



Voice Analysis of Dubbing Artists

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Abstract

There has been very little phonetic study of mimicry. Considering how interested the general public is in the phenomenon, this is really unexpected. However, there is curiosity in the phenomenon that extends well beyond the realm of public amusement. From a purely phonetic perspective, it could provide valuable insight into the human voice's versatility, including the degree and methods of voice modulation. Forensic phonetic study should also find the occurrence to be quite relevant. The literature claims that there aren't many real cases of fraud via mimicry in the courts now, but if automatic voice recognition is included into security systems for personal identity, this could alter significantly in the near future. The study was aimed to analyze voice characteristics in male mimicry artists and comparative with normal subjects. There may be considerable variations in acoustic characteristics of voice in male mimicry artists. As the mimicry artist use their voice for hours in a day can be classified under Level II – professional voice users. However, some mimicry artists suffer voice problems due to excessive demand of voice at certain situations. As there is a lack of study regarding their voice characteristics of mimicry artists, thus the current study is carried out to show the voice characteristics in male mimicry artists. In this current study, 30 Mimicry Artist (Group A) were age and gendered matched with 30 Normal Subjects (no voice problem) (Group B) and divided into two groups. The Questionnaire for Voice Analysis on Mimicry Artist was given to Mimicry Artist group to report their voice symptoms and conditions then subjectively by using voice handicapped index (VHI). After taking the case history, later voice samples were analyzed. The subjects were made to phonate /a/, /i/, /u/ and the voice samples were recorded. The voice samples were then analyzed using PRRAT software and parameters were obtained. The study proves that Mimicry Artist do fall under the level I of professional voice users who suffer from moderate level of voice disorders and their vocal demands affect their quality of life in terms of breathy and hoarseness, the study also shows that not all parameters in acoustic analysis show abnormality. The features which differed from Normal's will help us to identify early voice deviations and help in choosing proper remedy for it. Therefore, Mimicry Artist as a professional voice group should be considered for voice training and vocal hygiene programs.

Keywords: Mimicry; Voice Handicapped Index (VHI)

Introduction

Types of voice disorders

Voice disorders fall into a few main categories: Structural, neurogenic, functional, and psychogenic.

- **Structural Disorders:** With structural disorders there is a problem involving the tissue or fluids of the vocal cords. Examples can include nodules, polyps, ulcers, or other lesions on the vocal cords. These lesions can impair the normal vibration and function of the vocal cords which causes hoarseness.

- **Neurogenic Disorders:** Neurogenic disorders are related to problems with the nervous system, including paralysis or weakness of the vocal cords, tremor, or other neurologic conditions. Patients with these conditions can also have difficulty swallowing and may be at risk for developing pneumonia due to aspiration which is when food that is swallowed goes down the wrong way and ends up in the lungs.
- **Functional Disorders:** With functional disorders, the physical structure is normal but there is muscle tension due to improper use or strain causing muscle tension when vocalizing and preventing normal voice production.
- **Psychogenic Disorders:** It is rare for a psychological disorder to be the sole cause for a voice problem, but a psychogenic component is often present because of the emotional impact a voice disorder can have.

Often, a patient's disorder may fit more than one category and the challenge lies in determining the primary cause.

Causes of voice disorders

The causes of voice problems are classified in elite voice professional [40];

- **Misuse and abuse:** poor speaking techniques, speaking out of range, chronic coughing, throat clearing, smoking, poor hydration, overuse of voice. Vocal misuse and abuse are the predominant factors leading to voice problems. Chronic medical problems: esophageal reflux, allergies, sinusitis, upper respiratory tract infection, poor diet, fatigue, illicit drug uses.
- **Vocal attrition:** laryngeal tissue pathology, muscle fatigue and voice disorder due to acute or chronic misuse of the vocal mechanism.
- **Hyperkinetic:** This means excessive expenditure of energy in muscular movements with regards to voice production. Environmental factors: performing in dry, smoky environment, exhaustive schedule, poor acoustics, and loud music.
- **Emotional factors:** Stage fright, anxiety, depression, performance stress. Vocal fatigue – suggests musculoskeletal issue (misuse of abdominal or neck musculature) and overuse of voice. Neurological problems may also present to this complaint. Prolonged warm-up time is considered a problem in western singers. This refers to the time that singers need to warm up their voice while initiating a session of singing (usually morning times). Frequently associated with reflux [35].

Pain – May be due to vocal abuse, choking or coughing. Harsh voice is with loss of dynamic range – May be associated with vocal polyps, Reinkes edema or other mass lesions. Breathiness is may be indication of vocal fold palsy or other problems preventing closure of the vocal folds [39]. Voice weakening is especially in association with increased nasality could be indicative of myasthenia gravis. Volume disturbance: is characterized by an inability to sing loudly or softly. The physical instrument for human sound production has Activator: the respiratory system, primary vibrator is the vocal folds. Resonator is the upper part of the larynx, Oral and nasal cavity.

The professional voice users are singers, actors, teachers, receptionist, politicians, sales persons, lawyers, medical transcriptionists, telephone operators and clergy. These professional voice users use their voice in different situations and in different ways according to the need.

The term professional voice user will be arbitrarily limited to individuals who use the voice extensively for some form of artistic expression, in other words, to performers. Anyone who needs their voice in order to carry out their job is considered a professional voice user. Professional voice users are those individuals who are directly dependent on vocal communication for their livelihood [43]. Professional voice users are also often considered 'athletic' voice users because their voice use is more extensive and strenuous (action involves a lot of energy or effort.) than that of a non-professional voice user.

Classification of professional voice users

The professional voice users are classified into 4 levels by [24].

- **LEVEL - I:** Elite vocal performer (actors, singers, sports casters, announcers.)- Slight vocal abnormality may be disabling.
- **LEVEL - II:** Professional voice user (teacher, clergy, receptionist) - Moderate vocal abnormality affects job performance.
- **LEVEL - III:** Non-vocal performer (Physician, Businessman, Attorney) - Severe vocal abnormality affect job.
- **LEVEL - IV:** Non-vocal-nonprofessional (clerk, mechanic, construction worker)- Would have difficulty doing their work if experiencing vocal difficulty.

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Common pathological condition in singers

Laryngitis, Dehydration & lubrication, Reflux laryngitis, Vocal fold nodules, Vocal polyp, Vocal fold cyst, Sulcus vocalis are the common pathological conditions were noted in singers.

Professional voice users who travel are frequently confronted with changes in their sleep and eating patterns. Performing in dry or dusty concert halls increases the risk of vocal fatigue and infection. A minor cold or allergy can be devastating to a professional voice user, who is obliged to perform with swollen (edematous) vocal cords. Good vocal hygiene, good travel habits, and vigilant protection of one's instrument (good judgment) is an important responsibility of every professional voice user.

Voice problems in actors

Actors engaged in emotionally charged behaviors or acts in which emotions change very fast are expected to indulge in screaming, shouting, grooming, grunting and sobbing, depending on the theme of the play, which are usually considered vocally violent behaviors. These behaviors involve extremes in pitch and loudness variation, increase of muscular tension and explosion of air across the partially closed vocal folds [3]. This leads to vocal abuse and voice disorders. If the acoustics of auditorium is poor, actors put tremendous pressure on the vocal mechanism and are a source of vocal abuse. prolonged vocal strain after a theatre performance exhausts the vocal muscles and causes hypo functions. Thus, it concluded that more vocal strain is reported in cases of actors.

Voice problem in theatre artist

A theatre performer is one the largest groups of professional voice users who develop voice disorders because of abusive speaking or singing habits, especially hyper-functional voice techniques. Acting frequently necessitates vocal production that explores a wider range than usual, in terms of loudness, pitch, rhythm and vocal quality. These projection skills in actors may be the result of alteration in the overall shape of the vocal tract which leads to an increase in spectral energy in the higher part of the spectrum [43]. Optimum projection is related to the breathing mechanism, resonators, and intelligibility of the text. These attributes are gained

through vocal training. Lack of vocal training may lead to an inappropriate projection by increasing laryngeal muscle tension, and constriction, resulting in vocal strain [5]. When the demand of characterization adds to this, it may place them at greater risk for developing voice disorders than other professional voice users.

Actors are also expected to enact many emotions, and to give in to the given circumstances of the play they are in ("you have discovered that both your sister and wife have been murdered", "someone close to you has died in an accident", etc.). Realization of some of these emotions through voice may be considered to be vocally abusive behaviors. Such behaviors involve the use of pitch and loudness in their extremes, increased muscular tension and forced and effortful explosion of air across the partially closed vocal folds [29]. Actors, using vigorous voices, often encounter vocal trauma, hoarseness and other vocal symptoms when they assume a strained rough phonatory style for character portrayal.

Mimicry artist

Mimicry, mixing, or re-recording is a post-production process used in filmmaking and video production in which additional or supplementary recordings are "mixed" with original production sound to create the finished soundtrack. The process usually takes place on a dub stage. Following the editing and preparation of all required tracks (music, effects, Foley, automated dialogue replacement (ADR), and dialogue), the mimicry mixer or mixers balance all of the components and record the final soundtrack. ADR (sometimes referred to as "additional dialogue replacement," "additional dialogue recording," and "looping"), in which the original actors re-record and synchronize audio sequences, is occasionally confused with mimicry.

The most prevalent use of the term "mimicry" outside of the film business is to substitute the voices of actors on screen with those of other actors speaking a foreign language; this practice is known as "revoicing" in the film industry. Mimicry has many meanings. The word originated in the recording business sometime in the 19-teens to 1920s. It is a slang word from "doubling" that is, "make a copy or duplicate." The word also appeared when motion movies began to include sound. The original purpose of mimicry was to combine sounds from several separate channels into a single composite audio track. A place where this work was done was known as a mimicking stage or studio. However, the cinema industry quickly realized (I'm assuming 1928) that it was necessary to add voices to already-existing tracks or even to substitute an actor's voice recorded on the set with another actor's voice recorded later on a separate stage. Another name for this phenomenon is imitation.

Types of voice mimicry

- **UN-Style Voice-Over:** In most cases, this is carried out while an interpreter is present during an interview. When a news reporter interviews a politician or athlete who speaks a foreign language, you have most likely witnessed this. The speaker will start using their mother tongue. The interpreter will start explaining after a few seconds when their audio starts to fade a little. The character's authenticity, tone, and dramatic effect are maintained by maintaining the ability to hear the original native language.
- **Lip-Sync Mimicry:** You have probably seen this when watching old kung fu movies where the original Chinese dialogue has been replaced with English or any other language. The new voice-over is designed to appear as though the performer was speaking that language in the first place, and the original audio track is not audible.
- **Looping:** This is an expensive and time-consuming procedure that is usually reserved for high-budget feature films. It requires Automatic Dialogue Replacement (ADR) equipment. It basically involves looping short phrases of narration at a time. A machine assists in matching the timecode for the original language with the new audio track in effort to have it be completely seamless and synchronized.
- **Lock-to-Picture Recording:** This is a less costly method that is comparable to looping but does not require all of the same tools. As they translate, a professional voice actor will watch the video and try to follow both auditory and visual signals. In this manner, by focusing on rhythm, intonation, etc., they may accurately perform the scene while preserving its original integrity.

Need for the study

There may be a considerable variation in acoustic characteristics of voice in male mimicry artists. As the mimicry artist use their voice for hours in a day can be classified under Level II – professional voice users. However, some mimicry artists suffer voice problems due to excessive demand of voice at certain situations. As there is a lack of study regarding their voice characteristics of mimicry artists, thus the current study is carried out to show the voice characteristics in male mimicry artists.

Aim of the Study

To analyses voice characteristics in male mimicry artists.

To compare the voice characteristics of male mimicry artists and normal subjects.

Hypothesis

- There will be significant difference in the perceptual aspects between the groups Experimental Group and Control Group
- There will be significant difference in the acoustical voice characteristics between the groups Experimental Group and Control Group

As mimicry artists use their voice in their profession several hours in a day, these professionals use their voice more frequent as compare to normal. Thus, there will be significant difference in both the groups.

Review of Literature

The word "mimicry" originated in around 19-teens to 1920s. It is a slang word from "doubling" that is, "make a copy or duplicate".

The most popular use of the term "mimicry" is "revoicing," which is the process of substituting the voices of actors on film with those of other actors speaking a foreign language.

Based upon the language, mimicry is characterized into two categories:

- Mimicry as an intralingual self-translation
- Mimicry as an interlingual translation

The intralingual self-translation is in which the mimicry voices usually occurring within the same language. The authorial mimicry is the one where the actors' voices dubbed with the same actors' voice is one kind of intralingual self-translation, or with the dubbers' whose voice is similar to the original speaker is another sort of intralingual self-translation.

Conversations that are translated between languages to help the task be completed in nations with different customs and languages.

Automated dialogue replacement (ADR) The practice of having the original actor re-record dialogue after filming in order to enhance audio quality or reflect changes in dialogue is called automated dialogue replacement (ADR) (also known as "looping" or a "looping session"). The technique is simply referred to as "mimicry" in India, but it is also known as "post-synchronization" or "post-sync" in the UK.

In the past, when an actor's singing voice was inadequate, mimicry was mostly used in musicals. In nations where viewers do not speak the same language as the actors in the original production, mimicry makes it possible to screen audiovisual content for a large audience. The local language of a foreign market is frequently used to dub movies, videos, and occasionally video games. In Canada and France, a different approach to imitation known as "rythmo band" (sometimes termed "lip-sync band") has long been employed. It can be utilized to supplement the conventional ADR approach and gives the actors, directors, and technicians a more detailed instruction.

Israeli technology business Video Dubber created an automated mimicry software as a service (SaaS) platform that uses digital voices to automatically mimic video material in more than 40 languages. In July 2015, it became the first to use this technology to dub an entire TV channel for a Spanish cable operator.

A specialized piece of software created by imitation company Media Movers, Inc. may automatically sync ADR/dubbed recordings with preset algorithms.

Many people in society place a high value on vocal health. Advancement in the workplace can be hampered by even short-term vocal issues. A person's quality of life may be negatively impacted by psychological effects and the inability to work due to severe or more chronic vocal problems.

The phrase "professional voice user" will be arbitrarily restricted to performers—those who use their voices frequently for artistic purposes. Professional voice users, such as singers, actors, broadcasters, sportscasters, teachers, clergy, receptionists, salespeople, lawyers, medical transcriptionists, and telephone operators, use their voices in a variety of contexts and for a variety of purposes.

Mimicry artists have particular vocal requirements that call for efficient use of loudness, pitch control, and endurance. During rehearsal and performance, miming artists put greater strain on their voices than they would in casual speech. They may have to speak and sing several times a week, depending on the conversation and emotions in an audiovisual, which can put a lot of strain on their vocal mechanism. Performances are possible above and above the demanding voice burden. Compared to non-vocal performers, even imitation artists are more susceptible to laryngeal disorders. In addition to having long-term effects, vocal injury

might force imitation artists to quit their jobs or face additional harm. Therefore, vocal health is crucial for mimicry performers. Research on the prevalence of vocal damage in imitation artists is quite limited.

Sri Lakshmi (2004) analyzed acoustic parameters of voice in trained and untrained actors and singers. There were 10 trained singers, 10 untrained singers, 10 trained actors and 10 untrained actors. Analysis was done using MDVP and exspirograph. They found that experienced and untrained professionals differed in amplitude perturbation quotient, shimmer percentage, pitch perturbation quotient, and soft phonation index, and that actors reported more vocal strain.

Namita Joshi, S Bhushan Jirgale (2004) in a study investigated the acoustical and perceptual analysis of voice projection in Marathi speaking actors. Exploring the characteristics of actor's voice is been the interest of the researchers in last two decades. Research on professional voice users in India is mostly concentrated on singers, teachers, radio jockeys etc. In India, the majority of research on professional voice users focuses on radio hosts, teachers, singers, and others. Two areas that require further research are identified by a literature search. mainly explaining how to perceive an actor's voice (speaking voice) and relate its acoustic characteristics. It is necessary to conduct research to determine whether the actors' methods of projecting their voices in Indian contexts are unique. Finding a correlation between the acoustic and perceptual characteristics for voice projection in actors and non-actors at three loudness levels is the secondary goal of the study that follows.

Participants in the study were 18 actors and 18 non-actors between the ages of 19 and 60. LTAS (Dr. Speech, Real Analysis-Tiger Electronics, Version 5) was used to analyze the frequency-intensity properties of their digitally recorded speech. The outcome demonstrated that, at the stage performance level, actors and non-actors differ significantly ($P < 0.01$). At 3–4 kHz, a dramatic decline in the spectral slope pattern was observed in actors with higher energy concentration. Only the average f_0 at stage performance level showed a moderate correlation with perceptual characteristics. They came to the conclusion that, in accordance with acoustic characteristics at the stage performance level, actors are more effective than non-actors at perceptually projecting their voices.

Suely Master, Marco Guzman, *et al.* (2010) have done an electroglottographic Analysis of Actresses and Non-actresses' Voices in Different Levels of Intensity. Previous studies with long-term aver-

age spectrum (LTAS) showed the importance of the glottal source for understanding the projected voices of actresses. The contribution of the glottal source to the projected voice was examined in this study using electroglottographic (EGG) analysis, which compared the voices of actresses and non-actresses at several intensities. 30 non-actresses and 30 actresses used loud, moderate, and habitual intensities of sustained vowels. Contact quotient (CQ), closing quotient (QCQ), and opening quotient (QOQ) were the EGG variables. The fundamental frequency (F0) and sound pressure level (SPL) were additional variables. They used a KayPENTAX EGG. A general linear model was used to input the variables. All SPL levels were noticeably higher for actresses, and both groups' SPLs increased dramatically when they transitioned from normal to moderate and then to loud. EGG quotients did not significantly differ across groups. Only the F0 and CQ values for both groups showed significant differences.

Despite finding no differences in the EGG analysis, they came to the conclusion that SPL was considerably greater among actresses across all intensity levels. In contrast to earlier LTAS investigations, the glottal source's seeming modest contribution to actresses' reportedly projected voices may be due to a higher subglottal pressure or possibly a bigger vocal tract contribution in SPL. By rising the cost in terms of higher vocal fold collision and thus more impact stress, the results of this study indicate that trained subjects did not significantly create a higher SPL than untrained persons. In order to assess the correlation between physiological findings and the acoustic and EGG data, future studies should investigate the differences between trained and non-trained voices using aerodynamic measurements. Additionally, for both EGG and LTAS analysis, future research should take into account both running speech and sustained vowel vocal tasks.

Evelien D'haeseleer, Iris Meerschman., *et al.* (2016), investigated on the Vocal Quality in Theater Actors. The purpose of this study was to investigate vocal quality, vocal complaints, and risk factors for developing voice disorders in theatre actors. Second, objective and subjective vocal quality were compared before and after a theatrical performance in order to examine the effect of a single vocal performance on the voice. The software Praat was used to analyze speech samples of 26 theater actors (15 men, 11 women, mean age 41.9 years) that were captured both before and after a one-and-a-half-hour performance. Continuous speech and sustained phonation were combined to create the speech samples. The Acoustic Voice Quality Index was computed for every speech sample. Utilizing the GRBASI scale, auditory perception assessments were conducted. Vocal symptoms and contributing factors were enumer-

ated using questionnaires. A mean Acoustic Voice Quality Index (AVQI) of 3.48, which corresponds to mild dysphonia, was found using acoustic investigation. Following a performance, half of the theater actors said they experienced vocal issues occasionally or frequently. Poor vocal hygiene habits and verbally violent behavior were shown to be quite prevalent in the questionnaire. Following a theatrical performance, objective vocal quality as determined by the AVQI remained unchanged. The vocal quality has slightly improved, according to the auditory perceptual assessment of the overall dysphonia grade. The study's findings demonstrated that theater performers had mild dysphonia, frequent vocal complaints, and inadequate vocal hygiene practices. The objective vocal quality was unaffected by a theatrical performance.

Mara Behlau, Fabiana Zamboz, Ana Cláudia Guerrieri, Nelson Roy (2010), have done an epidemiological study and compared the frequency and adverse effects of voice disorders in Brazilian teachers and non-teachers. 3,265 participants—1,651 teachers and 1,614 non-teachers—were recruited from all 27 Brazilian states and given a standardized interview/questionnaire. Findings: Teachers reported a present voice issue at a rate of 11.6%, whereas non-teachers reported a prevalence of 7.5%. Thirty-five percent of non-teachers and sixty-three percent of teachers said they have had a voice issue at some point in their lives. Compared to non-teachers, teachers reported greater current (3.7) and former (3.6) voice issues, and they were more likely to connect these symptoms to their job. Teachers reported more voice-related absenteeism over the past year (12.1% of teachers missed 5 or more days of work vs. 2.4% of non-teachers; $P (0.001)$); (2) more teachers than non-teachers reported that their voice limited their ability to do certain tasks within their current occupation (29.9% of teachers vs. 5.4% of non-teachers; $P (0.001)$); and (3) this large epidemiological study comparing teachers and non-teachers confirms that teaching at school is a high-risk occupation for voice disorders. Due to their voice, many Brazilian teachers are forced to think about changing careers in the future, and these voice disorders also lead to decreased job performance and attendance. Successions of fleeting sounds are used when speaking. A longer, more sustained voice production is required for singing.

Evelien D'haeseleer, Iris Meerschman., *et al.* (2016), investigated on the Vocal Quality in Theater Actors. Investigating vocal quality, vocal complaints, and risk factors for voice disorders among theater actors was the aim of this study. Second, objective and subjective vocal quality were compared before and after a theatrical performance in order to examine the effect of a single vocal performance on the voice. The software Praat was used to analyze

speech samples of 26 theater players (15 men, 11 women, with an average age of 41.9 years) that were recorded both before and after a one-and-a-half-hour performance. Continuous speech and sustained phonation were combined to create the speech samples. The Acoustic Voice Quality Index was computed for every speech sample. Utilizing the GRBASI scale, auditory perception assessments were conducted. Vocal symptoms and contributing factors were enumerated using questionnaires. A mean Acoustic Voice Quality Index (AVQI) of 3.48, which corresponds to mild dysphonia, was found using acoustic investigation. Following a performance, half of the theater actors said they experienced vocal issues occasionally or frequently. Poor vocal hygiene habits and a significant prevalence of vocally violent behavior were found in the questionnaire. Following a theatrical performance, objective vocal quality as determined by the AVQI remained unchanged. The vocal quality has slightly improved, according to the auditory perceptual assessment of the overall dysphonia grade. The study's findings demonstrated that theater performers had mild dysphonia, frequent vocal complaints, and inadequate vocal hygiene practices. The objective vocal quality was unaffected by a theatrical performance.

According to Prada E, Roberts A, Cohen S., *et al.* (2012) According to a cross-sectional survey, voice issues are more common among teachers and cause them to miss workdays and engage in less activities. Clarifying some of the obstacles to caring that educators can encounter was the aim of this study. From a list of 95,364 Kindergarten–12 instructors in North Carolina, 1,000 subjects were chosen at random. A 43-item survey with five-point Likert scales covering topics like demographics, personal voice health, and barriers to care was mailed to teachers. The chi-square test was used for statistical analysis once the results were tallied. 237 of the 243 responses that were received were complete. At the moment, twenty-two percent were hoarse. At one time, fifty-eight percent had been hoarse. 23 percent have been absent from work due to hoarseness. Less than half thought a doctor could help or knew about voice therapy. Thirty percent thought hoarseness was typical in the classroom.

According to Dhanshree R. Gunjawate, Venkataraja U. Aithal., *et al.* (2016) Yakshagana, Singing and dancing are two common forms of Karnataka, India's traditional folk art. When it comes to singing and directing the show, the Yakshagana singer or Bhagavata is crucial. Using the Singing Voice Handicap Index-10 (SVHI-10), the current study attempts to evaluate the vocal health of these singers and compare those who report voice problems with those who do not. Using SVHI-10 in Kannada and a demographic questionnaire, a cross-sectional study was conducted on 26 Bhagavata. Of the

Bhagavata, 38% said they had voice issues that hindered their singing, and their overall SVHI-10 score was greater (31.2 ± 5.7) than that of those who said they had no issues (16.81 ± 9.56). The emotional domain and overall scores showed a statistically significant difference between the groups. The current study offers preliminary data regarding Bhagavata's voice handicap. On the SVHI-10, the singers who reported having vocal issues performed better. For Yakshagana singers, having a healthy singing voice is crucial, and issues with it can significantly affect their performance and means of support. Therefore, the current study's findings suggest that a more thorough understanding of these singers' voice issues and their effects is necessary, as is education regarding voice care.

Usha Devadas, Navya Jose, Dhanshree Gunjawate (2015) aimed to investigate the Prevalence and Influencing Risk Factors of Voice Problems in Mar Thoma Priests in Kerala. There were 270 Mar Thoma priests in the study group, ranging in experience from 1 to 35 years. Data was gathered using a self-reported questionnaire. It was discovered that Mar Thoma priests had a higher prevalence of vocal issues during their careers (47.8%) and years (25.2%), with 17.8% of them experiencing frequent voice issues. Priests who reported frequent voice issues were found to be significantly more likely to have asthma, allergies, and a tendency to clear their throats. Priests who experienced frequent voice issues missed work at a significantly higher rate. The study's findings offer important first insights into the frequency of voice issues and related risk factors among Mar Thoma priests. However, further research is needed to fully comprehend the kinds of speech issues these priests have and how they affect their quality of life.

Katie L. Buckley, Paul D. O'Halloran, Jennifer M. Oates (2014) have done an Exploratory Pilot Study of Football Coaches to explore the occupational voice use and vocal health of elite football coaches. We also looked into each coach's experiences with vocal issues and symptoms. Twelve professional football coaches from Australia took part in a mixed-methods study. Semi-structured interviews, a voice symptom questionnaire (Voice Capabilities Questionnaire), and an acoustic voice measurement device (Ambulatory Phonation Monitor) were used to gather data. Heavy verbal loads for coaches during player training were suggested by acoustic measures. Voice problems were reported by every subject. They also indicated that their voices were affected by the way their workweek was organized, the duties they had to complete at work, and the demands placed on them vocally. This study shows that sports coaches' vocal health may be adversely affected by occupational vocal demands. Considering coaches' high voice loads during coaching duties and

their reported poor occupational vocal health experiences, this is especially crucial. Coaches’ vocal performance and health may also be impacted by their lack of knowledge about vocal health management and voice usage.

Methodology

The purpose of the current study is to analyze voice characteristics of mimicry artist and to compare the voice characteristics of the mimicry artist group with normal group.

Aim of the Study

- To analyses voice characteristics in male mimicry artists.
- To compare the voice characteristics of male mimicry artists and normal subjects.

Subjects

The Subjects for this study were divided into two groups.

- **Group A:** Consists of 30 Male mimicry artists (age range of 30 -40 years)
- **Group B:** Consists of 30 Normal Subjects (age range of 30 -40 years).

	Experimental Group	Control group
Groups	A	B
No. of Subjects	30	30
Gender	Males	Males
Age	30-40 years	30-40 years

Table a

Selection criteria

The Subjects selection criteria.

Group A

- All subjects had an experience of 10 -15 years.
- All subjects have a minimum 5 hours to 8 hours of participation in voice mimicry.
- The Participant should not have any other medical problems.
- May or may not exposure to toxic fumes and not habituated to tobacco.

Group B (Normal group) Subjects selection criteria

- No history of any speech, hearing and other medical problems.
- No prolonged use of voice.
- All have perceptually normal voice.
- May or may not exposure to toxic fumes and not habituated to tobacco.

Source of subjects

Professional mimicry artists were selected for the study from various mimicry studios in Hyderabad and Secunderabad.

Material

- Questionnaire for Voice Analysis (JAIISH, Vol. 30, 2011).
- Voice handicapped index for perceptual analysis of voice.
- PRAAT software for acoustical voice analysis.

Instrumentation

- A hand-held portable miniature unidirectional electret condenser type of microphone named Ahuja UTP 30 Microphone is used for recoding voice samples.
- The unidirectional electret condenser microphone is then connected to Dell Laptop (with Intel i3 processor) for voice sample recording.
- The acoustical assessment is done by PRAAT Voice Analysis Software (Version 5.4.08).

Procedure

The subjects were given a Questionnaire for Voice Analysis which consists of thirty-six questions in which first twelve are on general health and life style, next fifteen questions are on present voice characteristics, next three questions were related to emotional impact, and next six questions are on communication in daily situations.

The subjects were instructed to read the questions and answer them accordingly, and if they did not understand any questions the examiner explained those questions to them. Extra space was given to indicate any other difficulties. The subjects were also instructed to be truthful and give correct responses. They were also informed that the information provided will be kept confidential and will be used only for the purpose of present study. The subjects signed a consent form before participating in the research and were duly explained about the purpose of research.

Recording

Both the group Subjects such as of mimicry artist (Group A) and normal Subjects (Group B) voice samples was recorded using dell laptop in combination with an miniature unidirectional electret condenser type of microphone named Ahuja UTP 30 Microphone held at 6 inches from Subjects mouth and the samples are saved in wav format.

The Subjects were asked to

- Take a deep breath and phonate /a/ for as long as possible.
- Take a deep breath and phonate /i/ for as long as possible.
- Take a deep breath and phonate /u/ for as long as possible

Recordings for experimental group and control group were done in a relatively quiet environment and in a single sitting. Three samples for each sustained phonation such as /a/, /i/, /u/ were recorded and the best of the three sample for each sustained phonation was taken into consideration and was analyzed for the purpose of voice analysis. The phonation samples of both the groups recorded were analyzed in PRAAT (version 5.3.30) software. The first and the last 2 seconds were ignored from the samples and the segment for analysis was selected from the steady center portion.

- **Recording settings:** Sampling frequency: 44100 Hz
- **Analysis settings:** Pitch range: 75-500 Hz
- **Analysis method:** Autocorrelation
- **Intensity range:** 50-100Db
- **Averaging method:** Mean energy.

Vocal assessment

The phonation samples of both groups have been fed to the praat software using Dell Laptop (Pentium III Sound card with i3processor) and the following measures were calculated using Praat (Version 5.4.08) software.

- **Habitual Fo (Hz):** The pitch range used by an individual or habitual pitch level, which is variable according to the individual and circumstances.
- **Jitter (%):** Varying pitch in the voice or pitch variation in a short-term speech signal.
- **Shimmer (%):** Variation in intensity in voice or in a short-term speech signal.
- Mean Fundamental Frequency (Mean Fo) (Hz)
- **SD Fo (Hz):** It is the variation on the target fundamental frequency of the production.
- S/Z ratio
- Maximum Phonation Duration (in seconds).

Statistical analysis

Graphs were drawn for the Questionnaire for Voice Analysis of mimicry artists based on the response elicited from the mimicry artist's subjects Group A. The statistical software package was used.

- Acoustic data: All the six parameters that are selected for analysis are obtained with the help of Praat Software. The Parameters that are obtained are tabulated separately for

the sample's /a/, /i/, /u/ and for both the Groups A (Mimicry artists) & Group B (Normal). Initially mean and standard deviation was calculated for each component of the acoustic data for /a/, /i/, /u/. To note the significance of the mean difference between parameters of both groups, independent t test was used.

Results and Discussion

Voice is the element of speech that provides the speaker with the vibratory signal upon which speech is carried, today the production of voice is viewed as a powerful communication tool and an artistic medium. In order to understand the voice chrematistic of Mimicry artist the current study carried out on Voice Analysis of Male Mimicry Artist. The total number of subjects participated in the study are 60. In this 30 are Male Mimicry artist with the age range thirty to forty years and thirty Normal subjects.

The voice characteristic of Mimicry artist has been studied in two accepts.

- Subjective Analysis
- Objective Analysis

In Subjective analysis

Questionnaire for voice analysis on male mimicry artist

Questionnaire was administered for Mimicry Artist to obtain perception of voice by the subjects themselves. The responses for the questions elicited by the subjects were drawn on graph accordingly separately for each of the four sub groups in the questionnaire such as general health & life style, present voice characteristics, emotional impact, communication in daily life.

The responses were yes, no and sometimes. Depending upon the response obtained from the Group A (Male Mimicry Artist) the graphs were drawn.

It is noted from the above results that more than 70% of the Male Mimicry Artist have pain, fatigue, dryness and change in voice at the end of the day. Most of them reported of mouth breathing. This may be due to the excessive use of their voice for a long period of time and due to prolonged duration without breaks. They also increase their loudness levels as per as there need, which will affect their voice leading to fatigue, pain, dryness etc.

From the above tables general health and life style, present voice characteristics, emotional impact, communication in daily life. Interprets that more than 70% of the Mimicry Artist have problems with their voice.

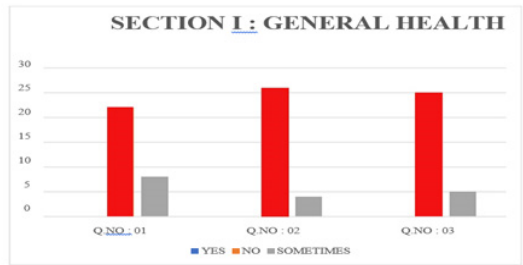


Figure 1: Responses from Male Mimicry Artist in terms of yes/no/sometimes regarding general health questions from the Questionnaire for Voice Analysis.

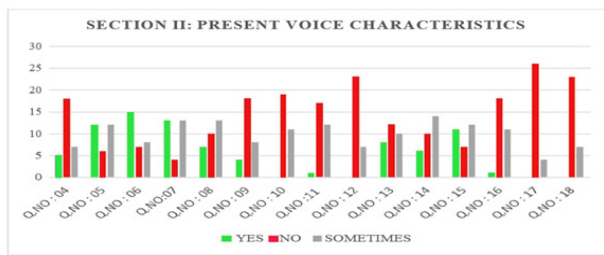


Figure 2: Responses from Male Mimicry Artist in terms of yes/no/sometimes for present voice characteristics from the Questionnaire for Voice Analysis (Appendix-I).

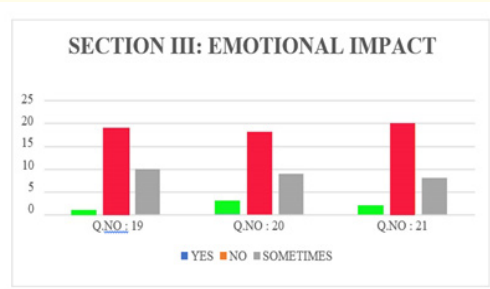


Figure 3: Responses from Mimicry Artist in terms of yes/no/sometimes about Emotional impact from the Questionnaire for Voice Analysis (Appendix -I).

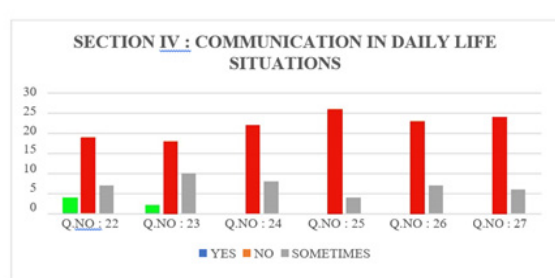


Figure 4: Responses from Mimicry Artist in terms of yes/no/sometimes for Communication in daily life situations from the Questionnaire for Voice Analysis (Appendix - I).

According to Salem, NC, at the Centre for voice disorders also found that level I and II professional voice users may suffer vocal emergencies like respiratory infection or stress related issues.

Verddini and Ramig (2001) investigated prevalence of voice problems in professionals and identified that teacher, singer, counsellor, social worker, lawyer and clergy consistently emerges as the common occupations most likely to seek otorhinolaryngological evaluation for a voice problem.

Thus, the present study shows that the mimicry artist voice characteristic which reveals problem based on the four accepts that is health & life style, present voice characteristics, emotional impact, communication in daily life. After taking the case history, later voice samples were analyzed objectively and subjectively by using voice handicapped index (VHI).

The results and discussion of the present study is explained in the following sections.

- There will be significant difference in the perceptual aspects between the groups i.e. Experimental Group and Control Group.
- There will be significant difference in the acoustical voice characteristics between the groups i.e. Experimental Group and Control Group.

Hypothesis

There will be significant difference in the perceptual aspects between the groups i.e. Male Mimicry Artist and Normal Subjects.

The perceptual analysis is done by voice handicapped index. Which is a 30-item self- administered questionnaire that describe the individual’s voice- on three subscales, which covers the areas of functional, emotional, and physical aspects of voice disorders. Statistical analysis was done to show the overall comparison to know the values within the groups i.e. Mimicry Artist (30 males) and Normal subjects (30 male), which shows improvement in the scoring. Table 1 shows the values of mean and standard deviation values of physical, functional and emotional scales. According to voice handicapped index (VHI) scores there are criteria for mild, moderate and severe. If the scoring is of >33 then it will be considered as mild, >44 it will be considered as moderate and >61 it will be considered as severe.

In the above table 1, figure 5 we can see the Mimicry Artist p -scale mean and standard deviation value are 8.566and 2.254 and Normal subject p -scale mean and standard deviation value are 6.733 and1.574 and Mimicry Artist f- scale mean value and stan-

		Mean	S.D	T	P
P scale	Mimicry	8.566	2.254		
	Normal	6.733	1.574	3.652	0.001
F scale	Mimicry	22.966	4.222		
	Normal	19.066	3.050	4.101	0
E scale	Mimicry	6.066	1.928		
	Normal	6.133	1.224	-0.16	0.874

Table 1: T-test results for voice handicapped index scales (VHI) of Mimicry Artist and Normal Subjects.

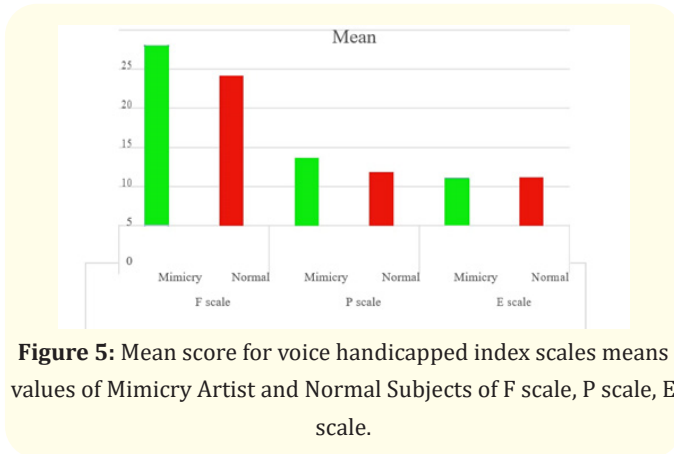


Figure 5: Mean score for voice handicapped index scales means values of Mimicry Artist and Normal Subjects of F scale, P scale, E scale.

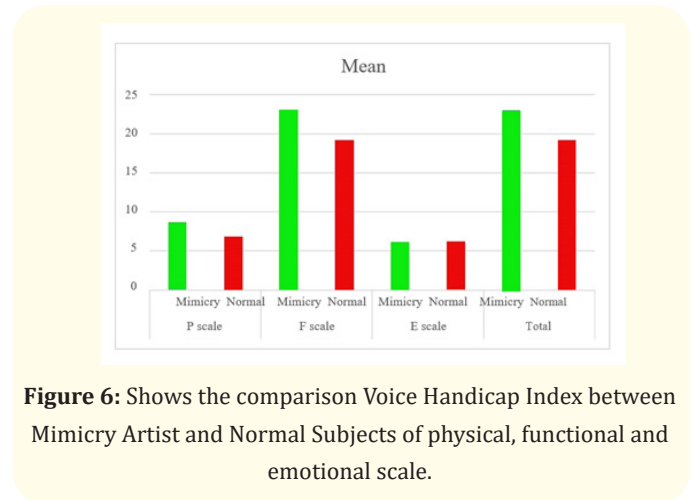


Figure 6: Shows the comparison Voice Handicap Index between Mimicry Artist and Normal Subjects of physical, functional and emotional scale.

Standard deviation values are 22.966 and 4.222. Normal subjects f-scale mean and standard deviation values are 19.066, 3.050 and Mimicry artist e-scale mean and standard deviation values are 6.066, 1.928. Normal subjects e-scale mean and standard deviation values are 6.133, 1.224. Thus, the difference between Mimicry Artist and Normal subjects in p-scale is 0.001 which is < 0.05 thus it shows as there is significant difference. The difference between f-scale based on Mimicry Artist and Normal subjects is 0.00 which is < 0.05 thus f-scale shows significant difference. While e-scale difference is 0.874. Thus, there is no any significant difference in e-scale.

Table 2: Overall mean, standard deviation, t value and significance value (paired test).

VHI scales overall	Mean	Std. Deviation	T value	Sig
Mimicry Artist	22.966	4.222	4.101	0.000
Normal	19.066	3.050		

From the above table 2, figure 6 shows Overall values based on Mimicry Artist and Normal Subjects from the table 1 shows total mean value Mimicry Artist is 22.966 and standard deviation is 4.222 and mean values of Normal subjects is 19.066 and standard deviation 3.050. It shows as 0.00 difference which is less than 0.05. Thus, overall, it shows the significant difference.

Results and Discussion

Figure 6 shows the comparison in Mimicry Artist and normal subjects responses based on physical, emotional and functional scales. Normal's results shows better responses comparative to Mimicry Artist. And with the statistical analysis it shows that there is the significant difference of 0.00 overall (which is < 0.05). Hence the hypothesis proved "There will be significant difference in the perceptual aspects between the groups i.e. Experimental Group and Control Group is proved."

Hypothesis

There will be significant difference in the acoustical voice characteristics between the groups i.e. Male Mimicry Artist and Normal Subject.

The voice samples of all these individuals were subjected to analysis using PRAAT. The recordings were done for phonation of vowels /a/, /i/ and /u/. The acoustic measurements were obtained for parameters including Habitual pitch, Mean F0, Jitter, Shimmer, Maximum Phonation duration, HNR and S/Z. The mean and standard deviation of the various acoustic parameters for the voice sample collected in phonation is given in the following tables.

The results of the present study are discussed comparing: Mimicry artiste and Normal subject.

Table 3: Comparison of Habitual pitch between Mimicry Artist and Normal Subjects of overall mean, standard deviation, t value and significance value.

		Mean	SD	T	P
Habitual	Mimicry	123.694	24.954		
	Normal	139.165	21.79	-2.558	0.013

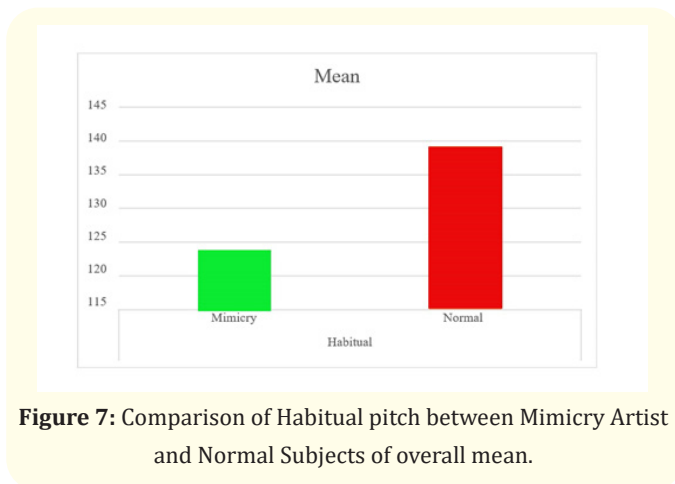


Figure 7: Comparison of Habitual pitch between Mimicry Artist and Normal Subjects of overall mean.

In Mimicry Artist that is at Habitual Pith the Mean value is 123.69(SD -24.95) and Normal Mean value is 139.16(SD-21.79). On comparing Habitual Pitch of Mimicry Artist and Normal Subjects the Mean value of Mimicry Artist is slightly reduced. Habitual Pitch, T= -2.558 (P < 0.005). As the results suggest that the Mimicry Artists have low Habitual Pitch when compared with normal individuals. As the Mimicry Artist are habituated for short duration of a takes frequently. Thus, there Rate of speech is reduced.

Table 4: T-test result for Mean Fo in Mimicry Artist and Normal Subjects for Vowel /a/, /i/, /u/.

Mean Fo	Mean	Std. Deviation	T	Sig	
/a/	Mimicry Artist	123.551	36.38334		
	Normal	127.3509	26.70378	0.46	0.646
/i/	Mimicry Artist	132.023	32.32817	--	--
	Normal	133.0907	29.93653	-0.133	0.895
/u/	Mimicry Artist	135.4181	34.00774	--	--
	Normal	137.0938	29.10726	-0.205	0.838

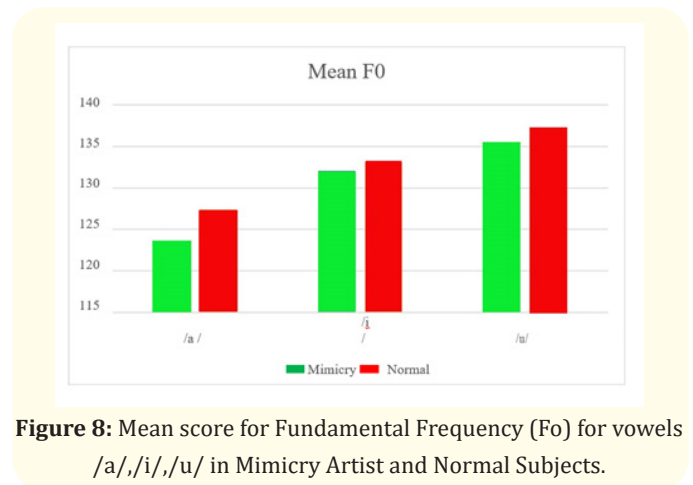


Figure 8: Mean score for Fundamental Frequency (Fo) for vowels /a/, /i/, /u/ in Mimicry Artist and Normal Subjects.

From the above figure 8, shows the average mean Fo. An independent sample t test was used to determine the significance between the two groups. The average Fo mean of Mimicry artist is 123.551, 132.023, 135.4181 and Normal subjects is 127.350, 133.090, 137.093 for /a/, /i/ and /u/ respectively and the p-values are 0.646, 0.895 and 0.838 which is > 0.05, hence there is no significant difference between Fo of both the groups for all the three vowels.

In this above table 4 and figure 8 shows the Mean Fo value in Normal subjects for vowel /a/ is 127.35(SD- 26.70) and for Mimicry Artist the Mean value is 123.55(SD-36.38). the Mean Fo value in Normal subjects for vowel /i/ is 133.09(SD- 29.93) and for Mimicry Artist the Mean value is 132.02(SD- 32.32). The Mean Fo value in Normal subjects for vowel /u/ is 137.09(SD- 29.10) for Mimicry Artist the Mean value is 135.41(SD- 34.00) respectively on comparing the Fo value for Normal and Mimicry Artist, the Mean value for Mimicry Artist is slightly reduced. p-values are 0.646, 0.895 and 0.838 which is P > 0.05, hence there is no significant difference between Fo of both the groups for all the three vowels.

The results suggest that the Mimicry Artists are able to alter her perceived vocal tract length. The same results were seen in the Talal Bin Amin, Pina Marziliano, et al. in 2015. investigated voice and this can change their voice identify. voice quality of various people which differ in age, gender is analyzed. Acoustic parameters were measured and analyzed including Fo. The mean fundamental frequency depends largely on the size of vocal fold. In general men have lower values of mean Fo compared to women. It can be seen that voice artist is flexible with mean Fo and can vary it with in normal range (132Hz to 266 Hz). These results suggest that the voice over artist is able to alter their perceived vocal tract length which impersonating different ages, gender and voice qualities.

Table 5: T-test result for Jitter in Mimicry Artist and Normal Subjects For Vowel /a/, /i/, /u/.

Jitter					
		Mean	Std. Deviation	T	Sig.
/a/	Mimicry Artist	0.4847	0.50811	0.993	0.325
	Normal	0.3892	0.13704		
/i/	Mimicry Artist	0.3417	0.28628	-0.793	0.431
	Normal	0.3863	0.1148		
/u/	Mimicry Artist	0.2548	0.0842	-3.951	0
	Normal	0.3727	0.14014		

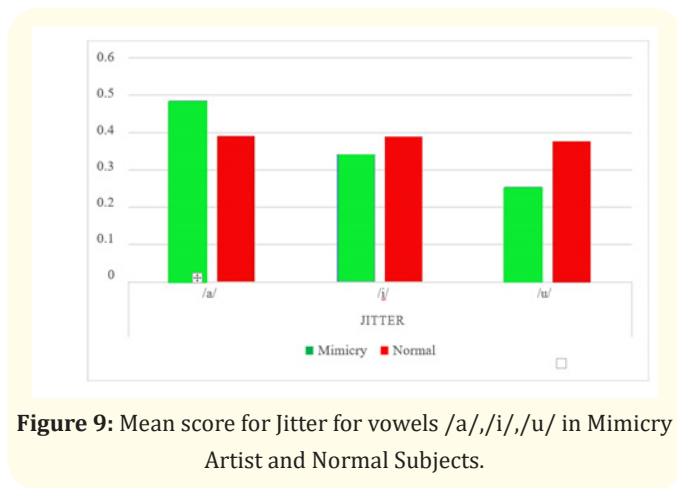


Figure 9: Mean score for Jitter for vowels /a/, /i/, /u/ in Mimicry Artist and Normal Subjects.

From the above figure 9, shows jitter the p-values are 0.325 and 0.431 for /a/ and /i/ showing no significant difference but for /u/ p-value is 0.000 which is <0.05 showing significant difference.

In this above table 5 and figure 9 shows the Jitter value in Normal subjects for vowel /a/ is 0.38(SD- 0.13) and for Mimicry Artist the Mean value is 0.48(SD- 0.50). The Jitter value in Normal subjects for vowel /i/ is 0.38(SD- 0.11) and for Mimicry Artist the Mean value is 0.34(SD- 0.28). The jitter value in Normal subjects for vowel /u/ is 0.37(SD- 0.14) for Mimicry Artist the Mean value is 0.25(SD- 0.08) respectively. On comparing the Jitter value for Normal and Mimicry Artist, showing no significant difference but for /u/ p-value is 0.000 which is <0.05 showing significant difference. The results suggest that the Mimicry Artists have emotions changes but the results were shown there is thirty percent of them show the pitch variation.

The same results were seen in Actors engaged in emotionally changed behaviours or acts in which emotions change very fast are expected to indulge in screaming, shouting, grooming, grunting and sobbing, depending on the theme of the play, which are usually considered vocally violent behaviours. These behaviours involve extremes in pitch and loudness variation, increase of muscular tension and explosion of air across the partially closed vocal folds [39].

Table 6: T-test result for Shimmer in Mimicry Artist and Normal Subjects For Vowel /a/, /i/, /u/.

Shimmer					
		Mean	SD	T	Sig.
/a/	Mimicry Artist	4.2845	3.3069	-0.183	0.856
	Normal	4.416	2.14874		
/i/	Mimicry Artist	2.1174	1.69763	-3.2246	0.002
	Normal	4.0743	2.83151		
/u/	Mimicry Artist	1.8379	1.27861	-4.553	0
	Normal	3.884	2.10314		

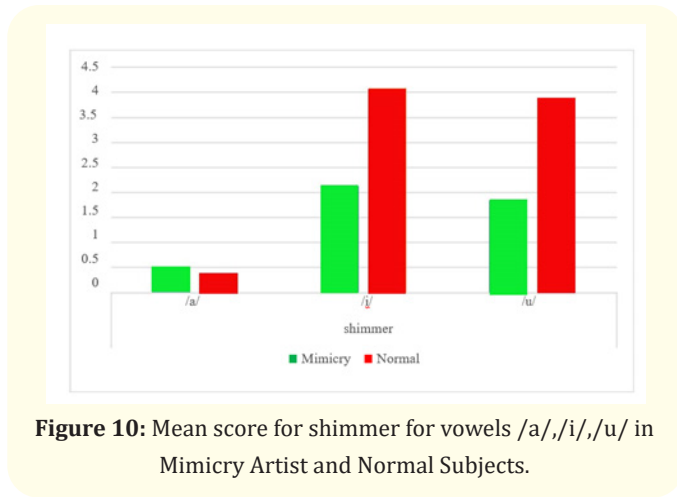


Figure 10: Mean score for shimmer for vowels /a/,/i/,/u/ in Mimicry Artist and Normal Subjects.

From the above figure 10, shows the p-values for shimmer are 0.856 for /a/ which shows no significant difference but p-value is 0.002 and 0.000 for /i/ and /u/ which is <0.05 showing significant difference.

From the above table 6 and figure 10 shows the shimmer value in Normal subjects for vowel /a/ is 4.41(SD- 2.14) and for Mimicry Artist the Mean value is 4.28(SD- 3.30). The shimmer value in Normal subjects for vowel /i/ is 4.07(SD- 2.83) and for Mimicry Artist the Mean value is 2.11(SD- 1.69). The shimmer value in Normal subjects for vowel /u/ is 3.88(SD- 2.10) for Mimicry Artist the Mean value is 1.83(SD- 1.27) respectively. On comparing the shimmer value for Normal and Mimicry Artist shows no significant difference but p-value is 0.002 and 0.000 for /i/ and /u/ which is <0.05 showing significant difference.

The results suggest that the Mimicry Artists have emotions, shouting, screaming changes based upon his act but the results were shown there is thirty percent of them show the loudness variation. The same results were seen in Actors engaged in emotionally changed behaviours or acts in which emotions change very fast are expected to indulge in screaming, shouting, grooming, grunting and sobbing, depending on the theme of the play, which are usually considered vocally violent behaviours. These behaviours involve extremes in pitch and loudness variation, increase of muscular tension and explosion of air across the partially closed vocal folds [39].

From the above figure 11, shows the HNR the p-values are 0.100 and /i/ which shows no significant difference but p-value is 0.001 and 0.001 for /a/ and /u/ which is <0.05 showing significant difference.

In this above table 7 figure 11 shows the Harmonic to Noise Ratio (HNR) value in Normal subjects for vowel /a/ is 19.62(SD- 4.95) and for Mimicry Artist the Mean value is 20.53(SD- 5.36). The Harmonic to Noise Ratio (HNR) value in Normal subjects for vowel /i/ is 22.43 (SD- 5.99) and for Mimicry Artist the Mean value is 24.84(SD- 5.12). The Harmonic to Noise Ratio (HNR) value in Normal subjects for vowel /u/ is 21.29(SD- 6.66) for Mimicry Artist the Mean value is 26.64(SD- 4.66) respectively. On comparing the Harmonic to Noise Ratio (HNR) value for Normal and Mimicry Artist shows no significant difference but p-value is 0.001 and 0.001 for /a/ and /u/ which is <0.05 showing significant difference.

Table 7: T-test result for Harmonic to Noise ratio (HNR)in Mimicry Artist and Normal Subjects For Vowel /a/,/i/,/u/.

		Mean	SD	T	Sig
/a/	Mimicry Artist	20.5346	5.36394	0.685	0.496
	Normal	19.622	4.95412		
/i/	Mimicry Artist	24.8402	5.12715	1.67	0.001
	Normal	22.4321	5.99728		
/u/	Mimicry Artist	26.6407	4.66273	3.60	0.001
	Normal	21.295	6.6673		

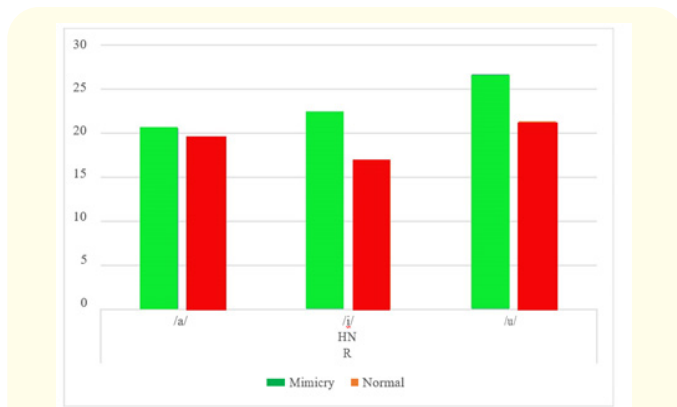


Figure 11: Shows Harmonic to Noise Ratio (HNR) for Mimicry artist and Normal Subjects for the production of /a/, /i/ and /u/.

These results of the present study correlating with the study done by Catherine., *et al.* (2010) investigated the production of clear voice in speech pathology students using acoustic and auditory perceptual analyses. The result of the study indicates that there are no differences in distribution of vocal clarity between student cohorts and the voice conditions. The graduating students' voices had significantly less jitter and shimmer than the voices of the beginning students. No significant differences in the acoustic measures were found between the two voice conditions. Clear voices had significantly higher harmonic-to-noise ratio (HNR) and lower jitter (%) and shimmer (%) than unclear voices.

Table 8: T-test result for Maximum Phonation Duration (MPD) in Mimicry Artist and Normal Subjects For Vowel /a/,/i/,/u/.

Maximum Phonation Duration (MPD)					
		Mean	SD	T	Sig
/a/	Mimicry Artist	16.5	5.86486	3.488	0.001
	Normal	11.8333	4.39501		
/i/	Mimicry Artist	17	6.37344	3.523	0.001
	Normal	12.1	4.17174		
/u/	Mimicry Artist	16.4333	5.01503	3.703	0
	Normal	12.1333	3.91049		

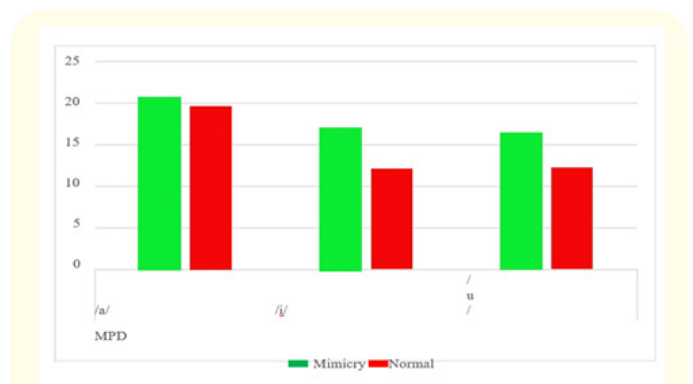


Figure 12: Shows Maximum Phonation Duration (MPD) for Mimicry artist and Normal Subjects for production of /a/, /i/ and /u/.

From the above figure 12, shows the Mean phonation time (MPT) the p-values is 0.001 for /a/,0.01 for /i/ and 0.000 for /u/ which is <0.05 showing significant difference.

In this above table 8 and figure 12 shows the Maximum Phonation Duration (MPD) value in Normal subjects for vowel /a/ is 11.83(SD- 4.39) and for Mimicry Artist the Mean value is 16.5(SD- 5.86). The Maximum Phonation Duration (MPD)value in Normal subjects for vowel /i/ is 12.1 (SD- 4.17) and for Mimicry Artist the Mean value is 17(SD- 6.37). The Maximum Phonation Duration (MPD)value in Normal subjects for vowel /u/ is 12.13(SD-3.91) for Mimicry Artist the Mean value is 16.43(SD- 5.01) respectively. On comparing the Maximum Phonation Duration (MPD)value for Normal and Mimicry Artist shows the p-values is 0.001 for /a/,0.01 for /i/ and 0.000 for /u/ which is <0.05 showing significant difference.

The results suggest that the Mimicry Artists have Maximum phonation then normal subjects that is high vital capacity because of their daily practices of exercises. There is contradicting study by [28] studied the aerodynamic and acoustic features of voice in stage actors and normal. The Maximum Phonation Duration (MPD), s/z ratio were measured. There was no significant difference between the groups i.e. it was found that stage actors were not using the speech system differently from the normal group.

From the above figure 13, shows that the S/Z ratio for the Mimicry Artist is slightly reduced (mean value is 0.835) on comparing to Normal Individual (mean value is 1.03). The results suggest that

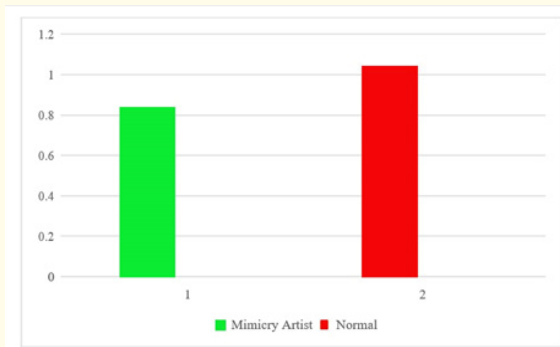


Figure 13: Shows s/z Ratio for a Mimicry artist and normal subjects.

the Mimicry Artists have low phonatory efficiency when compared with normal individuals. As the Mimicry Artist are habituated for short duration of a takes frequently. Thus, there phonation efficiency might be reduced.

There is contradicting study [28] studied the aerodynamic and acoustic features of voice in stage actors and Normal's. The Maximum Phonation Duration (MPD), S/Z ratio were measured. There was no significant difference between the groups i.e. it was found that stage actors were not using the speech system differently from the normal group.

From the figures 8, 9, 10, 11, 12 and 4.13 shows the acoustical parameters of Mimicry Artist when compared with Normal group shows that there are no Significant difference has been seen in Fo, Jitter, Shimmer, HNR, values of /a/ vowel between Mimicry Artist and Normal Subjects While MPD and Habitual Pitch there is a significant difference of 0.01 and 0.013(<0.5) has been seen in the Mimicry Artist and Normal subjects as Mimicry Artist complaints about Fatigue and Dehydration etc. which might leads to the MPD and Habitual Pitch Effected comparative to Normal's.

While in /i/ vowel there is a significant difference has been seen in Shimmer and MPD which is 0.02 and 0.01(<0.05), while in F0, Jitter and HNR values there is no significant difference has been seen. In /u/ Vowel, there is no Significant difference in F0 between Mimicry Artist and Normal, while In Jitter there is significant difference of 0.00, in Shimmer there is Significant difference of 0.00, In HNR significant difference of 0.01, and in MPD significant difference of 0.01 (<0.05). the S/Z ratio for the Mimicry Artist is slightly reduced (mean value is 0.835) on comparing to Normal Individual (mean value is 1.03). Thus, the Hypothesis there will be significant difference in the acoustical voice characteristics between the groups has been proved.

Summary and Conclusions

Sataloff, 1991 indicated that if one is possessed by a drive towards artistic vocal expression which is the foundation of one's endeavors, he/she develops any sort of a problem in the vocal mechanism, and if the problem develops at a pivotal or critical point in career development, leads to frustration and becomes a threatening condition for an established professional voice user who's financial well-being rests on the condition of his/her vocal mechanism.

A voice disorder may prevent a professional singer from performing or a business person from effectively managing his/her affairs. A person's vocal quality may influence the type of work the person does and conversely, the type of work a person does may influence the importance of avoiding voice difficulties and the degree of impairment that may result from voice disorder.

The actors use high levels of habitual energy to bring towards the surface a large range of strong emotions and communicate with high degree of sensitivity, awareness, concentrations which make them susceptible to functional voice difficulties. Many young actors who are in a struggling period do survival jobs in addition to the acting, may work as waiters/waitress, taxicab drivers, receptionists, part time teacher or baby sitter, tour guides, or sales executives. With this additional work they use their voice more than 8 hours in a day which strains their voice even more prone to develop voice problems. They usually show general physical fatigue, throat fatigue, tightness or constriction, strain/tension, a greater effort to produce and sustain voice, reduction in functional pitch range, and greater difficulty in producing higher pitches [37].

In this current study, 30 Mimicry Artist (Group A) were age and gendered matched with 30 Normal Subjects (no voice problem) (Group B) and divided into two groups. The Questionnaire for Voice Analysis on Mimicry Artist was given to Mimicry Artist group to report their voice symptoms and conditions then subjectively by using voice handicapped index (VHI). After taking the case history, later voice samples were analyzed. The subjects were made to phonate /a/, /i/, /u/ and the voice samples were recorded. The voice samples were then analyzed using Praat software and parameters were obtained.

The Questionnaire for Voice Analysis on Mimicry Artist (Appendix I) includes questions related to demographic data, general health and life style, present voice characteristics, emotional impact of voice in daily life, communication in daily life.

The perceptual analysis is done by voice handicapped index. Which are 30-item self-administered questionnaires that describe the individual's voice on three subscales, which cover the areas of functional, emotional, and physical aspects of voice disorders.

The acoustic parameters include Mean Fundamental frequency (Mean Fo) (Hz), Jitter (%), Shimmer (%), Harmonic to Noise Ratio (HNR), Maximum Phonation Duration (in seconds) and S/Z Ratio.

The study proves that Mimicry Artist do fall under the level I of professional voice users who suffer from moderate level of voice disorders and their vocal demands affect their quality of life in terms of breathy and hoarseness, the study also shows that not all parameters in acoustic analysis show abnormality. The features which differed from Normal's will help us to identify early voice deviations and help in choosing proper remedy for it.

Therefore, Mimicry Artist as a professional voice group should be considered for voice training and vocal hygiene programs.

Merits of the present study

- Provides an explanation of voice characteristics in Mimicry Artist.
- The study also provides information on how the voice characteristics in Mimicry Artist differ from those of Normal subjects.
- The outcome of the study will aid in assessment and management of voice disorders in Mimicry Artist.
- The outcome will also assist the Speech pathologists/voice pathologists in planning the Professional voice coaching program during the management.

Limitations of the study

- This study is conducted only on the male subjects.
- Study has been carried out on a very small group so it cannot be generalized.
- The advanced voice analysis could not be because of unavailability of equipment.

Implications for future research

- The study can be conducted in larger population.
- Additional voice parameters can be analyzed.
- The more advanced analysis can be used to find out minimal changes in acoustics in Mimicry Artist voice.
- The Mimicry Artist and other professional voice users in the level II group need to be compared.

- To compare vocal characteristics in Mimicry Artist with in the Gender.
- The difference in voice characteristics of different denominations of Mimicry Artist.
- To compare vocal characteristics in Mimicry Artist based on Experience.

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