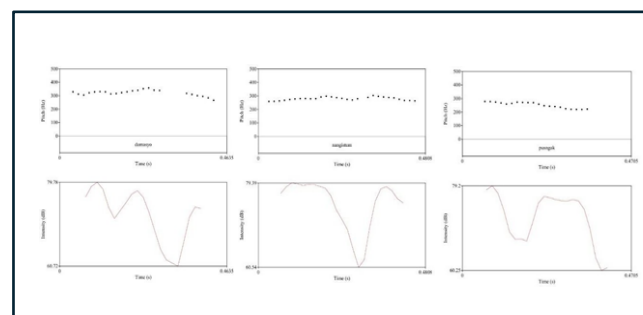


Plate 2

Praat Phonological Segmentations of College Students' Angry Registers (*damasyo*, *nangistom*, *pusngak*)

LRP 3. Teachers

Teachers' angry register expressions also exhibited distinct phonological traits. The pitch of *damasyo* spanned 300 Hz to 350 Hz, with a continuous increase to highlight strong

feelings or attract attention, followed by a minor reduction. Intensity levels of *damasyo* varied, starting at 79.78 dB, decreasing, then becoming louder again, with a final decrease to 60.72 dB indicating a shift to softer speech or a statement's termination. *Nangistom* maintained a stable tone range (200 Hz to 300 Hz) with limited fluctuations, reflecting a consistent, controlled delivery rather than exaggerated emotional speech. However, its intensity graph showed a noticeable dip, starting and ending at 79 dB but dropping to 60.54 dB in the middle, possibly to emphasize pronunciation. The voice pattern for *nangistom* displayed downward and upward changes in loudness, potentially creating a dramatic tone, with consonant clusters /ŋg/ and /st/ interfering with airflow and articulation. For *pusngak*, intensity dropped heavily towards the last syllable, with an initial pitch of 300 Hz descending to 200 Hz. This steady pitch descent suggested frustration or emphasis, making the word more assertive and intense. *Pusngak* expressed itself with intensity from 60.25 dB to 79.2 dB, starting at 79.2 dB before rapidly descending with minor upward movement. Loudness variations intensified pronunciation, strengthening the word's emotional nature and adding movement to make it more expressive for angry or frustrating statements. The vocalization methods and stressful delivery observed align with Lobel's (2005) theory that Bikol uses distinct noises for natural emotional emphasis instead of profane expressions. Raymond (2022) also supports that changing pronunciation methods make emotional statements more powerful, and voice pitch changes strengthen angry vocalizations.

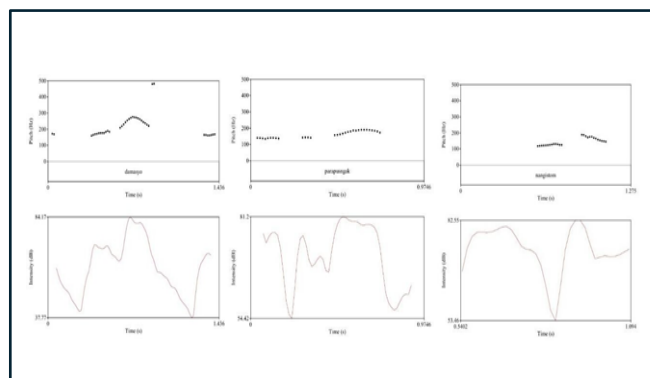


Plate 3

Praat Phonological Segmentations of Teachers' Angry Registers (*damasyo*, *nangistom*, *pusngak*)

For *gabsok*, the pitch line descended steadily from 200 Hz, giving the word a decisive, authoritative tone typical of angry speech. After reaching a maximum intensity of 78.26 dB, the delivery became brief and abrupt, consistent with emotionally intense and commanding speech. The utterance *tusmag* showed pitch ascending to 300 Hz, then descending, creating a scolding or commanding tone and making it sound more intense than *gabsok*. Its intensity reached 82.08 dB, with fluctuations indicating emotional shifts and prominent syllables. The word *siba* began with 300 Hz frequencies, decreasing to 200 Hz before slightly ascending, implying an assertive tone common in anger or frustration. An upward intensity surge at the end strengthened its emotional power, with peaks at 78.9 dB leading to fast decay, indicating a forceful burst of speech aligning with abrupt commands. This pattern aligns with Gobl & Ni Chasaide (2003), who noted

aggressive communication beginning forcefully before diminishing quickly.

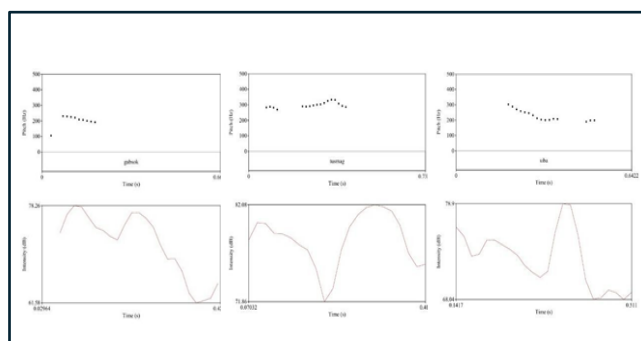


Plate 4

Praat Phonological Segmentations of Teachers' Angry Registers (*gabsok*, *tusmag*, *siba*)

LRP4. Laborers

The analysis of laborers' angry register expressions also revealed specific patterns. The Bikol term *gabsok* showed pitch rising from 100 Hz to 300 Hz, then descending to 200 Hz, producing an authoritative vocal tone that purposefully intensifies or highlights crucial information. Its sound intensity followed a bottom-up peak-down pattern, starting at 59.62 dB, peaking at 83.74 dB, and returning lower, indicating a deliberate attempt at word stress for powerful emotional delivery. The speech pattern of *tusmag* showed changing pitch patterns, not monotonous, with shifts conveying a range of emotions and increased vocal tension at medium pitch levels (300 Hz), ending with a final assertion. Intensity varied widely (63.6 dB to 83.31 dB) with two distinct bumps and a steep interruption, indicating major emphasis on stressed syllables and possible temporary stops or articulation changes. The word *siba* maintained a steady pitch level (300 Hz to 350 Hz), with a brief downward element and minor upward variation, indicating a constant tone without emotional peaks or valleys. Its sound intensity rose from 63.9 dB to 79.85 dB before swiftly dropping, displaying initial moderate volume, intensifying in the center, and reducing at the end. Stressed verbal delivery occurred at maximum intensity and highest pitch, indicating a combination of stressed/articulated delivery and strong/important/emotional vocalization.

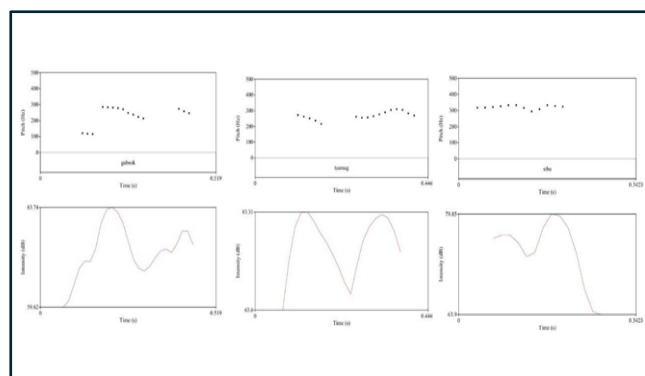


Plate 5

Praat Phonological Segmentations of Laborers' Angry Registers (*gabsok*, *tusmag*, and *siba*)

Another instance of *gabsok* showed limited pitch distribution (100-200 Hz) due to lower vocal intensities, with scattered pitch points suggesting weak or irregular

vocalization, possibly due to voiceless segments or quick speech articulation. Intensity increased to 76.03 dB before a rapid reduction, starting gently, increasing mid-utterance, and ending with a swift decrease, likely due to final consonant segments reducing energy output. The word *matusmag* featured a changing, descending pitch pattern (170 Hz to 230 Hz) with an intensity range of 65 dB to 79 dB, creating rhythm-based peaks. Its prolonged duration indicated a measured pace, and the decreasing pitch pattern suggested confident explanation rather than forcefulness or urgency. The rhythmic intensity followed natural stress patterns, making it expressive but less intense than an exclamation, suitable for explanatory or reflective speech, but not urgent situations. The word *siba* exhibited the highest pitch change, rising from 350 Hz to a significantly reduced level, indicating strong emotional participation common in exclamations or intense vocalizations. Acoustical intensity reached 83 dB, making it the most intense word examined; despite its quick duration, its high energy and rapid pitch shift created a powerful burst of vocalization. These findings align with Juslin and Laukka (2003), who posited that pitch, intensity, and speech rate are essential prosodic elements for conveying anger, with angry speech typically showing increased volume and a broader pitch spectrum. The observed patterns in *gabsok*, *tusmag*, and *siba* match these features, with controlled elevation indicating controlled anger expressions.

For *lasulas*, a flat pitch graph showed tension with small vibrations between 250 Hz to 350 Hz, maintaining an unchanging tone with no prominent syllables. Intensity measurements (67 dB to 81 dB) suggested a non-uniform syllable energy, with volume shifting between strong and quiet speech, and gradual intensity peaks. *Nguraspak* experienced pitch analysis malfunctions during voiceless consonants and glottal stops, with low frequencies (200–300 Hz) and minimal changes, creating a serious and assertive tone. Intensity started at 49.78 dB, precipitously increased, then decreased to 78.63 dB, with increases resulting from energetic syllable articulation and sudden drops indicating short vocal pauses. *Malisputon* showed a more dynamic pitch curve, rising significantly above 400 Hz mid-word before falling, suggesting prominence or stress on a middle syllable. Intensity ascended from 58 dB to a peak of 85.58 dB before a quick drop, with a significant decrease in the last section indicating natural speech weakening of the final syllable. The proximity of pitch linkage with high intensity in the middle portion suggested an emphasized syllable, giving the word greater emphasis. These findings are supported by Lobel's (2000, 2005) research on Bikol phonology, which identified glottal stops and voiced velar fricatives as key features distinguishing the angry register, functioning with pitch and intensity to differentiate neutral from angry speech. These features make the angry register more expressive, enabling speakers to intensify emotional expression through frustration, authority, and aggression.

Another instance of *lasulas* showed pitch levels between 200 and 300 Hz with a downward progression, indicating a controlled, short, and immediate vocal delivery. The word began with a high tone, suggesting strong energy that dissipated as the utterance finished, displaying controlled anger. Intensity changes matched this interpretation, peaking at 81.43 dB, then softening as the speaker exhaled, with sounds /s/ and /l/ producing gentle intensity reduction due to natural airflow. *Nguraspak* demonstrated powerful and masculine

prosodic features, making it the most aggressive word, despite a moderate pitch range (200–250 Hz). Clearly defined pitch breaks indicated unstable articulation with rapid shifts in syllabic stress, correlating with emotive emphasis in heated or explosive speech. Intensity for *nguraspak* started at 79.52 dB, with variations signifying an energy burst followed by a sudden cut-off, accentuated by stop-plosive sounds /k/ and /p/. This implied a big emotional release during frustration outbursts with increased loudness, consistent with uncontrolled anger and explosive expressions. *Malisputon* (likely *malisputon*) had relatively stable and moderately slow pitch variation (100–200 Hz), indicating less emotional heightening and no unnecessary vocal effort to emphasize anger. A consistently flat pitch contour indicated an even-tempered but irritated expression without escalation. The intensity curve (56.27 dB to 79.49 dB) paralleled this control, starting soft, growing louder, but never reaching a forceful peak, with a final decrease demonstrating intentional breath control and enunciation due to the stop consonant /p/.

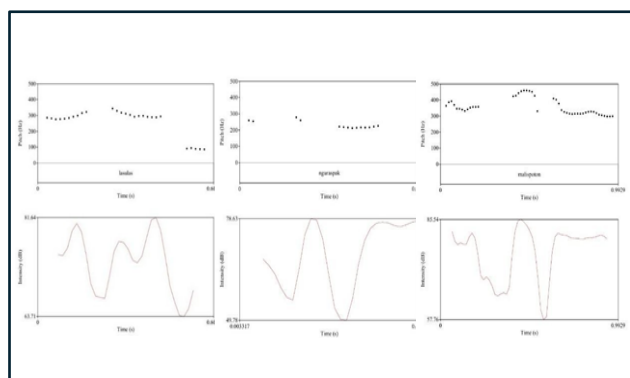


Plate 6

Praat Phonological Segmentations of Laborers' Angry Registers (*lasulas*, *nguraspak*, and *malisputon*)

Finally, for *lasulas*, the pitch remained within a 200 Hz range, neutral and sustained, with slight tonal changes during production. The lack of extreme pitch variations suggested no emotional intensity, maintaining a smooth and regulated acoustic pattern. Intensity varied between 73.48 dB and 82.54 dB, indicating stress falling on various syllables, highlighting prominence, and intentional loudness modulation for emotional emphasis.

Cross-Group Comparisons and General Findings

Across all demographic groups, the analysis generally supports the notion that anger in Bikol-Naga is conveyed through modifications in pitch and intensity. While high school students sometimes exhibited emotional suppression or neutral articulation, other instances revealed emotional involvement through rising pitch and significant intensity variations. College students showed emphasis through intense pitch peaks and varied intonation patterns, consistent with a forceful and energetic delivery. Teachers, especially with words like *gabsok* and *tusmag*, utilized descending and fluctuating pitch for authoritative and commanding tones, coupled with abrupt intensity peaks and rapid decays, aligning with aggressive communication patterns described by Gobl & Ní Chasaide (2003). Laborers displayed a range from controlled anger with dissipating energy (e.g., *lasulas*) to powerful, masculine, and explosive expressions (*nguraspak*) characterized by pitch breaks and sudden intensity changes.

A recurring theme is the presence of glottalization or creaky voice, particularly noted in high school students' *magparapurusngak* and laborers' *nguraspak* (implied by pitch analysis malfunctions during voiceless consonants and glottal stops). This aligns with Lobel's (2000, 2005) research, which identifies glottal stops and voiced velar fricatives as key phonological features distinguishing the angry register in Bikol. The findings consistently demonstrate that increased intensity and pitch variations are central to expressing anger, supporting Scherer (2003) and Bachorowski (1999). However, the data also highlights that the manner of expression is often controlled, particularly for words like *damasyo* (high school and college students) and *nangasti* (college students), where stable pitch and controlled intensity indicate intentional vocal delivery rather than uncontrolled outbursts. This control aligns with Sauter et al. (2010), who emphasize both universal and culturally specific vocal components in anger displays. The controlled patterns observed, especially among teachers and college students, suggest that cultural norms may enforce modulated expressions of anger in Bikol-Naga.

CONCLUSION

This comprehensive acoustic analysis of angry register expressions in Bikol-Naga across different age groups and professions reveals a complex interplay of universal prosodic features and language-specific phonological characteristics. While elevated pitch and increased intensity are consistently used to convey anger, the precise contours and variations are modulated by factors such as age, profession, and cultural norms. The presence of features like glottalization further distinguishes the angry register in Bikol-Naga, corroborating previous linguistic research. The findings underscore the importance of considering both universal and culturally specific factors when analyzing emotional speech. Future research could delve deeper into the perceptual salience of these acoustic features and explore a wider range of emotional expressions in Bikol-Naga and other Philippine languages.

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