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Effects of Digital Communication on Segmented and Super-Segmented Features of Pronunciation Patters among Undergraduate English Language Students in Nigeria

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Abstract

The widespread use of digital communication platforms, such as instant messaging, social media, and video conferencing, has transformed how university students interact and use language. This study investigates the effects of digital communication on pronunciation patterns, with a focus on both segmental features (vowel quality and consonant articulation) and supra segmental features (stress placement, rhythm, and intonation) among undergraduate students in Nigeria. A total of sixty participants, aged 18–25, and provided speech samples through structured reading tasks, spontaneous speech, and digital voice notes. Acoustic analyses measured vowel formants, consonant precision, stress placement, and pitch variation, while perceptual analyses involved listener ratings of intelligibility and naturalness. Results indicate that frequent engagement in digital communication is associated with reduced articulation precision, weakened stress contrasts, and a narrower pitch range, particularly in spontaneous and digital speech samples. These changes negatively impact intelligibility, suggesting that informal, rapid, and text-mediated communication encourages adaptations that deviate from standard pronunciation norms. Nevertheless, exposure to varied speech contexts can mitigate some comprehension challenges. The findings have important implications for language teaching, pronunciation training, and digital literacy programmes, highlighting the need to balance informal digital speech habits with strategies that preserve clear and intelligible communication. By understanding how digital communication influences pronunciation, educators and speech professionals can better support students in maintaining effective oral communication across both online and face-to-face contexts.

Keywords: Digital communication, segmented, super-segmented features, University students,

Introduction

In the dynamic environment of university life, digital communication platforms, such as instant messaging apps, social media networks, and video-conferences, have become deeply embedded in students' everyday linguistic practices. These technologies do not simply extend traditional face-to-face interaction; they shape the very way students use language, both in writing and oral engagement. While scholarly attention has long focused on the effects of texting and online interaction on written language (Crystal, 2008; Tagliamonte & Denis, 2020), far less has been devoted to the subtler impact these forms have on spoken language, and in particular on pronunciation. Pronunciation involves more than articulating individual sounds (segmental features such as vowels and consonants); it also encompasses supra segmental features, for example, stress patterns, rhythm, intonation, and pitch variation, that play a critical role in determining how speech is perceived, understood, and processed by listeners (Ladefoged & Johnson, 2014). Alterations in any of these domains can affect intelligibility, listener comprehension, and the overall effectiveness of communication.



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Digital communication environments often encourage rapid, informal exchanges, typographically mediated messages, and compressed speech segments. These contexts may reduce opportunities for deliberate articulation and thus reinforce simplified or abbreviated speech forms (Baron, 2008; Levis, 2018). More recently, researchers have highlighted how new digital behaviors, such as voice-note usage, video clip replies, and AI-based speech tools, are associated with narrower pitch ranges, less rhythmic contrast, and transformed prosodic behaviors among learners (Ping & Tao, 2025; Liu, 2025). Within this evolving context, the present study sets out to examine how habitual use of digital communication platforms by Nigerian university students influences their pronunciation patterns. It adopts a dual focus on acoustic measures (vowel quality, consonant articulation, pitch range, syllable timing) and listener-based perceptual outcomes (intelligibility, naturalness).

Literature Review

Digital Communication and Spoken Language

The rapid expansion of digital communication through social media, instant messaging, and voice-messaging apps has profoundly transformed how university students use and experience language. Research indicates that frequent engagement with these platforms encourages speech simplification, reduced vowel clarity, and increased use of casual or abbreviated phonetic patterns (Crystal, 2008; Tagliamonte & Denis, 2020). Voice notes and short video calls, while providing opportunities for oral interaction, often promote faster, less precise articulation due to their informal, rapid, and multitasking nature (Thir, 2023). These platforms create a unique linguistic environment where students naturally adapt their speech for efficiency and peer understanding, which may diverge from conventional pronunciation norms. Consequently, digital communication influences not only writing habits but also subtly reshapes spoken language, particularly in informal settings.

Pronunciation Patterns in L2 Contexts

In second-language learning, accurate pronunciation, both segmental (vowels and consonants) and suprasegmental (stress, rhythm, intonation), is essential for intelligibility and effective communication (Levis, 2018; Ladefoged & Johnson, 2014). Environmental and social factors, including peer influence and digital communication habits, can lead to shifts in these pronunciation features (Lin, Zhang, & Lin, 2022; Ojochegbe, Tersoo, & Nicodemus, 2024). For example, students frequently exposed to informal online speech may produce altered stress patterns, reduced pitch variation, and faster syllable transitions. While these adaptations may facilitate peer-to-peer comprehension within digital networks, they can hinder understanding for listeners outside the immediate social group.

Digital Communication and Pronunciation Adaptation

Recent studies suggest that digital communication represents a novel context in which L2 learners adapt their pronunciation patterns. Frequent texting, voice notes, and online calls appear to encourage abbreviated articulation and narrower pitch ranges, particularly in fast-paced, peer-oriented digital environments (Cao, Pavlik, & Bidelman, 2024; Kumari & Kumar, 2024). Research on AI-assisted pronunciation learning demonstrates that while segmental accuracy can improve with digital tools, suprasegmental features such as stress and intonation often remain underdeveloped (Senowarsito & Ardini, 2023). These findings highlight that digital communication may enhance informal peer comprehension but can reduce intelligibility for unfamiliar listeners. Understanding these dynamics is critical for educators and language practitioners seeking to balance students' informal digital habits with the need for clear, standard pronunciation, ensuring effective communication in academic and professional contexts.



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Objectives of the Study

1. How does frequent engagement in digital communication affect segmental articulation among university students?
2. What are the effects of digital communication practices on supra segmental features such as stress, rhythm, and intonation?
3. How do these pronunciation modifications influence listener intelligibility?

Research Questions

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2. What are the effects of digital communication practices on supra segmental features such as stress, rhythm, and intonation?
3. How do these pronunciation modifications influence listener intelligibility?

Methodology

This study explores the effects of digital communication on university students' pronunciation patterns, examining how frequent use of texting, social media, and voice messaging influences both segmental features (vowels and consonants) and supra segmental features (stress, rhythm, and intonation). The research is structured as follows: Section 2 reviews existing literature on digital communication and its impact on spoken language; Section 3 details the methodology, including participant selection, data collection, and analysis procedures; Section 4 presents the results, highlighting changes in articulation, stress patterns, and pitch range; Section 5 discusses the findings and their implications for pronunciation and intelligibility; Section 6 explores practical applications for language teaching, speech training, and digital literacy; and Section 7 concludes with recommendations for enhancing clear and effective communication in both digital and face-to-face contexts. The study involved sixty undergraduate students (30 males and 30 females) drawn from three universities in Nigeria. Participants were aged between 18 and 25 years and were either native speakers of English or had achieved advanced English proficiency (CEFR B2–C1), ensuring a strong command of the language for reliable pronunciation analysis (Levis, 2018; Kumari & Kumar, 2024). Selection criteria required that students actively engage in digital communication for at least two hours per day, including social media interaction, instant messaging, and voice notes, to capture the influence of frequent digital language exposure. All participants reported no history of speech, hearing, or neurological impairments, which could otherwise confound pronunciation performance. Demographic and language-use questionnaires were also administered to document participants' digital habits, language background, and exposure to English in both formal and informal contexts (Ojochegebe, Tersoo, & Nicodemus, 2024).

Materials

Speech samples were elicited using three complementary tasks designed to capture both segmental and suprasegmental features:

1. Reading Tasks – Participants read lists of words and sentences carefully designed to target vowels, consonants, stress patterns, and intonation contours. These tasks provided controlled data for comparing traditional pronunciation norms with digitally influenced speech.
2. Spontaneous Speech – Participants narrated a personal experience or described a picture for two to three minutes, offering naturalistic speech that reflected everyday expressive patterns in informal contexts (Thir, 2023).



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3. Digital Voice Messages – Over a period of one week, participants submitted voice messages via WhatsApp or Telegram. This captured authentic speech influenced by digital-mediated communication, which often encourages brevity, rapid articulation, and casual prosody.

All recordings were collected using high-quality microphones and smartphones to ensure clarity and consistency. The acoustic data were subsequently analysed using Praat software for detailed phonetic examination (Boersma & Weenink, 2021).

Data Analysis

Data were analysed using a combination of acoustic, perceptual, and statistical methods:

1. Acoustic Analysis – Measurements focused on vowel formant frequencies, consonant articulation precision, fundamental frequency (F0) contours, stress placement, and syllable timing, capturing both segmental and suprasegmental features of pronunciation (Ladefoged & Johnson, 2014; Cao, Pavlik, & Bidelman, 2024).
2. Perceptual Analysis – Ten trained listeners evaluated each speech sample for intelligibility and naturalness on a 5-point Likert scale, enabling a listener-centered assessment of pronunciation clarity and comprehension (Lin, Zhang, & Lin, 2022).
3. Statistical Analysis – Mixed-effects regression models were applied to examine the relationship between participants' frequency of digital communication and pronunciation changes. Gender and age were included as covariates to control for demographic influences on speech production. This approach allowed for a robust investigation of how digital communication predicts both segmental and suprasegmental modifications in university students' speech.

Presentation of Results

Segmental and Supra segmental Features

Table 1 presents the observed differences in pronunciation patterns across three speech tasks: controlled reading, spontaneous speech, and digital voice messages. The results indicate a clear trend: frequent digital communication is associated with reduced articulatory precision and weakened prosody. Vowel space progressively narrowed from reading tasks to digital voice messages, with high and low vowels tending to centralize in informal speech. Consonant reductions, such as final /t/ and /d/ deletions, were more frequent in spontaneous and digital speech, reflecting a tendency for casual, faster articulation. Supra segmentally, stress contrasts became weaker, rhythm shifted toward syllable-timed patterns, and pitch range (F0) narrowed, particularly in shorter voice messages. Listener ratings showed that these modifications collectively diminished intelligibility, with controlled readings receiving the highest scores.

Research Questions

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Table 1: Segmental and Supra segmental Features by Speech Task

Feature	Controlled Reading	Spontaneous Speech	Digital Messages	Voice	Observations / Notes
Vowel Space	Wide	Moderate	Narrow		Centralization of high/low vowels in informal tasks
Consonant Articulation	Precise	Slightly reduced	Reduced		/t/ and /d/ deletions are common in casual speech
Stress Contrast	Strong	Moderate	Weak		Weak stress patterns in digital voice messages
Speech Rhythm	Stress-timed	Mixed		Syllable-timed	Digital speech encourages even timing between syllables
F0 Range (Pitch)	Wide	Moderate	Narrow		Reduced pitch modulation in informal tasks
Intelligibility (Mean Score)	4.1/5	3.6/5	3.2/5		Lower intelligibility in informal speech

Statistical Correlations

To better understand how the frequency of digital communication relates to pronunciation changes and intelligibility, Pearson correlation analyses were conducted. Table 2 summarizes these relationships. The results indicate that higher digital communication frequency is significantly associated with reduced vowel clarity, weaker stress contrasts, narrower F0 ranges, and lower intelligibility scores. Stress placement and vowel precision emerged as the strongest predictors of intelligibility, reinforcing the link between segmental and supra segmental features in effective communication.

Table 2: Correlations between Digital Communication Frequency, Pronunciation Features, and Intelligibility

Variable	Vowel Clarity	Consonant Precision	Stress Contrast	F0 Range	Intelligibility
Digital Communication Frequency	-.42*	-.28*	-.50**	-.36*	-.54**
Vowel Clarity	1	.31*	.45**	.38**	.61**
Consonant Precision		1	.29*	.22	.39**
Stress Contrast			1	.40**	.68**
F0 Range				1	.42**

*p < .05, **p < .01

Summary of Findings

In essence, frequent engagement in digital communication platforms such as WhatsApp and Telegram is associated with subtle but systematic reductions in both segmental and supra segmental pronunciation features among university students. These changes, particularly vowel centralization, consonant reduction, weakened stress, and narrower pitch range, negatively affect listener intelligibility, emphasizing the importance of monitoring how informal, digital-mediated speech can influence pronunciation over time. These findings also suggest that both acoustic analysis and perceptual evaluation are critical in understanding how digital habits reshape spoken language.



Discussion of Findings

The findings of this study indicate that frequent use of digital communication platforms substantially influences university students' pronunciation, affecting both segmental and supra segmental features of speech. At the segmental level, participants showed reduced articulation precision, particularly in unstressed syllables, alongside centralized vowels and a narrowed vowel space, reflecting a tendency toward more casual and streamlined pronunciation. Consonant reductions, such as the deletion of final /t/ and /d/, were especially common in spontaneous speech and digital voice messages, highlighting how informal digital interactions encourage simplified articulation (Crystal, 2008; Tagliamonte & Denis, 2020; Hao et al., 2023). Regarding suprasegmental features, students demonstrated weaker stress contrasts and a shift toward a more syllable-timed rhythm, accompanied by reduced pitch variation, particularly in brief voice messages. This indicates that digital communication encourages prosodic patterns prioritizing speed and efficiency over careful modulation, corroborating prior research emphasizing the critical role of stress, rhythm, and intonation for intelligibility (Levis, 2018; Ojochegebe et al., 2024). Listener evaluations confirmed that stress placement and vowel clarity were the strongest predictors of intelligibility, underscoring the interplay between segmental and suprasegmental features in effective communication.

Statistical analyses revealed a negative correlation between digital communication frequency and speech intelligibility, suggesting that heavy engagement with informal, rapid digital interactions can lead to measurable declines in pronunciation accuracy. Notably, these adaptations appear systematic rather than random, reflecting habitual adjustments to digital communication constraints, such as brevity, speed, and reliance on visual text cues (Cao et al., 2024; Dossou, 2023). These results highlight the importance of targeted pronunciation instruction in university curricula, with a focus on both segmental accuracy and prosodic control. Pedagogical interventions could include structured reading exercises, prosody-focused drills, and feedback on digital speech patterns. Additionally, speech technology tools, such as automated pronunciation evaluators, should account for these digitally induced changes to better represent real-world speech. While digital platforms facilitate fast and convenient communication, they also subtly shape pronunciation habits, reinforcing the need for strategies that maintain clarity and intelligibility in both academic and professional contexts.

Implications

Language Teaching

The study highlights the crucial role of pronunciation and prosody awareness in modern language education. University educators should integrate explicit instruction on stress, rhythm, and intonation into English language and digital literacy curricula. By doing so, students can maintain intelligibility not only in informal digital exchanges but also in formal spoken communication contexts. Practical strategies might include guided reading exercises, prosody-focused drills, and voice note activities that help learners consciously monitor and adjust their speech patterns, counteracting the tendency toward casualized articulation in digital interactions (Levis, 2018; Ojochegebe, Tersoo, & Nicodemus, 2024).

Speech Technology

For developers of automatic speech recognition (ASR) and text-to-speech (TTS) systems, the findings indicate the importance of accommodating informal digital speech patterns. Speech produced over voice notes or messaging platforms often exhibits reduced articulation precision, narrower vowel



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spaces, and altered stress or intonation patterns. Training systems solely on formal speech corpora risks misrecognition or unnatural synthesis. Incorporating diverse speech samples that reflect these emerging patterns can improve system performance, making ASR and TTS more robust and inclusive across accents, age groups, and communication contexts (Dossou, 2023; de la Fuente & Jurafsky, 2024).

Professional Communication

The results also underscore the need for students and young professionals to adapt their speech according to context and audience. While rapid and casual digital communication encourages abbreviated forms and relaxed articulation, effective academic, professional, and international communication requires attention to stress placement, vowel clarity, and pitch modulation. Workshops and training that raise awareness of situational speech adaptation can help individuals strike a balance between informal digital habits and clear, intelligible oral communication, thereby enhancing overall professional efficacy (Cao, Pavlik, & Bidelman, 2024; Lin, Zhang, & Lin, 2022).

Conclusion

This study reveals that digital communication significantly shapes the pronunciation patterns of university students, influencing both segmental aspects, such as vowel quality and consonant articulation, and suprasegmental features, including stress, rhythm, and intonation. Frequent use of instant messaging, social media, and voice notes fosters faster, more casual speech, which can facilitate informal interaction but may compromise intelligibility in academic, professional, or intercultural communication settings (Levis, 2018; Lin, Zhang, & Lin, 2022). Observed changes include weaker stress contrasts, reduced vowel space, and limited pitch variation, indicating that habitual digital speech modifies natural pronunciation habits. These findings highlight the tension between the convenience of rapid, informal communication and the demands of clear, intelligible speech for audiences outside one's immediate peer group (Ojochegebe, Tersoo, & Nicodemus, 2024; Cao, Pavlik, & Bidelman, 2024). Overall, the study underscores the need for balanced strategies that support both adaptive digital communication and preservation of oral clarity.

Recommendations

Based on these insights, several practical recommendations are proposed:

1. **Language Teaching:** Educators should integrate pronunciation and prosody training into English and digital literacy curricula. Activities could include reading exercises, guided oral presentations, and voice note tasks to help students retain clarity while adapting to informal digital speech (Ojochegebe, Tersoo, & Nicodemus, 2024).
2. **Speech Technology:** Developers of automatic speech recognition (ASR) and text-to-speech (TTS) systems should incorporate informal digital speech patterns into training datasets. This approach can enhance system accuracy and naturalness across diverse accents and communication styles (Dossou, 2023; de la Fuente & Jurafsky, 2024).
3. **Professional Communication:** Students and young professionals should be trained to modulate their speech depending on the audience and context, balancing casual digital habits with standard pronunciation norms. This ensures intelligibility in formal, academic, or international settings and supports effective cross-context communication (Cao, Pavlik, & Bidelman, 2024).

In conclusion, a strategic combination of educational, technological, and professional interventions can help mitigate the unintended effects of digital communication on pronunciation, enabling university students to remain clear, intelligible, and adaptable communicators across a variety of contexts.



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Acknowledgements

We sincerely acknowledge the support, guidance and encouragement of individual who contributed to the successfully completion of this research article

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