

VOICE AND SPEECH CHARACTERISTICS IN RADIO JOCKEYS

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University of Mysore, Mysore

**ALL INDIA INSTITUTE OF SPEECH AND HEARING
NAIMISHAM CAMPUS, MANASAGANGOTRI
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MAY - 2004

Certificate

This is to certify that this dissertation entitled "**VOICE AND SPEECH CHARACTERISTICS OF RADIO JOCKEYS**" is bonafide work in part fulfillment for the degree of **Master of Science (Speech and Hearing)** of the student (**Register No. 02SH0007**).



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May, 2004

Certificate

This is to certify that this dissertation entitled "**VOICE AND SPEECH CHARACTERISTICS OF RADIO JOCKEYS**" has been prepared under my supervision and guidance. It is also certified that this dissertation has not been submitted earlier in any other university for the award of any diploma or degree.



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DECLARATION

This is to certify that this dissertation entitled "**VOICE AND SPEECH CHARACTERISTICS OF RADIO JOCKEYS**" is the result of my own study under the guidance of Dr. S.R. SAVITHRI, Reader and Head, Department of Speech-Language Sciences, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier in any other university for the award of any diploma or degree.

Mysore
May, 2004

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SISTER
'You are
The one I
Turn to
In my times of
Need
Your love and
Support
Are precious
Gifts
That I forever
CHERISH

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CHAPTER I

INTRODUCTION

"Nothing can surpass the ability of the voice for soulful expression of human experience "(http://www.texasvoicecenter.com/pro_care.html).

It's not a powerful instrument, this human voice, nor a technically perfect one. A trumpet can blow louder, a violin can play faster, an oboe can spin longer melodies. Still, it is unsurpassed in expressivity, depth and soulfulness of tone, truly the queen of instruments (Brodnitz, 1988). The one faculty that sets man apart from all living organisms- that makes him unique- is his ability to think and communicate in language. The one form of communication which man uses effectively in interpersonal relationships is speech. With it, he gives form to his in-most thoughts- his dreams, ambitions, sorrows and joys; without it, he is reduced to animal noises and empty gestures. In a real sense, speech is the key to human existence (Fisher, 1966).

Voice is an animate, subjective, living phenomenon. Despite its technical complexity, the mechanical production of vocal sound is inseparably associated with the psychology of the speaking or singing performance (Fields & Bender, 1950). Regarded as magical and mystical, in ancient times, today, the production of voice is viewed as a powerful communication and artistic tool. It serves as the melody of our speech and provides expression, feeling, intent, and mood to our articulated thoughts (Stemple, Glaze & Gerdeman, 1995).

Voice is one of the most important tools in human communication. Indeed, a well functioning voice is for most people, an indispensable apparatus in their everyday life. According to Stemple, Glaze & Gerdeman (1995), a large group of individuals are, by the very nature of their occupations, at greater risk of developing laryngeal pathologies than the general population. This group consists of people who are directly dependant on vocal communication for their livelihood. These people are classified as users of a "*professional*" voice. Dependency on their voices to function successfully in their occupations qualifies people as owners of a professional voice.

At the Lions Voice Clinic, University of Minnesota, Minneapolis, anyone who needs their voice in order to carry out their job is considered a *Professional Voice User*. Professional Voice Users are often considered "*Athletic*" voice users because their voice is more extensive and strenuous than that of non-professional voice users (<http://www.lionsvoiceclinic.umn.edu/page4.htm>).

The complex characteristics of human voice have been the object of a wide range of human interests, including scientific research. But most of the studies among professional voice users have been conducted on singers, actors, and teachers.

In the past, studies have been done on professional voice users. Brown, Rotham & Sapienza (2000) did acoustic and perceptual analysis to determine the effect of vocal training on professional singers when speaking and singing. Twenty professional singers and twenty non-singers were recorded while sustaining a vowel, reading the modified Rainbow Passage, and singing "America the Beautiful". Acoustic measures included fundamental frequency, duration, jitter%, shimmer%, noise-to-harmonics ratio, and presence or absence of both

vibrato and singers formant. Results indicated that whereas certain acoustic parameters differentiated singers from non-singers within sex, no consistently significant trends were found across males or females for either speaking or singing.

Kovai & Budanovac, (2002) did a study to investigate the difference in acoustic characteristics of voice between adolescent actors and non-actors. The experimental sample consisted of ten actresses and ten actors while controls included thirteen girls and fourteen boys. Phonation of /a/, spontaneous speaking and oral reading provided a set of acoustic variables (Fo, Jitter, Shimmer, speaking and reading ranges). T-test showed statistically significant difference between actresses and non-actresses in speaking range, reading Fo maximum, and reading range, whereas between actors and non-actors, difference was found only in reading range.

Neil, Worrall, Day & Hickson (2003) described the speech and voice characteristics of Broadcast Journalists. In their study, they found that professional newsreaders have superior voice quality, continuity, emphasis, phrasing, and overall performance.

Occupational voice health is becoming more important as more people rely on their voices for their work. A number of studies have identified certain occupational groups at increased risk of developing occupational voice disorders, namely, teachers, singers, and aerobics instructors (William, 2003).

Also, media plays an important role in each sphere of life. Advancement in technology in media has provided opportunity to a variety of professionals and there is an emerging need for usage of voice in a variety of ways. Radio Jockeys are a group of professional voice users

in the field of media, who use their voice as dynamically as singers, teachers, or actors. A Radio Jockey is basically someone who gets paid for playing his/her favorite tunes. But Radio Jockeys not only play music, they also chat, deliver news, weather or sports, or hold conversations with celebrities or call-in listeners (<http://www.princetonreview.com/dayInLife.asp?career=54>).

Although there is much literature about the voice of singers, teachers etc., there is none on Radio Jockeys. This information is essential for developing effective educational programs. Knowledge regarding Radio Jockeys' awareness of strategies to maintain vocal health is also lacking. As they are also professional voice users, they are at risk of vocal dysfunction. In this context, the present study was undertaken. It aimed at comparing the voice, speech and aerodynamic characteristics of Radio Jockeys with that of normal non-professional voice users. Specifically, various parameters of voice were determined. Fluency, phrasing, emphasis and modulation was analyzed and forced vital capacity was determined and compared with the normative data.

CHAPTER II
REVIEW OF LITERATURE

Who is considered a Professional Voice User? According to Stemple (1993), Professional Voice Users are those individuals who are directly dependant on vocal communication for their livelihood. If you rely on your voice for your profession, you are a professional voice user. This can include singers, actors, teachers, salespersons, clergymen, air traffic controllers, lawyers, doctors or anyone else who uses voice in work setting (http://hanoverspeech.com/voice_therapv.htm). Depending on the vocal usage, professional voice users have been classified into four levels, as given in Table 1 (www.sandiegovoice.org/professional.html).

Professional Voice Level	Description	Professional Needs
I	Elite vocal performer: Actor, singer, sportscaster, announcer	Slight vocal abnormality may be disabling
II	Professional voice user: Teacher, clergy, receptionist	Moderate vocal abnormality may affect job performance
III	Non-vocal performer: Businessman, physician, attorney	Severe vocal abnormality may affect job performance
IV	Non-vocal non-professional: Clerk, mechanic, construction worker	Vocal abnormality does not affect job performance

Table 1: Levels of Professional Voice Users.




Characteristics of Professional Voice Users

Professional voice users, especially those in the speaking profession, require certain qualities in their speech to be successful in their profession such as a good pitch range, rhythm and melody, fluency, phrasing, emphasis, modulation, and good expiratory air to sustain speech. All these parameters will be described and discussed.

Pitch Range

Pitch range is the difference between the highest and the lowest pitch. Radio and television admittedly are wonderful instruments. One of their most attractive features, in the minds of many of us, is the dials, which enable us to turn them off at will. Let a monotonous, droning voice assail our ears, and we are usually not slow in clicking the dial off (Karr, 1953).

In our effort to achieve expressiveness in the speaking voice, few things are of more importance than developing skill in the use of pitch variations. Pitch is more effective than either rate or force in expressing delicate shades of meaning (Karr, 1953).

For effective use of voice, it's helpful if one has a wide pitch range. Pitch variations are made up of inflections- rising , falling , and circumflex , which is the combination within a word or phrase of rising and falling inflections. The term "*Vocal Color*" is used for voice that, through pitch variations, can demonstrate a variety of emotions. To become a polished speaker, a person's voice should have "vocal color" (King & DiMichael, 1966). According to Nataraja and Savithri (1990), normal pitch range is 25Hz.

Rhythm and Melody

Rhythm is defined as "movement or procedure with uniform recurrence of a beat, accent, or the like". Melody is defined as "musical sounds in agreeable succession or arrangement; an air or tune". Speech rhythm and melody, then, considered somewhat as a unit, involve the use of accented and unaccented syllables in an arrangement, which produces

an agreeable effect on the listeners' ears. They include making artistic- but not arty- use of elements of emphasis, particularly pitch and rate (Karr, 1953).

The melodic rhythm of speech is, on the whole, more akin to prose than poetry. Generally, it's subtler, more complex and subject to more frequent changes in structure than is rhythm in poetry. Speech rhythm, however, even though it follows no mechanical scannable pattern, does have, at least in its more eloquent moments, a pulse beat that can be felt even though it cannot be analyzed (Karr, 1953).

Speech rhythm is extremely flexible. It varies according to the individual preferences of the speakers, the special requirements of different occasions, and the nature of subject matter (Karr, 1953).

Rhythm depends on the speaker's control capacity to generate a temporal structure and allocate peripheral speech movements to it. The rate of speech varies according to sentence length, possibly according to the speaker's emotional state and possibly according to the social situation. And the rate of articulatory movement, which may be timed by a central regulating rhythm, varies according to location within the clause, and is affected by word boundaries and syllable stress. This means that a speaker's ability to use his sense of rhythm, to adapt it to the rhythmic needs of speech, which change from moment to moment, is probably a more important capacity for fluency than the simple presence of a central rhythmic "clock".

Rhythm seems to promote or enhance fluency. Specifically, it seems that speech rhythm serves fluency by making it easier for us to talk faster. It does this in several ways.

Unstressed syllables are shorter and thus, require less time. In addition, rhythm assists in rapid speech production by providing a means for us to anticipate upcoming movements.

Fluency

The word "Fluency", derived from the Latin word for "flowing", connotes the quality of continuity of speech. Our intuitive recognition of highly fluent speakers is based partly on the ease and grace with which they produce long utterances without stopping (Starkweather, 1981). Fluency is a multi-dimensional behavior. The dimensions of fluency are the continuity and smoothness of speech, the rate of speech, and the effort a speaker makes in producing speech (Starkweather, 1981). Fluent speech is continuous: it flows along without hesitation or stoppage. Continuity is disrupted by pauses, repetitions, prolongations, and false starts. The rate at which meaningful speech is produced is an aspect or dimension of fluency. Most often, a rapid speaker is recognized as more skilled and fluent than a speaker whose rate is simply average. The normal rate of speech is 80-180 words per minute. Speaking rate can be considered normal up to 280 words per minute if the speaker is intelligible.

Goldman-Eisler (1968) reported that unfilled pauses occur on the average every 4.8 words when speakers are providing a narrative description and every 7.5 words when they are engaged in a discussion.

For all speakers, a limited amount of disfluency is normal. For example, people may insert short sounds or words, such as "um", "like", or "uh" when speaking. Also, speakers may repeat whole words or phrases (e.g. for clarification) or revise words or phrases. For the most part, disfluencies appear to be effortless and speaker may appear to be unaware of any

difficulty (<http://www.ssastutter.org/material/index.php?matid=213>). The average speaker has up to 7-10% of their speech disfluent (counting the number of disfluent words in a 100-word sample)

(<http://spearfish.k12.sd.us/west/speech/language/def.html>).

Emphasis

Emphasis or stress is perceived loudness from the listener's point of view and greater muscular effort from the speaker's point of view. Emphasis assists the listener in segmenting the flow of speech by contouring words. Syntactically, it helps in differentiating sentence types. Lexically, emphasis helps to differentiate verbs and nouns, and pragmatically, contrastive stress helps distinguish between topic and content.

Aerodynamics

Another aspect that most authors agree upon regarding professional voice users is their superior aerodynamic characteristics. As early as in 1934, Nadoleczny & Luchsinger found larger vital capacity in professional singers than in an average untrained person.

In 1994, Lundy, Roy, Casiano, Evans, Sullivan, & Xue did a study on 65 singing students with no complaints of any vocal difficulties at the time of evaluation. The Glottal Flow Rate (GFR), also called the Mean Airflow Rate (MAFR), was measured in the subjects, for speech and singing samples. Mean GFR was 253.68ml/sec for singing and 172.90ml/sec for speech samples.

Carroll, Sataloff, Heuer, Spiegel, Radionoff & Cohn (1996) collected respiratory and glottal efficiency measures from a pool of 60 classically trained singers with normal larynges. All singers had greater or equal to 3 years of formal classical training, and were active professional solo classical singers. Mean Flow Rate was obtained from all subjects to assess glottal efficiency. Also, Maximum Phonation Time and Phonation Quotient were obtained from a subset of singers. Pulmonary function test data or forced expiratory volume, forced vital capacity, and forced expiratory flow were obtained for all subjects. Results were compared with published normal values, used commonly in voice labs. Differences were found suggesting the need for separate normative data to be used for evaluation of the vocal athlete.

Characteristics of a Radio Jockey

The distinguishing characteristics of a good radio Jockey are: a good clear voice, legible diction, intensive knowledge of music, and excellent conversational ability (www.exchange4media.com/e4m/Radio/radiospeak.asp?rsid=25). The person must not have any speech disorders like lisp, must be able to communicate fluently and must have a high degree of self-confidence. The tonal quality of voice is also very important; the voice has to sound good (<http://femina.indiatimes.com/articleshow/1919229362.cms>).

There are four mantras for the success of a Radio Jockey; vision, consistency, empathy and the art of communication. It's not the lingo; it's the way you present it (www.exchange4media.com/e4m/Radio/radiospeak.asp?rsid=25).

A professional voice user is constantly on the line, with his/her performance not only judged by the audience, but by critics, managers, producers, agents' etc. Most of us are not subject to such constant external scrutiny of our endeavors. A professional voice user lives with the realization that if he/she makes even a minor mistake during a performance, it will very likely be noticed, perhaps even be pounced upon.

If one is possessed by a drive towards artistic vocal expression, how devastating it is to develop any sort of a problem in the vocal mechanism, which is the foundation of one's endeavors. How frustrating it is if the problem develops at a pivotal or critical point in career development, how threatening for the established professional voice user who's financial well being rests on the condition of his/her vocal mechanism (Sataloff, 1991).

It seems that the degree of "incapacity" in each individual appears to vary with the vocal occupational demands, and the severity of the voice disorder. It has been widely agreed upon that dysphonia in professional voice users can have a devastating effect on vocal performance. Dysphonia not only interferes with and detracts from the quality of the performance, but it may also create occupational, emotional and morale problems (Hoffman-Ruddy, Lehman, Crandell, Ingram & Sapienza, 2001).

Yiu (2002) opined that teachers are vulnerable to developing voice problems due to specific occupational demands during teaching. Information on how teaching profession is impacted by voice problem and what the professional perceives to be useful information for preventing voice problems is important for health care providers.

Zeine & Walter (2002) distributed a questionnaire investigating interest and knowledge levels of vocal function and dysfunction to 543 subjects. A total of 345 questionnaires, including those completed by 79 professional actors, 73 amateur actors, 124 acting students and 69 controls were analyzed. Professional actors and amateurs indicated the highest levels of interest in gaining further knowledge regarding role of speech language pathologists and voice and vocal hygiene. Professional and amateur actors also reported higher perceived knowledge levels than other groups in these areas, although very few claimed to have thorough knowledge in these areas.

Though most people can get through life without ever thinking of vocal hygiene, individuals who put extra strain on their voices must keep their vocal mechanism in better conditions (<http://lionsvoiceclinic.umn.edu/page4.htm>).

In general, professional voice user/vocal performer is a label widely used to classify a large body of professionals who earn a living using their voices. However, each type of professional uses the voice in a different manner. Many performers have attributes that make them electric and exciting (high levels of habitual energy, ability to bring to the surface and communicate a wide range of strong emotions, high degree of sensitivity, awareness and concentration). It can be these attributes that also make them susceptible to voice difficulties.

A voice disorder may prevent a professional singer from performing or a businessperson 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 a voice disorder (<http://thevoicecenter.com/voicedisorder.html>).

At the Center for Voice Disorders of the Wake Forest University, Winston-Salem, NC, the breakdown of patients in terms of their work indicates that approximately 45% are level I and II, and 43% are III and IV. Professional Voice Users (level I and II) may suffer vocal emergencies like respiratory infection or stress related problems. But more commonly, the voice problems in these groups are chronic and intermittent. Vocal abuse and misuse syndromes are common in professional voice users (<http://thevoicecenter.com/voicedisorder.html>).

Increased daily usage of vocal communication and increased environmental noise has increased demands on vocal system. Complaints of vocal fatigue by teachers, public speakers, coaches, salespersons, and many other professional voice users are common (<http://isb.ri.ccf.org/biomch-1/archives/biomch-1-1991-09/00036.html>).

Speech Pathology, Australia, warns that as the workplace becomes increasingly service-oriented and communication skills assume greater importance, the voice is being subjected to unprecedented demands (Cathy O'Leary, 2003 (<http://www.smh.com.au/articles/2003/07/10/1057783255171.html>)).

Peterson, Voice Consultant, says professional voice users such as media presenters, singers, lawyers, and others who rely heavily on talking for their jobs need near-perfect voice quality. A small problem for these "elite" voice users could put their jobs at risk (<http://www.smh.com.au/articles/2003/07/10/1057783255171.html>).

Verddini & Ramig (2001) did a paper with the purpose of providing a cohesive review of literature regarding functional consequences of voice problems and occupational

risk factors for them. According to conservative estimates, approximately 28,000,000 workers in the US experience daily voice problems. Many people who experience voice problems perceive them to have a negative impact on their work and quality of life. Across several countries, "Teacher" consistently emerges as the common occupation most likely to seek otorhinolaryngological evaluation for a voice problem. Other occupational categories likely to seek ORL examination for voice problems are- singer, counselor/social worker, lawyer and clergy.

Risk factors include excessive talking, continuing to talk with a throat infection, and having to talk over background noise. Damage is caused by constant strain placed on vocal cords because of some physical abnormalities, vocal misuse, or overuse (<http://www.smh.com.au/articles/2003/07/10/1057783255171.html>).

Professional voice users exhibit vocal misuse or overuse, either intentionally or unintentionally, which makes them more susceptible to voice disorders than non-professional voice users.

Neil, Worrall, Day & Hickson (2003) did a study on broadcast journalists. The first aim of the study was to compare the voice and speech characteristics of professional broadcast journalists with that of novice newsreaders. The second aim of their study was to find the awareness and use of vocal hygiene across these groups. Twenty professional newsreaders (7 male and 13 female), and 19 student newsreaders (4 male and 15 female) were included in this study. A matched control group of 18 non-newsreaders was used. Each participant took a speech and voice evaluation and completed a questionnaire.

Sustained phonation of vowel /a/ was obtained and analyzed using MDVP of CSL 4300B, version 5.0. Three measures of pitch were obtained: fundamental frequency, speaking fundamental frequency (SFF), and variability of speaking fundamental frequency. Measures of speech obtained were rate of speech, maximum phonation time, and number of pronunciation errors.

Three fourth- year speech pathology students rated nine voice and speech parameters. The parameters were included under the headings of voice quality, continuity, phrasing, emphasis, modulation, and overall performance. Judges rated on a 10-point rating scale where zero was the lowest score possible and 10 was considered outstanding. The participants' awareness of vocal hygiene was measured by counting the number of vocally abusive and non-abusive behaviors they correctly identified.

The results showed that the professional newsreaders had greater pitch variability, as measured by the SD of speaking fundamental frequency, than both their control group and the student newsreading group. Perceptual ratings of continuity, vocal quality in newsreading, phrasing, emphasis, and overall performance in newsreading showed a significant difference between the groups, with the professional newsreading group being rated significantly higher on all the parameters.

Results of the analysis of questionnaire on vocal hygiene revealed that both professional newsreaders and student newsreaders reported significantly more voice problems than their respective control participants.

The novice-professional differences in voice and speech characteristics revealed in this study have important implications for development of effective educational programs for student newsreaders. Also, the study has identified a number of aspects of vocal hygiene that need to be targeted for both novice and professional broadcasters.

The review indicates that characteristics of professional voice users causes risk factors in them. Radio Jockeys are professional voice users whose voice and speech qualities are not investigated. The present study investigated the voice and speech characteristics of Radio Jockeys.

CHAPTER III

METHOD

Subjects: Five professional Radio Jockeys, with a mean age of 25 years (3 females, and 2 males), from the radio station, Radiocity 91FM, Bangalore, India, and five age and gender matched non-professional voice users participated in this study. All the Radio Jockeys had a minimum of two years of experience working as a professional radio jockey.

Material: Three vowels, /a/, /i/ and /u/ were used for assessment of voice parameters. Five minutes conversation samples with each subjects was used.

Procedure:

- a) **Voice parameters:** Sustained phonations of /a/, /i/, and /u/ were recorded. These were fed to CSL 4300B. MDVP software was used to extract voice-related parameters.
- b) **Frequency range in conversation** for a five-minute speech sample was measured using MDVP software.
- c) **Fluency Assessment:** The conversation samples recorded were transcribed verbatim and the number and percentage of repetitions, filled pauses, unfilled pauses, false starts, prolongations, and parenthetical remarks was calculated by using the following formula:

$$\% \text{ Disfluency} = \text{No. of disfluencies} * 100 / \text{Total no. of words.}$$

- d) **Assessment of phrasing, emphasis, modulation, and overall performance:** The conversation samples of five Radio Jockeys, and five non-professional voice users were randomized and recorded. Eight speech pathologists did a perceptual analysis of these samples for phrasing, emphasis, modulation, and overall performance on a

three-point scale (3=Good, 2= Normal, 1= Poor). For test-retest reliability, the same . speech pathologists assessed the randomized conversation samples after a week. Test-retest reliability was calculated using Karl Pearson's coefficient of correlation,

e) **Assessment of vital capacity:** The portable Vitalograph was used to measure vital capacity. Subjects took a deep inhalation, and expired into the mouthpiece of Vitalograph. Three trials were done, and the best of the three was noted.

Statistical Analysis: Paired T-Test and Walsh test was used to find out the significant difference between perceptual analysis of speech of Radio Jockeys and normals. Test-retest reliability was measured using Pearson's correlation.

CHAPTER IV

RESULTS AND DISCUSSION

The results of each aspect studied will be presented and discussed separately for convenience of understanding.

1. Voice related parameters

MDVP Measures: Phonation of vowels /a/, /i/ and /u/ was recorded and analyzed using MDVP software of CSL 4300B software. The results are shown in Table 2.

Variable	RJ1	RJ2	RJ3	RJ4	RJ5	Normative
Fo Related Parameters						
FO	229.74	162.75	199.62	153.66	165.42	-
Time	1.32	6.14	5.01	6.67	6.13	-
Highest FO	243.04	170.48	233.37	170.06	190.09	-
Lowest FO	220.96	155.74	169.67	139.06	145.91	-
STD	2.84	2.22	6.31	2.49	3.77	-
PFR	3.00	2.33	6.66	4.33	6.00	-
Tsam	2.75	2.75	2.75	2.75	2.75	-
Tremor Related Measurements						
FTRI	0.18	0.46	0.55	0.88	0.22	0.95
ATRI	0.43	0.29	1.31	0.41	0.49	4.37
Fftr	8.48	8.14	10.46	5.45	8.10	-
Fatr	3.93	5.79	1.40	1.85	6.34	-
Short and Long Term Frequency Perturbation Measurements						
Jita	59.53	82.52	167.57	168.24	99.84	83.2
Jitt	1.38	1.34	3.35	2.43	1.62	1.04
RAP	0.82	0.79	1.92	1.55	0.99	0.68
PPQ	0.84	0.79	2.17	1.35	1.04	0.84
SPPQ	0.86	0.95	2.16	1.55	1.00	1.02*
VFO	1.21	1.35	3.14	2.58	2.37	1.10
Short and Long Term Amplitude Perturbation Measurements						
ShdB	0.10	0.05	0.32	0.16	0.21	0.35
Shim	1.27	0.61	3.46	1.85	2.66	3.81
APQ	1.05	0.44	2.49	1.18	2.34	2.07
SAPQ	1.21	0.48	3.04	1.12	2.76	4.23
Vam	1.95	0.69	5.78	2.12	10.99	8.20

Noise Related Measurements						
NHR	0.13	0.14	0.18	0.18	0.19	0.19*
VTI	0.03	0.04	0.03	0.05	0.05	0.06*
SPI	10.92	12.82	28.43	15.25	4.95	14.12*
Voice Break Related Measurements						
DVB	0	0	1.49	0.11	0	1.00J
NVB	0	0	1.00	0.33	0	0.90}
Sub-Harmonic Components Measurements						
DSH	0	0	2.53	0	2.29	1.00{
NSH	0	0	2.00	0	2.00	0.90\$
Voice Irregularity Related Measurements						
DUV	0	0	3.06	1.14	0	1.00
NUV	0	0	2.66	1.00	0	0.90

Table 2: Voice related parameters in Radio Jockeys (Abnormal parameters are in bold).

The results indicated that subjects 3 and 4 had high frequency perturbation measures, amplitude perturbation related measures, voice breaks, and higher degree of unvoicing. However, these are not pathological. MDVP uses peak picking method for F0 extraction. If a peak is not identified, it will be considered to have voice breaks and unvoicing.

Frequency range in conversation: The frequency range in conversation is in Table 3. All the five Radio Jockeys (RJ), except RJ3, had a very wide F0 range, which is one important requirement for any professional speaker who uses his voice for professional purposes, especially in the media. The normal frequency range is 25 Hz. It appears that the RJs have used extremely wide frequency range.

	RJ1	RJ2	RJ3	RJ4	RJ5
Max F0 (Hz)	670.24	665.77	422.29	665.77	619.57
Min F0 (Hz)	128.00	110.59	67.16	66.97	68.89
Range (Hz)	542.24	555.18	355.13	598.80	550.68
Av. F0 (Hz)	229.87	198.95	174.04	182.85	151.00

Table3: Maximum, minimum, average and range of fundamental frequency.

Fluency Assessment

A five-minute speech sample of each Radio Jockey was recorded and a 100 words sample was analyzed for various aspects of fluency. The results are given in Table 4. Of the various parameters, filled pauses and parenthetical remarks were used maximally and unfilled pauses and repetitions were least used by RJs. On the other hand, normals used filled pauses maximally, and parenthetical remarks and prolongations were least used. Overall, RJs showed a higher total number of disfluencies compared to normals. However, Walsh test indicated no significant difference between the two groups.

	FP	UP	WR	PhR	PaR	Pr	TOTAL
RJ1	2	2	1	1	3	1	10
RJ2	3	0	0	0	2	1	6
RJ3	4	0	0	1	1	0	6
RJ4	1	0	1	0	0	2	4
RJ5	1	0	1	1	5	1	9
Average	2.2	0.4	0.6	0.6	2.2	1.0	7.0
N1	4	0	0	0	0	0	4
N2	3	0	0	1	0	0	3
N3	4	2	4	3	0	0	13
N4	1	0	2	0	0	0	3
N5	0	0	1	1	0	0	2
Average	5.4	0.4	1.4	1.0	0	0	5.2

Table 4: Continuity parameters in Radio Jockeys (RJs) and normals (N) in percent (FP=Filled Pause, UP=Unfilled Pause, WR=Word Repetition, PhR=Phrase Repetition, PaR=Parenthetical Remark, Pr=Prolongation).

Assessment of phrasing, emphasis, modulation, and overall performance

In general, it was observed that phrasing was judged to be the best in RJs. Emphasis and modulation were not as good as phrasing. RJs were rated *good* on all

the four parameters compared to normals. Table 5 shows the results of perceptual analysis.

Parameter	RJ			Normals		
	Good	Normal	Poor	Good	Normal	Poor
Phrasing	77.5	21.2	1.2	18.2	62.4	11.2
Emphasis	69.9	28.7	1.25	28.7	63.7	7.5
Modulation	58.7	36.2	4.9	13.7	61.2	24.9
Overall Performance	68.7	29.9	1.2	16.2	79.9	3.7

Table 5: Percent rating of RJ's and normals by 8 SLPs.

Though all the RJs as a group obtained higher "Good" ratings compared to normals, RJ5 was always different from others, in all the parameters. He was rated "Normal" on all the parameters. Table 6 shows the individual differences in RJ's.

		Radio Jockeys			Normals		
		Good	Normal	Poor	Good	Normal	Poor
Phrasing	S1	87.5	12.5	0	0	93.5	6.25
	S2	81.2	18.7	0	18.7	81.2	0
	S3	100	0	0	56.2	43.7	0
	S4	75	25	0	12.5	50	31.2
	S5	43.7	50	6.25	37.5	43.7	18.7
Emphasis	S1	100	0	0	37.5	62.5	0
	S2	68.7	31.2	0	12.5	75	12.5
	S3	81.2	18.7	0	43.7	56.2	0
	S4	62.5	37.5	0	6.25	68.7	25
	S5	37.5	56.2	6.25	43.7	56.2	0
Modulation	S1	93.7	6.25	0	18.7	56.2	25
	S2	50	50	0	6.25	68.7	25
	S3	50	43.7	6.25	43.7	56.2	0
	S4	62.5	37.5	0	0	56.2	43.7
	S5	37.5	43.7	18.7	0	68.7	31.2
Overall Performance	S1	93.7	6.25	0	0	100	0
	S2	75	25	0	18.7	81.2	0
	S3	81.2	18.7	0	31.2	68.7	0
	S4	56.2	43.7	0	6.25	75	18.7
	S5	37.5	56.2	6.25	25	75	0

Table 6: Percent rating in RJs and normals for Phrasing, Emphasis, Modulation and Overall Performance.

RJs were rated to be "Good" on all the parameters 68.73% of the times. T-Test also showed a significant difference (Table 7) between RJs and normals, with better performance in RJs.

Rating	Subject	Mean	SD	t	Sig (2-tailed)
Good	RJ	68.73	21.26	8.061**	0.000
	Normal	20.91	17.8		
Normal	RJ	29.04	18.49	6.602**	0.000
	Normal	66.84	15.19		
Poor	RJ	2.18	4.64	3.037**	0.007
	Normal	11.86	14.16		

Table7: Means, SDs and the significance values for the overall rating of the RJs and Normals as rated by 8 SLPs (**= p0.01, df=19).

Figures 1-4 show the ratings for phrasing, emphasis, modulation, and overall performance, respectively. Tables 8-11 show the T-Test values and levels of significance for phrasing, emphasis, modulation, and overall performance, respectively. The results indicated significant difference between RJs and normals on phrasing, emphasis, modulation, and overall performance (at 0.05 level) with better performance in RJs.

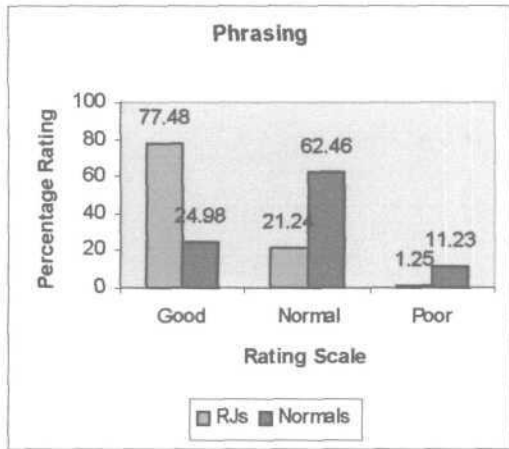


Figure 1 : Percent rating on phrasing.

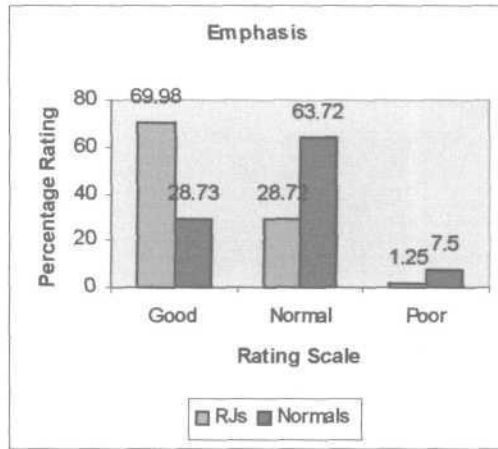


Figure 1: Percent rating on emphasis.

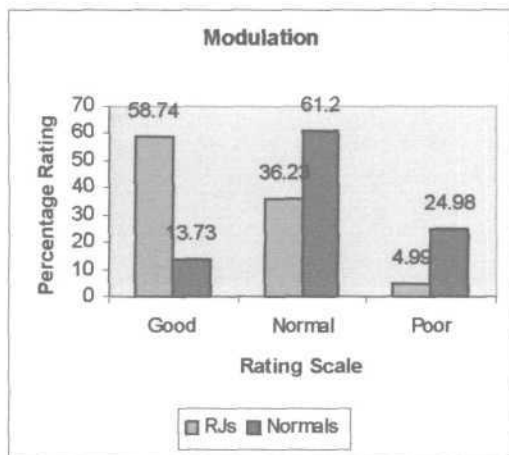


Figure 2: Percent rating on modulation.

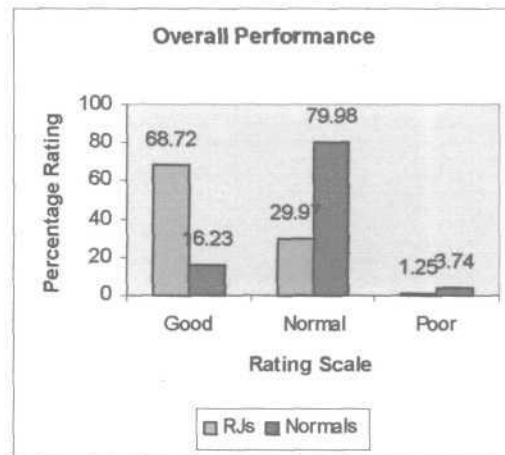


Figure 4: Percent rating of overall performance.

Rating	Subject	Mean	SD	t	Sig (2-tailed)
Good	RJ	77.48	21.02	3.889**	0.018
	Normal	24.98	22.08		
Normal	RJ	29.04	18.54	2.724*	0.053
	Normal	62.46	23.37		
Poor	RJ	1.25	2.79	1.725	0.160
	Normal	11.23	13.52		

Table8: T-Test values for phrasing.

Rating	Subject	Mean	SD	t	Sig (2-tailed)
Good	RJ	69.98	23.12	3.279*	0.031
	Normal	28.73	17.98		
Normal	RJ	28.72	20.99	3.433*	0.026
	Normal	63.72	8.16		
Poor	RJ	1.25	2.79	1.118	0.326
	Normal	7.50	11.18		

Table 9: T-Test values for emphasis.

Rating	Subject	Mean	SD	t	Sig (2-tailed)
Good	RJ	58.74	21.44	3.830**	0.019
	Normal	13.73	18.41		
Normal	RJ	36.23	17.33	3.812**	0.019
	Normal	61.20	6.84		
Poor	RJ	4.99	8.12	2.427	0.072
	Normal	24.98	15.91		

Table 10: T-Test values for modulation.

Rating	Subject	Mean	SD	t	Sig (2-tailed)
Good	RJ	68.72	22.08	4.071**	0.015
	Normal	16.23	12.94		
Normal	RJ	29.97	19.94	3.908**	0.017
	Normal	79.98	12.03		
Poor	RJ	1.25	2.79	0.589	0.588
	Normal	3.74	8.36		

Table 11: T-Test values for overall performance.

4. Test-Retest Reliability

Test-retest reliability was found using the Pearson's coefficient of correlation. Coefficient of correlation was found for each of the four parameters (phrasing, emphasis, modulation, overall performance) at the three points on the rating scale (good, normal and poor). The coefficient values, and the levels at which they are significant are given in Table12. Pearson's correlation indicated good test-retest reliability for all the parameters, except emphasis (normal and poor ratings), and modulation (normal rating).

	Good	Normal	Poor
Phrasing	.902**	.776**	.671*
Emphasis	.839**	.016	.509
Modulation	.855**	.269	.847*
Overall Performance	.891**	.830**	.8585*

Table12: Coefficients of correlation [**= Correlation is significant at the 0.01 level (2-tailed), *= Correlation is significant at the 0.05 level (2-tailed)].

5. **Vital Capacity:** Both the female and male Radio Jockeys had vital capacities higher than normals. Table 13 shows the vital capacities.

Subject	Vital Capacity (Its)	Normative (Its)
1 (Female)	2.15	>1.5
2(Female)	2.59	>1.5
3(Female)	2.71	>1.5
4(Male)	2.73	>2.5
5(Male)	3.38	>2.5

Table13: Vital capacity values (in liters).

DISCUSSION

The results revealed several points of interest. First of all, in RJs, frequency and amplitude perturbation measures were higher and voice breaks and unvoicing were evident. However, these may not be considered pathological. In MDVP, peak picking is used to measure FO. If a peak is missing, it will be treated as a break and +unvoicing. The missing peak may be because of some noise or unclear signal.

Second, frequency range used by radio jockeys was wider compared to normals. This indicates the importance of bringing out liveliness in speech.

Third, interestingly, percent disfluency was higher in radio jockeys compared to normals. If parenthetical remarks are not considered, the percent disfluency will be lower in RJs compared to normals. Parenthetical remarks are considered as a sophisticated kind of disfluency and do not bring about discontinuity in speech.

Fourth, except one, all the four RJs were rated to have good emphasis, phrasing, modulation, and overall performance, compared to normals. These results suggest that if one wants to become an RJ, he should develop good phrasing, emphasis, and modulation.

Fifth, all RJs had higher vital capacities compared to normals, i.e. an average of 2.71 Its for RJs, compared to an average of 1.9 Its for normals. This is in accordance with previous studies, which state that professional voice users have higher vital capacities as they have more vocal effort than non-professional voice users.

CHAPTER V

SUMMARY AND CONCLUSIONS

Knowledge of difference in voice and speech characteristics between RJs and normals is essential for effective education of novice students. The present study attempted to investigate the voice, speech, and aerodynamic characteristics of an upcoming group of professional voice users, namely, Radio Jockeys (RJs). This is a relatively new profession in the field of media and hence, there are not many studies done on voice and different aspects of speech of these professionals, especially in the Indian context. RJs are totally dependent on their speech for their livelihood, and hence, it is imperative for them to have certain qualities that will ensure them success in their field, which has been reported in literature by various authors.

Five RJs (3 females and 2 males) and five age and gender matched normal subjects with an average age of 25 years participated in the study. The material consisted of sustained vowels /a/, /i/, and /u/, and a five minutes conversation sample. Using MDVP, 31 voice parameters were analyzed and frequency range was analyzed from the speech sample. Vital capacity was measured using a Vitalograph. Percent disfluency was analyzed from the conversation sample. Eight speech pathologists rated the conversation sample for phrasing, emphasis, modulation, and overall performance on a 3-point rating scale (3=Good, 2=Normal, 1=Poor). All the parameters were tabulated and T-Test was administered to find out the significant difference between RJs and normals.

The results indicated that frequency and amplitude perturbation measures were higher and voice breaks and unvoicing were present in RJs. However, these need not have to be considered pathological.

Frequency range used by RJs was very wide (540 Hz), compared to normals (25 Hz). Percent disfluency was interestingly higher in RJs (7%) compared to normals (5.2%). Except one RJ, all other RJs were rated to have significantly better phrasing, emphasis, modulation, and overall performance. Of these 3 parameters, phrasing was rated best. Having identified phrasing as the best parameter, it would be helpful to prioritize teaching phrasing first to aspiring RJs, then emphasis, and then modulation.

The results indicated that RJs were superior in most respects. Using these results, a training module can be developed for RJs. Also, prevalence of voice disorders in this population can be investigated and awareness of vocal hygiene can be studied.

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