



COMPARISON OF VOCAL PITCH AND LOUDNESS USING VOICE TOOL ANDROID APPLICATION AND PRAAT FOR REAL TIME ANALYSIS IN HEALTHY MALES OF LUCKNOW

Speech & Hearing

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ABSTRACT

Voice is a multidimensional phenomenon conveying linguistic and social information through vocal fold vibrations. Pitch, varying by gender, reflects vibration frequency. The aim of this research is to comprehensively compare and evaluate the effectiveness of vocal pitch and loudness analysis in real-time, employing both Voice Tool Android App and PRAAT. This investigation enlisted 10 healthy male adults from Lucknow, adhering to inclusion criteria of no reported history of voice issues and an age range of 18-25 years. The participants' voice samples, specifically during the phonation of the /a/ sound, underwent a dual assessment employing real-time analysis with the Voice Tool Android Application and PRAAT analysis. A notable difference in loudness assessments emerged between the two tools ($p=0.0264$), indicating a current limitation in the Voice Tool Android Application's ability to accurately capture loudness variations. Conversely, no significant difference was found in pitch results ($p=0.3751$). While the application shows promise in real-time pitch analysis, further refinement is necessary, especially in loudness assessments, to enhance its reliability and usability in diverse applications.

KEYWORDS

Voice Analysis, PRAAT, Android Application, Vocal Pitch, Loudness, Screening Tool.

INTRODUCTION

Voice is a complex and multidimensional phenomenon involving sound produced by vocal fold vibrations, which conveys not only linguistic information but also para- and extralinguistic features such as identity, emotion, and social cues. (Wiechmann et al., 2022; Garelek, 2019) This complex interplay results in the creation of vocal pitch. Vocal pitch refers to the relative highness or lowness of a tone as perceived by the ear, and it is influenced by the number of vibrations per second produced by the vocal cords.

The voice is composed of different parameters like pitch, loudness, and quality. When considering pitch differences between genders, distinct ranges are observed. On average, the pitch of an adult male's voice ranges from 85 to 155 Hz, constituting approximately an octave lower than the average pitch range for women, which is typically between 165 and 255 Hz. In applied fields like speech therapy or forensic analysis, understanding voice involves linking perceptual impressions with measurable acoustic parameters while acknowledging challenges in objective assessment (Wiechmann & Wagner, 2025). Overall, voice encompasses both the physical production of sound and its social and communicative meanings.

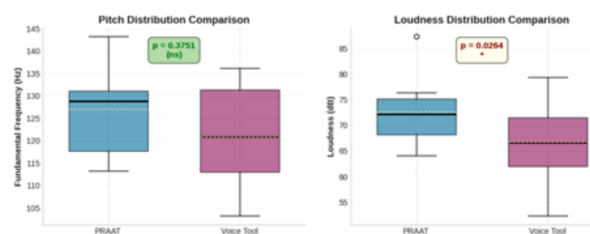
PRAAT is one of the standard ways to examine voice pitch and loudness. The Voice Tool Android Application, a free app available on the PlayStore, estimates real-time pitch and loudness parameters and is available for people as a tool to estimate their voice parameters, similar to various hearing threshold estimating apps. It will hence be interesting to see if this tool has the potential to be used for screening in the general population.

As emerging technologies reshape the landscape of voice analysis, it is essential to discern whether there is a discernible shift towards relying on Voice Tool Application as a screening tool. This study aims to investigate the accuracy and efficiency of the Voice Tool Android Application by comparing it with PRAAT.

METHODOLOGY

The purpose of the study was to assess acoustic measures of vocal pitch and loudness using contemporary technological tools. The investigation included 10 healthy male adults from Lucknow who met the inclusion criteria of being between 18 and 25 years of age and having no reported history of voice disorders. Voice samples were recorded during sustained phonation of the vowel /a/ in a sound-treated room. The collected samples were analyzed using two methods: real-time analysis with the Voice Tool Android Application and acoustic analysis using PRAAT. Both tools were employed to examine parameters such as pitch and loudness. The results of the acoustic analysis revealed noteworthy differences, which were further validated through statistical procedures to ensure reliability.

RESULTS AND DISCUSSION



Parameter	PRAAT Mean±SD	Voice Tool Mean±SD	p-value	Interpretation
Pitch (Hz)	127.0±9.9	120.8±1.4	0.3751	No significant difference
Loudness (dB)	72.5±6.2	66.8±8.4	0.0264	Significant difference

This research conducted a comparative analysis of vocal pitch and loudness parameters using PRAAT and the Voice Tool Android Application. The loudness analysis revealed a significant difference between the two tools ($p=0.0264$), indicating a limitation in the Voice Tool Android Application's ability to accurately measure loudness variations during speech when compared to the standard PRAAT software. In contrast, the pitch analysis showed no significant difference ($p=0.3751$), demonstrating the application's effectiveness in estimating pitch similarly to PRAAT.

The findings suggest that while caution should be exercised when relying solely on the Voice Tool Android Application for loudness assessment, it shows promise for real-time pitch analysis. The study highlights the need for continued refinement and development of the application to better align its performance with established acoustic analysis standards. It provides valuable insights for the general population within the evolving landscape of voice analysis technologies and suggests that the application may have potential as a convenient screening tool for voice, similar to existing hearing screening apps. Overall, the research underscores the importance of understanding both the strengths and limitations of emerging Android-based voice analysis tools that could serve as accessible screening resources.

CONCLUSION

The study provides valuable insights into the comparative effectiveness of vocal pitch and loudness analysis using the Voice Tool Android Application and PRAAT. While the application shows promise in real-time pitch analysis for the male population studied, further refinement is necessary, especially in loudness assessments, to enhance its reliability and usability in diverse applications.

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