Establishment of a Forensic Speech Science Center in India and its Efficacy

Dr. Didla Grace Suneetha

Assistant Professor, The English and Foreign Languages University, Hyderabad, India

Abstract— *This paper attempts to give 1) an overview of the area of Forensic Speech Sciences, 2) the advances made in this field at the global level and 3) the current issues with regard to its practice in India. In the light of this, it underscores the need for the establishment of a Forensic Speech Science Center in India, and briefly presents the efficacy of such a center.*

Keywords— *Forensic speech science, Phonetics, Forensic Speech Science center.*

I. INTRODUCTION

Forensic Speech Science is a burgeoning discipline in the domain of Forensics. It is the application of the knowledge of Phonetics to help solve crimes. This is relevant in real life cases where the only evidence available in the commission of a crime is the incriminating speech sample. Rose [1] explores the several aspects of forensic speech science as follows:

1.1. **Speaker Profiling** (determining age, gender, regional or socioeconomic background of the offender's voice),

1.2. **Content Identification** (determining what was said when the recordings are of bad quality, or when the voice is pathological or has a foreign accent),

1.3. **Voice Line-ups** (allowing the witness to pick out a voice previously heard from a line-up of recordings which includes the suspect's voice and a few foils),

1.4. **Tape Authentication** (determining if the tape has been tampered with or not) and

1.5. **Speaker Identification** (comparing the incriminating voice with one or more suspects' voices to determine if they are produced by the same speaker or by two different speakers)

The interest in Forensic Speech Science appears to be on the rise, primarily owing to its procedural applications in the forensic sciences. One of the earliest cases recorded in this area was that of 'Lindberg's case' in 1932 which involved the kidnapping and murder of Lindberg's infant son. Two years later, when the case was tried in the USA court, Lindberg testified that it was the suspect Hauptmann's voice that he had heard over the telephone earlier, when a ransom call was made. Based on Lindberg's

statement, Hauptmann was convicted and sentenced to death. A few years later in 1935, this case triggered the attention of a psychologist named McGhee. She decried as to how someone could be hung to death just based on a witness' memory of voice. This made her carry out several experiments to establish the relationship between voice and memory [2]. She came up with some interesting results that memory for voices fades with time. This series of research laid the basis for Forensic Speech Science. Subsequently, a whole body of research has been carried out and it focused on several related issues.

Voice is indeed a barometer of an individual and substantial evidence exists that identifying people may be possible through voice. Speaker-specific characteristics primarily result from an interplay of the anatomical factors such as the length of the vocal tract, size of the vocal folds and the size of the oral and nasal cavities. In addition, the habitual speech patterns the speakers employ, and their social, economic and educational factors also contribute to the uniqueness of a speaker's voice. As Laver [3] aptly puts it: "The voice is the very emblem of the speaker, indelibly woven into the fabric of speech. In this sense, each of our utterances of spoken language carries not only its own message, but through accent, tone of voice and habitual voice quality it is at the same time an audible declaration of our membership of particular social regional groups, of our individual physical and psychological identity, and of our momentary mood."

Having said that, voice unlike fingerprints, is complex and dynamic. Even under favorable circumstances, speaker identification may be a demanding task as many factors affect speech and voice. In this regard, several attempts have been made to find out the effects of Age [4], Gender

[5], Stress [6], Intoxication [7], Deception [8] and Disguise [9] on speech and voice. Some of the relationships between speech and the said factors have been established in the literature although they cannot be claimed to be conclusive.

II. GLOBAL SCENARIO

The field of Forensic Speech Science at the global level has been growing in prominence in the past couple of decades. It is commendable that it took roots in premier universities like Cambridge, Cardiff, Aston, York (UK), Hofstra, University of Florida (USA), University of Marburg (Germany) etc., where Graduate Programs in this field are being offered. In addition, there are online courses of study either in existence or in the planning stages. The idea also paved the way for the establishment and growth of various professional organizations. Notable among them are IAFPA (The International Association for Forensic Phonetics and Acoustics), IAFL (International Association of Forensic Linguistics), AAFSA (American Academy of Forensic Sciences), GFSL (Germanic Society for Forensic Linguistics) etc. These bodies primarily seek to: a) foster research, b) provide a forum for the interchange of ideas through workshops, seminars etc., and c) set down and enforce standards of professional conduct and procedure for those involved in forensic phonetic and acoustic casework.

Another promising feature globally is the publication of reputed periodicals/journals such as IJSLL (The International Journal of Speech, Language, and the Law), JFS (Journal of Forensic Sciences), which are very much acknowledged in the academic circles. Articles addressing the forensic phonetics aspects of speech and voice have been published in great numbers thus paving way for academic discussions and scientific approach in dealing with the related issues.

Internationally, there have also been great strides made in the setting up of Forensic labs to help courts administer criminal justice better by both solving crime and absolving people wrongly accused of committing crimes. Important among them are: JP French Associates (UK), Forensic Communication Associates (USA), etc., and their services include: forensic analysis of voices, author identification, tape authentication, speaker profiling, to name a few.

.

III. INDIAN SCENARIO

Unfortunately, in India we have a host of issues to deal with in this regard. The Indian judicial system is currently plagued with the problem of a whopping 3 crore pending court cases [10]. It is alarming to note that there are just 28

Central and state Forensic labs to handle the ever increasing crimes [11].

In the wake of this situation, as recently as in 2014, the Honorable Supreme Court of India has identified the need to strengthen forensic science and urged the investigating agencies to adopt 'scientific methods' in crime detection [12].

Of late, the voice identification cases related to threats, blackmail, extortion etc. are on the rise, owing to the increased use of mobile phones. It is reported that an estimated 200 voice identification cases got registered with the Indian forensic labs in just one particular year [11]. Unfortunately, the 'methods' used in the analysis of voice are not based on sound academic principles. In addition, they are antiquated, remotely scientific and far removed from the current international practices. Coupled with this is the acute dearth of trained personnel and infrastructure despite modest attempts made by a few Institutions in India in this direction.

In this context, Sinha [13] quips: "It is really disheartening to comment that India portrays a dismal scene with regard to advances in forensic linguistics. This branch has not been given its due seriousness so far." She further proposes that "the government as well as various technological institutes should fund research projects so that India should come at par with the researches in the other parts of the world."

In the light of these lacunae, this paper attempts to present the logistics for establishing a well-structured, state of the art Forensic Speech Science Centre in India.

IV. OBJECTIVES OF FORENSIC SPEECH SCIENCE CENTER IN INDIA

The forensic speech science center could be set up either under the aegis of Ministry of Human Resource Development (MHRD), Govt. of India or under a private and public partnership program. The center could initially be run by a team with a right mix of well-acclaimed international and Indian phoneticians and later taken over by Indian experts.

The objectives of the center would be four-fold: 1) Creating Awareness, 2) Imparting Training, 3) Fostering Research and 4) resolving criminal cases.

4.1 **Creating Awareness**: For any fledgling field, awareness acts as a key motivating factor. In this context, it should pervade primarily the judicial system (Courts), law enforcement, academic institutions and forensic laboratories, which naturally leads to civic (general) awareness. This can be achieved through

international collaboration, workshops, seminars, etc. To this end, the English and Foreign Languages University held its first conference on 'Forensic Speech Science: Theory and Practice' in 2014, which paved a way for the phoneticians, police personnel and legal fraternity to come onto a common platform and discuss issues of significance. The conference was attended by a world-renowned forensic phonetician, Dr James Harnsberger (University of Florida), who delivered the keynote address.

4.2 **Imparting Training**: A successful training program must encompass basic knowledge in the three prominent domains of speech science namely 1) the anatomy and physiology of speech articulation; 2) the acoustic consequences of speech articulation; and 3) the perception and comprehension of the acoustic signal via the human peripheral and central nervous system. In addition, courses on the application of phonetic theory in speaker identification are also essential. It is crucial to impart training to the various groups (law enforcement, legal practitioners, faculty of academic organizations and forensic lab personnel) involved in delivering criminal justice.

In this direction, the Department of Phonetics, the English and Foreign Languages University (EFLU), Hyderabad, currently offers courses in all the three core areas of speech science aforementioned. Besides, courses specific to Forensic Phonetics titled: 'Fundamentals of Forensic Phonetics', 'Phonetic Bases of Speaker Identification' and 'Forensic Speaker Identification,' are offered at the MA and PhD level. In addition, the key also lies in seeking the services of eminent personnel from abroad who have decades of experience in the field.

4.3 **Fostering Research**: India being a linguistically diversified country, it is indeed a herculean task to measure any aspect of speech and language of its population for a few good reasons: 1) Indian constitution recognizes 22 scheduled languages and in addition, English is declared as a second language for official purposes, 2) Coupled with this, there are 100 non-scheduled languages that are spoken in various parts of India [14], 3) Each language in turn has several dialectal variations and 4) a sizeable proportion of Indians is either bilingual or multilingual exhibiting different levels of communicative competence in each of these languages. Owing to this linguistic complexity, research on measuring the voice aspects of Indian population involves a host of issues.

Having said that, it is imperative to carry out research at different sub-levels -- the results of which can culminate into making broad generalizations. The first place to start with is the building up of a speech database. On the lines of the UK's speech database (DyVis -- a large scale forensically oriented speech corpus), Indian speech database should also be constructed and standardized for uniformity of research. Probably, the next step is to carry out systematic research at various levels of speech and arrive at the much-needed generalizations.

In this regard, EFL University has rigorously initiated doctoral research in this burgeoning area and thus far scores of PhD scholars have been actively involved in research which at times also involves analysis of real-life cases.

4.4 **Resolving Criminal Cases**: There is a large array of possible applications of Forensic Speech Science, all with the potential of improving or assisting in decisions about crimes associated with voice. Forensic phoneticians can provide systematic and scientific analyses of incriminating speech samples that can guide investigations like: Ear Witness Reliability, Voice Line-ups, Speaker Identification, Decoding Disguises, Transcribing Speech, Tape Authentication, Gunshot Signatures, etc.

V.   CONCLUSION

Forensic Speech Science is the application of the knowledge of phonetics and acoustics to legal investigations and proceedings. With the exponential growth of crime rate in India and the ingenuity with which criminals resort to crimes, it is imperative that newer and unconventional techniques be evolved in identifying criminals. Internationally, it has been acknowledged that Forensic Speech Science as a crime investigation technique has met with a high rate of success in solving legal cases. It is about time, in India, that concerted efforts are made to endorse the importance of having Forensic Speech Science as a new dimension to the investigation processes currently implemented by the judicial system and Law Enforcement agencies to solve cases.

REFERENCES

[1] Rose, P. (2002). Forensic Speaker Identification. London: Taylor and Francis, London

[2] McGehee, F. (1937). The reliability of the identification of the human voice'. Journal of General Psychology, 17: 249-71.

[3] Laver, J. M. D. (1994). Principles of Phonetics. Cambridge: Cambridge University Press.

[4] Endres, W., Bambach, W. and Flosser, G. (1971). Voice Spectrograms as a Function of Age, Voice Disguise and Voice Imitation. JASA, 49: 1842-8.

[5] Coleman, R.O. (1971). Male and Female Voice Quality and its Relationship to Vowel Formant Frequencies. JSHR, 14: 565-77.

[6] Scherer, K. R. (1981). Vocal Indicators of Stress, in J. Darby (ed.), Speech Evaluation in Psychiatry. New York: Grune and Stratton.

[7] Chin, S. B., Large, N. and Pisoni, D. (1996). Effects of Alcohol on the Production of Words in Context. Report 21, Speech Research Laboratory Indiana University, 404-20.

[8] Hollien, H., Geisson, L. and Hicks, J. W. Jr. (1987). Voice Stress Evaluators and Lie Detection. Journal of Forensic Science, 32: 405-18.

[9] Masthoff, H. (1996). A Report on a Voice Disguise Experiment. Forensic Linguistics, 3:160-167.

[10] More than 3 Crore Court Cases Pending Across Country. NDTV. Retrieved from http://www.ndtv.com/india-news/more-than-3-crore-court-cases-pending-across-country-709595, Updated: 2014, December 7.

[11] Rajeswari, S.J., Detect the frequency of crime. Indian Express. Retrieved from http://www.newindianexpress.com/education/edex/article207089.ece?service=print, 2010, August 23.

[12] Venkatesan, J., Supreme Court Calls for Scientific Methods in Crime Detection. The Hindu. Retrieved from http://www.thehindu.com/todays-paper/tp-national/tp-andhrapradesh/supreme-court-calls-for-scientific-methods-in-crime-detection/article5913231.ece#, 2014, April 15.

[13] Sinha, S. (2015). Forensic Linguistics and Forensic Phonetics: An Introduction. IJIMS, 2, 6: 153-157.

[14] Census of India, Office of the Registrar General and Census Commissioner, India. Census Data Summary. Retrieved January 10, 2009, from Census of India, Official Site Web site http://www.censusindia.gov.in, (2001).