The Role of Forensic Speaker Identification in Establishing Sexual Victimization of a Scheduled Caste Woman: A Case Study

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ABSTRACT

A voice is not just a string of words, it manifests the personality of the speaker. Voice is unique as the shape and size of an individual's vocal cords, vocal tract, and the manner in which the speech sounds are habitually formed and articulated are different for each individual. Forensic speaker identification is the application of science for the identification of voice of the unknown speaker involved in criminal investigation. Criminal offences such as kidnapping, extortion, blackmail threats, obscene calls etc. are committed, widely using telephones and mobiles. However, on the boon side, mobile phones come handy and helpful for needy victims to prove their victimisation through recorded conversations. These disputed recordings and the control speech samples obtained from the speakers are examined for their phonetic and acoustic features such as frequencies, amplitude, plosive duration, unvoiced signals at different positions. During Forensic Speaker Identification examination these features are extracted from both the disputed and control speech recordings and compared. Of late, there is an exponential increase in the number of crimes committed against women with digital recordings playing a crucial role in establishing the crime and in the identification of the accused. In one case received in Forensic Sciences Department, Tamil Nadu, recorded conversations of a sexually victimised Dalit woman with the perpetrator were sent for Forensic Speaker Identification examination. The procedure adopted and the outcome of the examinations, results and its significance in securing justice to a Dalit woman victim have been discussed in this paper.

Key Words : Forensic Speaker Identification, Caste marginalization, Crime against woman, Women victim

INTRODUCTION

Significance of Voice:

Every person has a distinct voice, based on unique physics properties like the shape of each person's throat, mouth, nasal passages, larynx, tongue length etc. and hence human voice is a unique personal trait. Speech of a person also conveys the information about the speaker from the words or message being spoken, language spoken, the presence and type of speech pathologies, their physical and emotional state. (Kasuya *et al.*, 1986a, 1986b; Klatt and Klatt, 1990; Fant, 1993; Murray and Arnott, 1993). The person's speech also contains the features that may reveal their geographical origin, ethnicity or race, age, sex, education level and religious orientation and background (Schwartz and Rine, 1968; Hartma and Danhauer, 1976; Lass and Brown, 1978; Graddol and Swann, 1983; Childers and Lee, 1991; Childers and Wu, 1991; Wu and Childers, 1991). The voice and the speech together make a speaker individualistic in nature helping in the identification of the speaker. In the present scenario, speech of a person has become an important physical evidence, as it is the only available evidence to establish the link of a suspect with the criminal activity. Reason being, mobile phones has become part and parcel of many people's life in today's world. There are mobile phones with in-build multi-media facility and digital recorders with small size memory chips, making it easy to handle and

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affordable by general public. Taking advantage of such communication devices, criminals use mobile phone for committing various offences like, child pornography, human trafficking, kidnapping, bomb threat calls, extortion, terrorist activities, hoax calls, bribery and many other offences (Kulshreshtha, Singh, and Sharma, 2012). On the boon side, the mobile phones also come to the rescue of victims in times of need. They use mobile phone for recording the conversation with the perpetrator. To prove their victimization, victims submit those recorded conversations as evidence in offences such as threatening, dowry harassment, sexual harassment, domestic violence etc., In such situations, forensic science helps the investigators in identifying the individuals involved in criminal activities and to exonerate the innocent.

Forensic Speaker Identification:

There are various methods to establish the identification which in turn depends on the nature of the collected evidence. Identification through voice is one of the methods used by the investigating officers in cases where recorded conversation is seized as physical evidence. Identification of a speaker is performed when the characteristic features of disputed speech samples of an unknown person are compared with the features of control speech samples of the suspect(s). The method is known as Forensic Speaker Identification. In some of the cases, where the suspected accused could not be found or they refuse to give control speech samples for forensic speaker identification examination (asone cannot force an individual to give his voice sample) it is difficult to prove their involvement in a criminal activity as speaker identification is not possible in the absence of control samples. However, Speaker profiling provides clue for the investigators to pin point the actual criminal and to narrow down the field of investigation. Speaker Profiling is done by extracting individual information about the unknown perpetrator from the disputed speech material like gender, age, dialect, features of respiration, phonation, articulation and manner of speaking etc. (Kulshreshtha et al., 2012)

Often, humans are capable of identifying the speaker they are acquainted from their voice. But in Forensic speaker identification, voice of the unknown speaker involved in criminal investigation has to be identified. During forensic speaker identification examination, the auditory-acoustic analysis of specific features and parameters, of a disputed sample and a control sample

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are extracted and compared in order to identify the speaker.

Violence against woman:

As many as 2.5 million crimes against women have been reported in India over the last decade. Reported cases of crime against women increased 83% from 185,312 in 2007 to 338,954 in 2016 according to Crime in India 2016 report by National Crime Records Bureau. Dalit women face complex web of discrimination that includes Gender, Caste, Class, Poverty and Culture even in today's society.

Vulnerability:

Vulnerably positioned at the bottom of caste, class and gender hierarchies, Dalit women experience rampant gender-and-caste discrimination and violence as the outcome of severely imbalanced social, economic and political power equations. Their socio-economic vulnerability and lack of political voice, when combined with the dominant risk factors of being Dalit and female, rise their exposure to potentially violent situations while simultaneously reducing their ability to escape. There are nine major forms of violence against Dalit women; six being violence in the general community - physical assault, verbal abuse, sexual harassment and assault, rape, sexual exploitation, forced prostitution, kidnapping and abduction; and three being violence in the family-female foeticide and infanticide, child sexual abuse and domestic violence from natal and marital family members.

Case:

This is a case of a Dalit woman working as Woman Police Constable. Sometime in 2005, she came in contact with male individual, a caste Hindu, who was working as Sub Inspector of Police and were in love with each other. He had promised to marry her and, on that premise, and assurance, he deflowered her after tying thali (similar to wedding ring) at Murugan temple in Palani. They both lived as man and wife at the police quarters in various places where they were posted. However, here fused to marry her on the ground that she is a Dalit and further, he started demanding huge dowry (10 lakhs rupees and 150 sovereign of gold) from her as a condition precedent for marriage. Pushed to her wit's end, she lodged a complaint, based on which, the CB-CID registered a case for the offences under Sections 294(b), 417, 506(ii) IPC, Section 4 of the Dowry Prohibition Act read with Section 3(1)(xii) of the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989. The trial took place before the Special Judge, Chennai under S.C & S.T (Prevention of Atrocities) Act. As there were no clinching physical evidences to prove the crime committed against her, she had to rely only on the digital evidence that was in her mobile phone as recorded conversation she had with the perpetrator in which, he said to have spoken certain aspects, which would incriminate him in the case. The perpetrator refused to give the control speech samples and approached the High Court of Madras on the premise that he cannot be compelled to give his voice sample especially when the matter is still under seiz in by the Supreme Court. However, the High court of Madras, considered that giving of voice sample will not violate Article 20(3) of the Constitution of India relating to selfincrimination and directed both the parties to give control voice samples at Forensic Sciences Department for the purpose of speaker identification. Aggrieved by the said order, perpetrator appealed the Supreme court through SLP; however, the court ordered the petitioner to undergo voice test. Thereafter, the perpetrator appeared at Forensic Sciences Department and his control voice samples were recorded for forensic speaker identification examination.

METHODOLOGY

There were 53 audio files of size 98.9 MB and containing the alleged conversation between a male and a female individual. The conversations were in tamil language of total duration 5h 24m 48s. The method used for forensic speaker identification is a semiautomatic technique that comprises both manual and automatic processing. Manual processing occurs at the feature extraction level whereas automatic processing occurs at the feature modelling, similarity scoring and Likelihood Ratio computation levels. The manual input at the feature extraction level includes the auditory identification and phone technological classification of sounds, their segmentation in the signal (location of beginning, end, centre, or other events), as well as the examination and, if necessary, correction of the results too. Preceding the central processing stage of the speaker identification examination there is pre-processing of the disputed speech samples. During pre-processing the audio files were converted to wave format and they are critically listened for the number of speakers and the content of the speech. Transcription of all the 53 audio files were

done. The speech of the female (known) and the male (unknown) were separated. The non-speech events such as laughter, cough, throat clearing, clicking, and breathing or unusual speaking styles such as falsetto voice, whispering, and shouting were removed wherever necessary (Drygajlo *et al.*, 2015). Sentences for the known and the unknown speaker were chosen after ensuring that the spectrum is noise-free and the selected sentences are incriminating to the case in hand. Some of the selected sentences of both the known and the unknown speakers are given as Annexure. After the preprocessing of the disputed utterances, the investigating officer was informed through concerned court to produce the complainant and the perpetrator for recording their control voice samples in Forensic Sciences Department.

Control Speech Recording:

On arrival, the complainant was explained about the examination procedure and an informed consent form was submitted to her and by signing the consent form she agreed to give her voice samples, She was fitted with Sennheiser PC 8 Over-Ear USB VOIP Headphone with Mic and her knowledge about the case was tested and the same was recorded in a sound treated room. Then the selected sentences of the disputed utterances were played one by one. She was asked to repeat the same after hearing the sentence which was recorded using Nokia E 71 model mobile phone. The process is repeated for three times. This is novel method that was evolved due to the shortcoming of the methods that were suggested in the Speaker Identification procedures. Mostly, it is the written transcription that is given to the speakers to read and the same is recorded. However, the sample speech recorded by the said method lacks supra-segmental features such as stress, intonation, rhythm, tempo, pitch which conveys the information about the meanings and structure of an utterance, and hence making it difficult for a meaningful comparison of the spectrums of the disputed and the control speech samples for arriving at a decision. The new procedure of listening and repeating retains the prosody in the control speech samples facilitating the auditory acoustic comparison.

The perpetrator didn't turn for recording the control speech samples as he approached the High Court of Madras and later the Supreme Court of India on the premise that he cannot be compelled to give voice sample especially when the matter is still under seizin by the Supreme Court. Only after the order of the Supreme

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Court directing the perpetrator to undergo voice test, he signed the consent form to record his control speech samples. He was subjected to the same procedure as detailed above. But he tried to feign many times when he was repeating the incriminating sentences, he decreased his pitch and some words he swallowed and said he couldn't hear it though it was very much audible. Multiple repetitions forced him to forget feigning where needed which improved the spectral quality.

The speech situation (read, spontaneous, monologue, dialogue, (un)altered, style etc.) and emotional and physical speaker features (relaxed, upset, timid, depressive, drowsy, suffering from a cold etc.) are assessed first. Sub-sequently, aural-perceptual and acoustic- phonetic techniques are used as it widespread since 20 years. (Gfroerer, 2003)

Aural- Perceptual Analysis:

After analytical listening the speech samples were evaluated with respect to the following features in Speech and Language

Table 1 , Eastures in Speech and Language
Table 1 : Features in Speech and Language
Speech and Language
Dialect / Regional Accent
- Type and degree of deviation from, standard "pronounciation
/ grammar
Sociolect
 Identification of jargons, description of phonetic, lexical, grammatical peculiarities
Foreign Accent
 Deviation from / accordance with grammar and sound system of a reference language
Verbal Habits
- Degree of eloquence
- Typical phrases
Idiolectal Phonetics
- Identification and description / measurement of articulatory
and acoustic features

Similarly, the Voice and Manner of Speaking on the features mentioned below were also evaluated for both the speakers.

Acoustic-Phonetic Examination:

In combination to the aural-perceptual analysis, objective measurements of spectral amplitude (f0), formant frequency, band width and other acoustic features are evaluated using Praat version 5.3.56- a Phonetics software. In this manner perceivable differences such

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Table 2 : Features in Voice and "Manner of Speaking
Voice and, Manner of Speaking"
Speech Rhythm
- Segmental durations and intensities
Voice and Intonation
- Fundamental frequency (average, variation)
- Auditory and acoustic characteristics of voice
Speaking Tempo and Pausing
- Syllable and articulation rate
- Pauses: numbers, durations, positions
Respiratory Behaviour
- Rate, duration and spectral composition of respirations
Nonverbal Habits
- Hesitations, clicks, etc.

as the resonant frequencies of vowels, the aspiration of plosives, the pitch and intensity patterns of utterances for the disputed and control speech samples for each speaker are quantified and the values compared.





More than being objective, acoustical analysis also yielded important information that cannot be evaluated by the human perceptual system (e.g. differences or similarities with regard to the higher resonant frequencies of the same vowel categories). Thus, of all the parameters analysed, many of them are documented using techniques that are available in acousticphonetics.

All analyses are carried out keeping in mind the situational context and the physical and psychological state of the perpetrator. Evaluations are done on the basis of similarities / differences in the features when the disputed and control speech samples are compared. A number of features like average f0,f0 variation, speech rate, regional and / or foreign accents are evaluated.

RESULTS AND DISCUSSION

During the pre-processing stage, when the disputed utterances of both the complainant and the perpetrator was assessed, the speech situation for the complainant was dialogue and emotionally upset and that of the perpetrator was spontaneous and arrogant. However, the speech situation and the emotional and physical features of the control speech samples of the complainant was unaltered and depressive whereas that of the perpetrator was altered, upset and complained of suffering from cold though not so.

The speech and language feature analysis indicated that the male individual conversed ineloquent Maduraitamil with usage of words such as "uttiru' 'vittodia' 'evanga', 'unnta', 'solludha', 'Panniputtoam', 'inguttu', 'vakkurenu', 'unnta', 'illattina', 'viduri', with little deviation and the tamil speech dispersed with some English words such as switch off, friendu, bore, resign, close. The voice and manner of speaking feature analysis revealed that he has a distinct speech rhythm, there was a good variation in the fundamental frequency ranging from 75 hz to 110 hz. Speaking tempo was slow in the control speech samples as he tried to feign and also mixed with nonverbal habits of hesitation and avoiding of incriminating words stating not audible in the selected sentences of disputed utterances though it was clear and loud.

As the disputed utterances of the complainant were not questioned, the analysis part of it is not discussed in detail in this paper.

For the perpetrator (male speaker), 23 words were chosen from the selected sentences and they were subjected to feature extraction such as segmentation of vowels, vowel formants, and tracking of vowel formants. In Tamil language there are 12 vowels and 18 consonants. Of the 12 vowels, 10 are monophthong (A, A, Q, FF, 2, 26F, 6T, 6J, 3G, 3G-5 short and (552) 5 long versions) and two are diphthongs. ($\mathfrak{B}, \mathfrak{G}\mathfrak{G}\mathfrak{I}$). However, in the chosen words there were only five short vowels and two long vowels viz., \mathfrak{A} , $\mathfrak{D}, \mathfrak{L}, \mathfrak{G}, \mathfrak{G}, \mathfrak{A} \mathfrak{I} \mathfrak{F}$. The shape of the Short-term spectral envelope for the segmented vowels of the speech signal as derived over a short portion (frame) of the signal were studied for examining the influence of the vocal tract (frame by frame) while ignoring the influence of the voice source, in particular the fundamental frequency (Fig. 1 and 2).

Articulation Rate (AR), measured as the inverse of average syllable duration per recording excluding pauses and parameters such as the percentage of the voiced or vocalic portions of a syllable as in speech rhythm were estimated

Within speaker variability of speech patterns (e.g., state of health, emotions) represents an undesirable factor (also called "intrinsic variability") and technical and environmental effects such as variations in microphones, recording devices or background noise and speech signal distortion introduce further variability beyond the within-speaker variability itself (also called "extrinsic variability") (Rose, 1999) though found was well within the limits and far below between speaker variation. Also, fine idiolectal, dialectal or accent-based similarities were found during perceptual analysis. Additionally, frequencies of slips of the tongue was counted, the degree of the dialectal coloring such as the accent of English were studied in both the disputed utterances and the control speech sample.

Though the description of phonetic detail is always based upon the expert judgment which in turn is based upon factors like talent, quality of education, quality training, and experience, like in many other fields of forensics, expertise and experience in forensic phonetic is an important aspect for arriving an opinion. Experience shows that trained listeners with a comparable education and experience correspond in their perceptions and tend to represent the same phonetic events with identical symbols (Gfroerer, 2003)

The identity of male (perpetrator) and female (complainant) speakers were determined on the basis of a synopsis of the results obtained from the parameters of both the aural- perceptual and acoustic-phonetic features of the speech samples. Finally, it was opined that the utterances of the male individual in the disputed speech sample is that of the male individual for whom the control speech samples were obtained.

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The case was tried in the court of the Special Judge, Chennai under S.C & S.T (Prevention of Atrocities) Act and the perpetrator had pleaded not guilty during the entire trial for the charges framed against him u/s. 3(1) (xii) of Scheduled Caste and Scheduled Tribes (Prevention of Atrocities Act 1989) and u/s 417, 294(b) and 506 (ii) of IPC and us 4 of Dowry Prohibition Act. In the Judgment the Judge has observed about the report submitted by Forensic Sciences Department as, "conducted voice test...the accused and the recordings available synchronized with the voices of respective parties. A detailed report has been given". Further, it is ordered" Considering the nature of offence and punishment that can be imposed is only one year u/s 417 of I.P.C., this Court finds fit to impose simple imprisonment for one year u/s 417 I.P.C. As far as Sec.4 of Dowry Prohibition Act is concerned, the punishment is up to two years and fine upto Rs.10,000/- This court finds no legal necessity to impose lesser punishment in view of the offence committed and therefore, the accused is sentenced to undergo imprisonment for two years and to pay a fine of Rs.10,000/-, in default, to undergo a further period of three months.

A valuable matrimonial life of the victim has been lost. Considering the same, for an offence u/s 417 of I.P.C., apart from sentence, u/s 357(3) of Cr.P.C., this court inclined to award compensation of Rs.5 lakhs. Hence, the accused is directed to deposit a sum of Rs.5 lakhs into the court, in default, to undergo imprisonment for a further period of three months. The compensation amount is ordered to be given to the victim girl. All the above sentences shall run consecutively".

- Sentences Selected from the conversation between the perpetrator and the complainant
- F : அப்பறம் எதுக்கு marriage பண்ண என்னை wait பண்ண சொன்ன
- М : நான் அதான் சொன்னேன் வேணாம் வேணான்னுதான் உன்னை சொன்னேன்
- F : என்னை எதுக்கு wait பன்ன சொன்னீங்க ...
- M : நான் வேனான்னுதான் சொன்னேன் நான் first வேணாம் என்னை விட்டுரு விட்டுருன்னு சொன்னேன் உன் வாழ்க்கையை கெடுக்கக் கூடாதுறதுனால நான் அவ்வளவும் சொன்னது புரியுதா
- F : அப்பறம் எதுக்கு என்னை
- M : ... நான் வந்து ஏற்கனவே வந்து நான் பண்ண ... இதுக்காகத்தன் வேணாம் வேணாம் விடு விடு
- F : எதுக்கு love பன்னீங்க
- M : ... வேணாம் வேணாம் ஏதோ சூழ்நிலையில் இப்ப திரிஞ்சிட்டு இருந்தோம் போனாம் வந்தோம் ஏதோ தப்பு நடந்து போச்சுனு தான சொன்னோம் ரெண்டு போமேலேயும் தப்பு இருக்குனுதான சொன்னோம்
- F : அதத்தான் கேட்கறேன் ஒரு பொன்னு கூட ... அது கூடப்படுத்துக்கும் போதெல்லாம் ஒன்னு தெரியலயா love பன்னு love பன்னு-னு பத்து தடவை சொல்லும் போதெல்லாம் தெரியலயானு கேக்குறேன்
- M : அது ஏதோ இதுல பன்னிட்டோம்னுதான் சொன்னேன்

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- F : நான் உன்னை நம்புனே பாரு என்னை வந்து செறுப்பால அடிக்கறதுக்கு எனக்கு வந்து ஒன்னுமே இல்ல நீக்க வச்சு சுட்டுக்கூடத் தள்ளலாம் என்னலாம் வச்சு அந்தளவுக்கு தான் எங்க வீட்ல இருக்காங்க நான் வந்து தூக்கிப்போட்டு இது பன்னி ... அப்படியே வந்தது கிடையாது சரியா எங்களுக்கும் குடும்பம் இருக்கு எங்களுக்கும் ஆள் இருக்காங்க எங்களுக்கும் இது இருக்கு சும்மா வந்து உங்ககிட்ட பேசறேன்றதால அப்படின்றதால அப்படியே இதுன்னு நினைச்சிக்காதீங்க ... உறவுக்காரங்களா? இவங்களா அவங்களானு கேட்கறதுக்கு வந்து prestige எங்களுக்கும் விready எல்லாமே இருக்கு so உங்கள வந்து பாத்தனால இங்க வந்து இப்படி உக்காந்துட்ருக்கு
- M : உன்னுடைய life-அ நான் பன்ன தப்புனால கெடுக்கக்கூடாது அப்படின்ற ஒரே reason-க்காகத் தான் நான் இவ்வளவு நாளும் இல்ல வேணாம் வேணாம்-னு சொல்லியிருந்தாங்க
- M : ஆ ஒன்ன தான் எவனும் கல்யாணம் பண்ணிக்க மாட்டான்னு முடிவாயிருச்சுல்ல அப்பறம் என்னவே ஆ
- M : நீ ... நான் இதுக்கு பதில் சொன்னேனு வச்சிக்க, அவ்வளவு கேவலமா போயிடும், புரியுதா, அத மட்டும் தெரிஞ்சுக்கே, எப்படி பேசனும்னு மொதல்ல கத்துக்க, கேட்ட கேள்விக்கு ... இரண்டு மணி நேரமா பதில் சொல்ற பன்ன தப்ப ஒரு காலத்துக்கும் நீ ஒத்துகு்க மாட்டே, ரைட்டு
- F : நீ எதுக்கு கவலப்பட்டே, நான் போய் எங்காயவது செத்துட்டேனா நீ மாட்டிப்பேனு சொல்லி கவலைப்பட்டியா
- F : ஆனா, ஏண்டா இப்படி அப்பாவி மாதிரி பேசறே என்னையே அப்படியே உருக்குற மாதிரி பேசற, அவ்வளவு கோவத்துல இருந்தேன் அப்படியே உருக்குற மாதிரி பேசற, என்னையே உருகிடுண்டா நன்றீ இப்படி பேசி பேசி தான் இவ்ளோ நாளு என்ன wait பன்ன வச்ச, ஒன் பேச்சால தான், நிஜமா சொல்றேனே நீ பேசறதனால நான் நிஜமா மயங்கிர்ரேன், என்னானே தெரியல அப்படியே அந்தக் கோவத்திலயே இருந்தேன் நானு, அந்தக் கோவத்த விட்டு எறங்கிட்டேனு வச்சிக்கயேன் நீ மயக்கிர்ர என்ன இன்னாதான் இருக்குமோ உங்கிட்டனு தெரியில, அப்படி இப்படி அப்போ சாப்பிடல, அது இல்ல இது இல்ல உடனே அப்படிய நான் இதுவாயிடுவேன் ஆம்...
- F : ஏய் எதுக்குடா என்ன லவ்-பன்ன எதுக்கு லவ்-பன்ன, தொரத்தி தொரத்தி லவ் பன்னியே, எதுக்குடா லவ்-பன்ன, ஆவடிலேர்ந்து இதுலேர்ந்து வீராப்புறத்லேர்ந்து தொரத்தி தொரத்தி வந்தியே, எதுக்குடா வந்த
- F : ம் சொல்லு எதுக்கு வந்த ஆவடியில புடிச்சு உலுக்கினியே பன்னிதான் ஆகனும் சொல்லிதான் ஆகனும் அப்படினு கேட்டல்ல எதுக்கு பன்ன, அப்ப தெரியலயா, வேணான்ட்டு உனக்கு தெரியலயா, இப்ப வந்துடடு அப்படியே இது அது இப்படி பசிக்குது அப்படி பசிக்குது பேசறதுக்குக்கூட உனக்கு பசிக்குதா, நான் எதனா நீங்க எதனா சொன்னா நான் அப்படியே செஞ்சிறுவன்றதனால நீங்க அப்படியே இப்படி இருக்குது அப்படி இருக்குது உடம்பு அப்படி இருக்கு இப்படி இருக்கு ஆம் ...
- F : வீட்ல பேசினியானு கேட்கறேன் வீட்ல பேசினயா
- M : நான் தான் உன்ட்ட என்ன சொன்னேன்
- F : வீட்ல பேசினயானு கேட்ட question-க்கு மட்டும் answer சொல்லு ...
- M : என்னைய வந்து அதான் சொல்றேன்ல வீட்டை விட்டு என்ன ஒதுக்கீட்டாங்கன்றேன் ... அவங்கிட்ட என்ன பேசனும்
- F : நீ கேளுனு சொல்றேன், உனக்கென்ன கேட்கிறதுக்கு என்ன
- ஏய், நீதானடா லவ்-பன்ன, நீதானடா இது பள்ள எல்லாம் பன்னல்ல நீதான் கேட்கனும், நீதான் கேளு, எள்ள விட்டு வந்து உன்மேல போகவே முடியாது, சரியா உன்னய வந்து என்னய விட யாரும் நல்லா பாத்துக்கவும் முடியாது நீ நினைச்சுக்கலாம் என்ன விட்டு ஓடிடலாம், அப்படின்னுட்டு சொல்லிட்டு, ஆனா அவன் ஒட முடியாது நீவாழு வாழாம இரு என்னமாச்சும் பன்னு, நீபேசு வீட்ல
- F : உங்க அம்மாகிட்ட பேசு, உங்க அன்னன்ட்டலாம் பேசுனா எப்படித் தெரியும், உங்க அம்மாகிட்ட பேசு நான் பன்னிக்க போறேனு சொல்லு பன்னிக்குறேன், அதுக்குப்புறம் நடக்கறத பாத்துக்கலாம்னு சொல்லு
- M : அதுக்கப்புறம் என்ன நடக்கும் பாத்துக்கலான்ற, அதான், உன்ட்ட confuse பன்னிட்டு உன்ட்ட ஒன்னு சொன்னனே ஞாபகம் இருக்கா
- F : என்னது உன் வாழ்க்கை waste-ஆ தான போகும் அன்னக்கி என்ன சொன்ன என்ன எல்லாம் சரி பன்னிடலாம், அப்புறம் தம்பி marriage பன்னவுடனே வீட்ல சொல்லி இது பன்னலாம் அப்படினு சொன்ன
- M : ... அதான் பத்துலட்சத்தோடு நூத்தி அம்பது பவுன கொண்டு வந்தேன்னா எங்கேயாவது ஒடிப்போயிடலாம்னு பாக்குறேன் அதுக்கும் முடியலங்கிற

Annexure

THE ROLE OF FORENSIC SPEAKER IDENTIFICATION IN ESTABLISHING SEXUAL VICTIMIZATION OF A SCHEDULED CASTE WOMAN: A CASE STUDY

REFERENCES

- Childers and Lee, C.K. (1991). Vocal quality factors; Analysis, synthesis, and perception, .I. *Acoust. Sot. Amer.*, **90** : 2394-2410.
- Childers and Wu, K. (1991). Gender recognition from speech, Part II; Fine analysis. J. Acoust. Sot. Amer., **90** : 1841-1856.
- Drygajlo, A., Jessen, M., Gfroerer, S., Wagner, I., Vermeulen, J., and Niemi, T. (2015). Methodological Guidelines for Best Practice in Forensic Semiautomatic and Automatic Speaker Recognition. Retrieved from http://enfsi.eu/wpcontent/uploads/2016/09/guidelines_fasr_and_fsasr_ 0.pdf
- Fant (1993). Some problems in voice source analysis. *Speech Communication*, **13** (1-2): 7-22.
- Gfroerer, S. (2003). Auditory-instrumental forensic speaker recognition. EUROSPEECH 2003 - 8th European Conference on Speech Communication and Technology, 705–708.
- Graddol and Swarm, J. (1983). Speaking fundamental frequency: Some physical and social correlates. *Language and Speech*, **24**: 351-356.
- Hartman and Danhauer, J.L. (1976). Perceptual features of speech for males in four perceived age decades. *J. Acoust. Sot. Amer.*, **59** : 713-715.

http://www.idsn.org/

Kasuya, Y. Kobayashi and Kobayashi, T. (1983). Characteristics of pitch period and amplitude perturbations in

pathological voice", Proc. Internat. Conf Aoust. Speech Signal Process., pp. 1372-1375.

- Kasuya, K. Masubuchi, Ebihara, S. and Yoshida, H. (1986a). Preliminary experiments on voice screening. *J. Phonetics*, **14**:463-468.
- Klatt and Klatt, L.C. (1990). Analysis, synthesis, and perception of voice quality variations among female and male talkers. J. Acoust. Sot. Amer., 87 (2): 820-857.
- Kohler, K. J. Einführung in die Phonetik des Deutschen", 977, De Gruyter, Berlin.
- Kulshreshtha, M., Singh, C. P. and Sharma, R.M. (2012). Forensic Speaker Recognition. Forensic Speaker Recognition.
- Lass and Brown, W.S. (1978). Correlational study of speaker's height, weight, body surface areas and speaking fundamental frequencies, *J. Acoust. Sot. Amer.*, **63** : 1218-1220.
- Murray and Arnott, J.L. (1993). Toward the simulation of emotion in synthetic speech; A review of the literature on human vocal emotion. *J. Acoust. Sot. Amer.*, **93** : 1097-1108.
- Rose, P. (1999). Long- and short-term within-speaker differences in the formants of Australian hello. *J. International Phonetic Association* (Vol. 29).
- Schwartz and Rine, H.E. (1968). Identification of speaker sex from isolated, whispered vowels. J. Acoust. Sot. Amer., 44:1736-1737.
- Wu and Childers, D.G. (1991). Gender recognition from speech, Part I; Coarse analysis. J. Acoust. Sot. Amer., 90: 1828-1840.
