Approved For Release 2001/03/07 : CIA-RDP96-00788 [redacted]

LIE DETECTION THROUGH VOICE ANALYSIS

By

Frederick C. Link*

"Have you read the articles on voice analysis in recent Playboy[1] and Penthouse[2] magazines?"

"Have you seen the movie 'The Trial of Billy Jack?'"

"Or, have you watched television presentations on 'What voice analysis shows really happened in the Kennedy assassination.'"

If the answer to any one of these is "yes," you may well have been left with the impression that voice analysis is the cure-all for detection-of-deception problems in law enforcement.

Lie detection through voice analysis has been glamorized by publicity in the popular media, and all this glitter has led many citizens to form an unrealistically high opinion of the present value of voice analysis. However, television, movies and popular magazines have not given unbiased, impartial presentations of the facts regarding the effectiveness of voice analysis for lie detection.

At the present time, no military law enforcement agency is using voice analysis for lie detection, although all of these agencies use the polygraph technique when it is appropriate. There are good reasons for this nonuse of voice analysis. While voice analysis may some day in the future be developed to the point where it is useful for military lie detection, that day has not yet arrived. In order to understand why this is so, let us look at some pertinent facts.

The Basis of Voice Analysis

Although human speech is the result of a very complicated process, several different aspects of the voice can be analyzed. The manufacturer of one voice analysis device (the Psychological stress Evaluator) relates that the single, integrated sound that we hear as human speech is composed of at least three different sounds blended together: the basic sound, formant sound, and the microtremor.

The basic sound is formed by air being forced over the vocal cords and is a signal generally between 100 and 300 hertz, (1 hertz, a frequency equal to one cycle a second). This frequency forms the base of the combined signals that constitute the voice.

---

*The author is a Chief Warrant Officer, Corps of Military Police, U.S. Army, and an instructor in polygraph technique in the Army Polygraph School at Fort McClellan, Ala. The article is reprinted from the Military Police Law Enforcement Journal, Spring, 1976, with permission of the journal and the author.

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

The formant sounds are resonances (vibrations) created by the various cavities of the head, especially the mouth, which add a second amplitude-modulated sound to the voice.

Finally, the microtremor (an inaudible frequency modulation) is superimposed on the base and formant sounds.

The microtremor signal is normally in the range of 8 to 12 hertz and it is present in all normal speech. However, when a speaker begins to feel internal stress and those speech processes that are normally mediated by the autonomic nervous system are brought under conscious control, then the microtremors are suppressed and disappear from the voice. When this presence or absence of the microtremor is recorded and charted with suitable equipment, it is possible to determine from speech whether a speaker shows stress. Under suitable testing conditions, the presence of stress would be an indication of lying, and the absence of stress would show truthfulness.[3]

Another voice analysis device, the Mark II Voice Analyzer, is claimed to function by extracting and processing the tremulo effect from the voice, a process related to but not the same as that used in the Psychological Stress Evaluator.[4]

Voice analysis devices have been highly marketable and they have been popping up like mushrooms. Although these devices differ from each other in their exact modes of operation and in their finished designs, they are all essentially similar in that they extract and process some signal contained in speech. The devices offered by the manufacturers range in price from about $3,500.00 up. Usually, these systems consist basically of a tape recorder; the analyzer itself, which gives a chart readout and, in at least one case, a numerical readout and the accessories such as microphones, telephone taps, and the like.

Does Voice Analysis Really Work in Lie Detection?

The manufacturers of these devices, of course, claim that they really work. In fact, they claim them to be better than the polygraph in accuracy, reliability, ease of use, comfort and dignity of the examinee, and in just about any other respect you can imagine. Additionally, the manufacturers of some of the devices have gotten nation-wide publicity by claiming to have analyzed and determined the truthfulness of the recorded statements of such contemporary figures as Lee Harvey Oswald, Edward Kennedy, and Patty Hearst.[5] They further claim to have determined the truthfulness of the statements made by these persons. We will deal with these latter claims further on in this paper.

Military attitudes on voice analysis for lie detection are based on tests of some of these devices made by several military agencies and on validation research conducted by a civilian institution under contract to the Army. The Air Force tested a Psychological Stress Evaluator for lie detection and found it "not useful."[6] The National Security Agency tested a Psychological Stress Evaluator and found it "insufficiently reliable."[7] The Army obtained three Psychological Stress Evaluators and used them in a study of lie detection

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

conducted by Dr. Joseph Kubis of Fordham University. Following this study, the Army dismantled two of the devices and transferred the third one to the Air Force for research in areas not related to the detection of deception.[8]

The Kubis study,[9] completed in 1973, provides the primary justification for the Army's nonuse of voice analysis. It is also a very interesting and enlightening document on the relative effectiveness of the polygraph technique, voice-stress analysis, and investigator intuition. In essence, Dr. Kubis put a number of volunteers through a crime situation in which money was stolen from a purse. The volunteers were placed in groups of three in which one person stole the money, the second acted as a lookout, and the third person had no connection with the crime whatsoever. After the crime had been committed, all three persons were tested to attempt to determine what their individual roles in the crime had been. In the structure of a polygraph examination situation, the suspects were given a polygraph examination while at the same time their answers were tape-recorded. These tape recordings were subsequently analyzed with two different voice analysis devices to attempt to determine each suspect's role. Finally, the examination was watched by observers who attempted to tell if the suspects were lying or telling the truth just by looking at them and interpreting their actions.

Kubis' study concluded that the polygraph technique had high validity, observation of behavior was second most effective in determining who did what, and voice analysis came off a poor third in detecting deception in this experiment. In the words of Dr. Kubis: "Essentially, the findings indicated the clear inferiority of voice analysis in its present state of development, not only to the polygraph but also to judgments made on the basis of simply observing subjects' behavior."[10] He further says: "The results failed to demonstrate that either of the voice-analysis techniques was effective in identifying the three basic roles of thief, lookout, and innocent suspect in the simulated theft. In contrast, the polygraph achieved an accuracy score of 76 percent, a value comparable to that obtained in previous studies using the simulated theft paradigm."[11] This validation effort provided the military community with a scientifically researched basis for rejecting voice analysis as a lie detection technique at this time.

Dr. Kubis does not conclude that voice analysis for lie detection is unworkable, only that presently available voice analysis equipment does not fill the bill. He attributes the failure of voice analysis in his experiment to "a matter of insensitivity or other inadequacy in the devices themselves in their present state of development."[12] Perhaps someday in the future, voice analysis will be developed to the point where it is usable for lie detection.

It should be noted that the manufacturers of the equipment and some of its users have criticized the Kubis study on technical grounds. These criticisms range from the claim that the tape recordings were of such poor quality they could not be analyzed to the claim that the requirements of the research contract were not met. Therefore, it is claimed that the results and conclusions of the Kubis study are invalid.[13] This appears to be a somewhat extreme position and there is probably little valid reason to doubt the overall conclusions of the study. Nevertheless, a new validation study is being

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

conducted by a group at the Michigan State University, but so far no findings have been announced.

Can Voice Analysis Determine If Public Figures Are Telling The Truth in Public Statements?

Probably the most effective publicity for voice analysis has come from the media that ran sensational stories about the analysis of public statements made by newsworthy persons. The publicity centered primarily about the questions of whether Lee Harvey Oswald shot President Kennedy, whether Oswald acted alone, and whether there was a conspiracy among various unnamed persons acting to shoot Kennedy. The leading article on this subject was written by a trained voice analyst. The article, entitled "Lee Harvey Oswald Was Innocent,"[14] appeared in the April 1975 issue of "Penthouse" magazine. It contained a quite detailed account of how the author had determined Oswald's innocence, and many other details of the Kennedy assassination, through voice analysis. Naturally, as indicated by the title of the article, the most significant conclusion was that Oswald was most probably telling the truth when he denied shooting President Kennedy.

More recently, another prominent voice analyst was reported in the press[15] to have analyzed the tapes made by Patty Hearst while she was under the domination of the Symbionese Liberation Army (SLA). This recognized authority on voice analysis concluded that Patty Hearst made all of her antisocial statements under duress. He said she was not telling the truth when she claimed to have voluntarily joined the SLA and to have voluntarily participated in the bank robberies and other illegal activities perpetrated by the SLA. He said she was innocent of any voluntary wrongdoing, and was doing only what she was forced to do. All of these conclusions were formed on the basis of this authority's analysis of the Hearst tapes.

On June 4 and 5, 1974, a subcommittee of the Committee on Government Operations of the House of Representatives of the United States held hearing on "The Use of Polygraphs and similar Devices by Federal Agencies." Various advocates of the voice analysis lie detection technique testified before this subcommittee. A position paper prepared by one manufacturer of voice analysis devices said:

> Because the PSE uses the voice as a medium for stress measurement, the question has been raised concerning the ability to detect attempted deception of truthfulness from television or radio broadcasts. It is indeed a fact that the PSE can be used to determine the stress levels on the part of the speaker under these circumstances. However, as has been discussed previously, lie detection is an interpretative or analytical process which requires certain control elements to allow equating the stress indications to attempted deception, as opposed to any other stress cause. Without these controls, appropriate pre-test, properly structured examination, and post-test interview indications of stress remain just that. (sic) It would be interesting, indeed, if lie detection could be accomplished under such circumstances, but it cannot."[16]

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

The developer of another of the voice analyzers told the subcommittee:

> "While the Mark II can provide data on the stress occurring in dialog, our experience to date shows that this is an exceedingly complex area. Patterns of stress reactions occur but, at present, we cannot be certain as to their meanings. Therefore, we do not believe that the Mark II or any other instrument currently available can analyze routine dialogs and determine deception based upon our present knowledge."17

He also stated that:

> "... We just don't know enough to be able to truthfully say what the patterns of tension in dialog mean. And I am afraid anyone can find support for whatever interpretation he wishes to make from these patterns. This is very bad obviously."18

In an early paper on voice analysis validation, two researchers concluded:

> "... For example, it has been suggested that someone might try to tape record a presidential news conference from the television coverage and determine if the president was lying. It would of course be possible to analyze the president's speech and one would also be able to detect the presence of psychological stress in it. But unless he volunteered to answer the questions from a structured interview, it would be impossible to determine if psychological stress derived from lying or other sources. Was the stress caused by a lie, an angry gesture from the crowd, an extraneous thought, or a gas pain? All could produce psychological stress."19

At these same hearings, the president of the voice analysis professional society, who is also a medical doctor, made this statement:

"Another charge that is made is that the Psychologic Stress Evaluator (PSE-1 or PSE-101) can and may be used in a clandestine fashion. It is true that tape recordings may be run in a clandestine fashion, in a face-to-face conversation, off the telephone, and off the television. However, without formal testing situations and structure, the only evaluation that you can achieve from these tests is that the individual you are talking to is stressing or they are not stressing. From this type of recording no type of truth evaluation could be undertaken. If a person is speaking with great emotion or conviction, the recording will show stress, as it should, mirroring that emotion or conviction."20

Finally, the voice analyst who has now declared Patty Hearst to be innocent of all the offenses of which she is suspected reported to this Congressional subcommittee:

> "The system, the PSE as a lie detector cannot be used without the knowledge of the individual because detection requires a very specific set of circumstances, which means a personal

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

confrontation, the pretesting of you, the very rigid test of a section of test questions which must be reviewed prior to the test. . . . You cannot conduct detection (of deception) tests surreptitiously. It is impossible with our equipment, to the best of our knowledge, or anyone else's equipment."[21]

These statements made to the Congress by the voice analysis group appear to conflict with the claims that have found their way into print in the popular press. In view of the inconsistent data coming from what are essentially the same sources, it seems difficult to decide if voice analysis of public statements works or not.

This brief overview of voice analysis has indicated that, while voice analysis appears to be scientifically based on involuntary psychophysiological phenomena, hard evidence that the voice analysis lie-detection technique is effective has not been introduced. It further seems that, at a minimum, much further testing and refinement will be required before voice analysis can be considered useful for military lie detection. Resolution of these problems does not seem to be enhanced by inconsistent statements made by the experts in voice analysis. Until a scientifically acceptable validity rate for voice analysis (that approaches the validity rate of the polygraph technique) is established and, until the boundaries are clearly established for what voice analysis can and cannot do, it does not seem reasonable that voice analysis for lie detection ought to be adopted by any of the military services.

Footnotes:

[1]Craig Vetter, "The Lie Machine," Playboy, XX, 4 (April 1973), pp. 92-4, 102, 164, 166, 168, 170, 174.

[2]George O'Toole, "Lee Harvey Oswald Was Innocent," Penthouse, VI, 8 (April 1975), pp. 45-46, 124-127, 132.

[3]Hearings Before a Subcommittee of the Committee on Government Operations, House of Representatives, Ninety-third Congress, 2d Session, "The Use of Polygraphs and Similar Devices by Federal Agencies," Government Printing Office, Washington, D.C., 1974, p. 238.

[4]Advertising material for the Mark II Voice Analyzer, Law Enforcement Associates, Inc., 1975.

[5]Art Dworken, "Patty Hearst Not Guilty," National Enquirer, September 23, 1975, p. 5.

[6]Hearings, p. 429.

[7]Ibid., p. 429.

[8]Ibid., p. 428.

[9]Joseph F. Kubis, "Comparison of Voice Analysis and Polygraph as Lie Detection Procedures," Final Report Contract DAAD05-72-C-0217, U.S. Army

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

Land Warfare Laboratory, Aberdeen Proving Ground, Maryland, August, 1973.

[10] *Ibid.*, p. 31.

[11] *Ibid.*, p. iii.

[12] *Ibid.*, p. iii.

[13] Hearings, pp. 301-310.

[14] O'Toole.

[15] Dworken.

[16] Hearings, p. 236.

[17] Hearings, p. 395.

[18] Hearings, p. 400.

[19] Hearings, pp. 292, 293.

[20] Hearings, p. 332.

[21] Hearings, p. 350.

* * * * * *

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

SG1I

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2

Approved For Release 2001/03/07 : CIA-RDP96-00788R002000150003-2