Forensic Linguistics and Forensic Phonetics: An Introduction

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Abstract

Communication is the essence of human civilization. Life would not have been possible without this cognitive faculty. However, with evolution in civilization instances of criminal activities are also on the increase. This paper introduces one such scientific discipline which has the potential to provide an authentic framework for such identifications. It is called Forensic Linguistics. Each individual is unique and is endowed with a unique "voiceprint". This voiceprint can be obtained by the application of various paradigms and levels of linguistic knowledge. The paper provides a basic understanding of what this field is all about tracing its development down the ages. It also highlights a sub- field within Forensic Linguistics, viz., Forensic Phonetics/ Speech Forensics which is widely being used by Phoneticians to investigate such criminal cases. It tries to invoke interest among its readers with an aim to arouse zeal for research in this field.
Key words: Forensic Linguistics, Speech Forensics, Forensic Phonetics, Speaker Identification, Voiceprint.

1. Introduction

Speech patterns play an increasingly important role in criminal investigation and litigation. A suspect's speech has always provided cues about truthfulness, mental and emotional stress and level of intoxication. Accents and dialects have also given information about an individual's homeland. These days, voice prints are being used to verify the authenticity of terrorists' taped messages and psychological stress evaluation.

Communication is the apex of human cognitive development. Over thousands of years of evolution, humans have developed sophisticated communication system allowing civilization to flourish. It happens at many levels. Human communication occurs all the time and it has been said that "we cannot not communicate" (Tanner & Tanner, 2004) [1]. Even silence is a form of communication.

Communication is a process, a series of events allowing the speaker to express their thoughts and emotions and the listener to understand them. Speech communication begins as thought that is transformed into language for expression. Then, the brain programs and activates the body movements necessary to produce sounds. Respiration provides the compressed air for the production of speech sounds, and the vocal cords vibrate providing voice for loudness and resonance. The tongue, the lips, teeth and soft palate valve the air- stream, and shape it into speech sounds. Energy is transmitted through the medium of air as sound waves which are then detected by the shape of the ear. The brain then perceives this and is decoded and understood by the listeners.

Transmission

Speaker ⟶ Listener

1.1 Forensic Linguistics: An Overview

.Forensic Linguistics is the study, analysis and measurement of language in the context of crime, judicial procedure, or disputes in law, including the preparation and giving of written and oral evidence (Olsson, 2008) [2]. It is essentially the application of linguistics to legal issues. It is the application of linguistic knowledge to a particular social setting, namely the legal *forum* (from which the word 'forensic' is derived). Generally speaking, it is the interface between language, crime and law.

Given the centrality of the use of language to life in general and the law in particular, it is somewhat astonishing that Forensic Linguistics is a relative newcomer to the arena. It is one such field in which various linguistic theories may be applied to the analysis of language samples in an enquiry. Thus, the forensic linguist may quote observations from various researches undertaken in fields as diverse as language and memory studies, Conservation Analysis, Discourse Analysis, theory of grammar, Cognitive Linguistics, Speech Act Theory etc. it is alright to say that the forensic linguist applies linguistic knowledge and techniques to the language implicated in (i) legal cases or proceedings or (ii) private disputes between parties which may at a later stage result in legal action of some kind being taken.

1.1.1 History of Forensic Linguistics

It is difficult to pin- point a particular time as to when it started. Ancient Greek playwright accused each other of plagiarism. Since the eighteenth century, several authors have tried to claim their authorship on some of the famous literary texts. However, the actual phrase 'Forensic Linguistics' was not used until 1968 when a professor of linguistics Jan Svartvik recorded its first mention in an analysis of statements given to police officers in UK in 1953. Similarly, another professor of linguistics Malcolm Coulthard of Birmingham University helped in few other criminal cases applying discourse analysis.

In USA, it began on a slightly different note in 1963. Professor Roger Shuy was roped in to investigate the famous Miranda Case which led to the awareness regarding individual rights and the coercive methods of interrogation. There is a very readable review of early Forensic Linguistics in the US written by Judith Levi (Levi, 1994) [3]. In her work she chiefly discusses the vocabulary used by the drafters in a criminal proceeding. Certain phrases and lexicon make the information explicit while certain others make it inferential.

In Australia it began in the 1980s to talk about the application of linguistics and sociolinguistics to legal issues. Australian research focused on how Aboriginal witnesses and defendants understood the legal processes in land claim hearings and examined the impact of cross- cultural differences. In this context Gibbons (1994; 198) [4] observes "the…….. system…….around interrogation in the courtroom is alien to Aboriginal culture". Gibbons is the author of two major books on Forensic Linguistics, 'Language and Law' (Longman, 1994) [4] and 'Forensic Linguistics: An Introduction to Language in the Justice System' (Blackwell, 2003) [5]. In these books he not only summarizes some of his own considerable experiences but also details mush of the history of the development of Forensic Linguistics.

In the years since Forensic Linguistics began to establish itself as a discipline its scope has grown appreciably. Right from the outset as a means of questioning legal matters it has been called on to give evidence in many different cases including authorship attribution in terrorist cases, interpretation of legal documents and analysis of mobile text messages.

1.1.2 Speaker Identification

Probably the most frequently practiced form in the forensic context is speaker identification by experts. By far the best-known pronunciation expert in the world of fiction is no doubt Professor Henry Higgins of *Pygmalion* and *My Fair Lady* fame, a character created by the Irish-English author G.B. Shaw. Possibly partly motivated by his experience as an Irish-accented speaker of English living in England, Shaw took a keen interest in matters relating to accent and dialect variation. It has often been suggested that he may have derived the inspiration for the character of Henry Higgins from professor Henry Sweet, a professor of linguistics in the University of London, whose ear was reported to be so acute that it allowed him to locate any Londoner within a radius of two or three miles of his home on the basis of his accent.

Recently however, a rival model for Higgins has been claimed in the person of the even more renowned Daniel Jones, one of the pioneers of phonetic science and holder of the first chair of Phonetics in Britain. Forensic applications of this type of speaker identification date from the first half of the last century, when the tape recorder and the sound spectrograph first made it possible to capture, replay, visually represent and analyze the inherently transient phenomenon of human speech. One of the early approaches based on the use of the spectrograph initially showed considerable promise and came to be known as the voiceprint technique. This method was actually developed during the Second World War and essentially amounts to a visual comparison of spectrograms of linguistically identical utterances to determine whether they originate from a single speaker.

1.2 Forensic Phonetics/ Speech Forensics

It is the analysis of speech through auditory and acoustic means and its application in the legal and criminal arena. It is the science which deals with questions of speaker identification, resolution of disputed context of recordings, the process of setting up of voice line- ups and ear line- ups and related topics. Phoneticians are able to analyze the distinctive speech characteristics of a speaker relative to other candidate speakers. It examines a set of phenomena and offers opinions based on the observations arising from the analysis. Forensic Speaker Recognition (FSR) process is used to determine if a specific individual (suspected speaker) is the source of a questioned voice recording (trace). This process involves the comparison of recordings of an unknown voice (questioned recording) with one or more recordings of an unknown voice (voice of the suspected speaker) (Neustein & Patil, 2012) [6].

1.2.1 Techniques of Speech Analysis and Speaker Identification

The field of forensic speech and audio analysis comprises a wide range of activities of which the most spectacular is no doubt speaker identification. Other activities in the field include intelligibility enhancement of recorded speech samples, the analysis of disputed utterances, and the examination of the authenticity of audio recordings. A related activity is linguistic authorship identification, the linguistic analysis of a spoken or written text undertaken with a view to establishing the identity of the author of that text.

There are probably few forensic disciplines that are characterized by such a diversity of methods and procedures as the field of forensic speaker identification by experts. Basically, practitioners' group consists of trained phoneticians. They rely primarily on a combination of auditory phonetic analysis and a variety of acoustic measurements, and will generally only consider themselves competent to analyze speech samples in their own native language.

They use the methods of speech analysis and synthesis. It is the process of breaking down an acoustic signal into its component parts and then they are reassembled together. These processes have become highly mechanized now and can be done by the telecommunication industry and services for the disabled. Advances in these technologies show no signs of relenting and the future promises even more inventories to accommodate the communication disabled (Nolan, 1983) [7].

It all began methodically with the formulation of what is known as the Fourier's law detailing the usefulness of spectrograms. It says that any non-sinusoidal wave, a complex wave can e represented as the sum of a number of sinusoidal waves, simple waves of different frequencies, amplitudes and phases. This law allow for speech synthesis and analysis. Speech synthesis involves adding acoustic segments to create a complex wave. The Fourier transform allows speech to be seen as a spectrum (Tanner, 2006) [8]. The Fourier law is the basis by which the sound spectrogram or 'voiceprint' is produced (Tanner & Tanner, 2004) [1].

Most automatic speaker identification systems today use a form of Gaussian mixture modeling to characterize or 'model' the speech of the known, target speaker (i.e., frequently the suspect in a forensic application) and that of the unknown speaker (i.e., the perpetrator). In addition to this, a relevant speaker population is defined and a probability-density function of the speech variance of this set is calculated. What the method essentially sets out to do is determine how likely a degree of similarity or difference as found between the target speaker (say the suspect) and an unknown speaker (say the perpetrator) is to occur within the relevant population.

1.2.2 The Indian Scene

It is really disheartening to comment that India portrays a dismal scene with regards to advances in forensic linguistics. This branch has not been given its due seriousness so far. With the number of terrorist attacks increasing in the recent past and the deteriorating degree of crimes that are being committed against women and children in particular it becomes all the more important to look for improved techniques to catch hold of the perpetrators. It is true that a considerable amount of money and time need to be invested at this stage for fast and improved research in this field but since the prospects are promising it would be prudent to take this field seriously. 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.

1.3 Conclusion

Language and communication are indispensable to human evolution. With the rate at which crime is catching up with evolution it is important to think of unconventional ways to identify criminals and suspects. Forensic Linguistics offers wide scope to improvise techniques of forensic analysis of speech acts and literary texts. The world has recognized the importance of this field and now it is high time that serious research must be undertaken in Indian universities and institutes as well. The main purpose of the paper was to provide a brief overview of Forensic Linguistics and what are its applications, limitations and scopes.

Acknowledgements

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