Observations on Voice Identification Training

In August, 1982, the U.S. Secret Service initiated a forensic voice identification program and designated me to obtain the necessary training credentials. In furtherance of that objective, the Secret Service solicited the assistance of both the Michigan State Police and the F.B.I. in providing the requisite background skills in voice identification and magnetic tape filtering and enhancement. In September, Det. Lt. Lonnie Smrkovski was designated by his organization as my training supervisor and he suggested a thorough and coordinated educational and training program which eventually should provide the Secret Service with a reputable Voice Print program by the end of 1984.

Since my background in forensic science involves certification in two other fields (polygraphy and document examination), I felt it may prove enlightening to review those training/educational requirements associated with certification in each of these respective fields and to compare it with present IAVI certification requirements.

My educational background involves a B.S. degree in engineering sciences from the USAF Academy; a Masters of Forensic Science degree from George Washington University; and a second masters degree in forensic science with a major in Questioned Documents from Antioch School of Law. Professionally, I have been involved in federal law enforcement for 16 years and received my initial training with the Air Force Office of Special Investigations. For the past 12 years I have been employed by the Secret Service. Since my initial forensic training was as a special agent/polygraph examiner for a period of nine years, I'll first review some of the training requirements imposed on all federal polygraph trainees.

The primary federally accredited school for providing polygraph instruction is the U.S. Army M.P. School on Polygraphy which extends approximately 14 weeks in length. Towards the end of this school, the Army requires all of its students to conduct actual field testing on accused felons wherein the trainee receives immediate feedback concerning the success or failure of his polygraph examination techniques and chart evaluation. It should be explained that these field examinations are performed on cooperative U.S. Army volunteers who are asked to participate in contrived crime situations so as to evoke a valid physiological response on the polygraph instrument. Thereafter follows a 3 month internship program wherein the trainee conducts all examinations under the supervision and guidance of a certified polygraph examiner. Only the most qualified senior examiners are chosen to assist and instruct the new examiner during his internship. Successful completion of the internship program is based on the recommendations of those senior examiners who have monitored the trainee's performance.

Each examiner will retain this certification for a period of one year. In order to be annually recertified, polygraph examiners are required to conduct a minimum of thirty-six (36) polygraph examinations each year. Failure to conduct the minimum required number of examinations will necessitate the examiner to re-enter the internship program until he/she has demonstrated their ability to conduct satisfactory examinations.

Each certified polygraph examiner is scheduled for a minimum of one advanced level or supplementary training activity during each year of certification. This requirement is intended to develop each examiner's expertise and proficiency in conducting polygraph examinations and to provide continuing education in physiology, psychology, instrumentation, and current developments in the field.

Of paramount importance to the increased acceptability and reliability of the polygraph technique (both by the courts and by Congressional oversight committees) has been the relatively recent establishment of Quality Control branches within each of the federal polygraph user agencies.

The quality control reviewer will perform an independent numerical evaluation of the charts (where applicable) and then compare this to the field examiners numerical evaluation. The construction of the test questions will be reviewed for established standards. The review will include inspections of the attachments to insure that they were properly executed and an overall review of the polygrams for technical errors. Following a thorough evaluation of the entire exam, the reviewer will sign and date the official report stating that he agrees or disagrees with the opinion rendered by the examiner in the field. If, in the opinion of quality control, an error has been made, the field examiner is notified and appropriate action will be taken.

The benefits of these review procedures are:

- to identify and correct errors immediately
- to standardize techniques and reports
- to increase validity of the examinations
- to support the rendered opinion
- to maintain the highest quality from field examiners
- to identify examiner problems and make corrections
- to maintain statistics on accuracy rate of the technique and calculate cost savings estimate derived from successful resolution of criminal cases through use of polygraph

Regarding planned research on polygraph validity and/or reliability, the Secret Service and the Federal Bureau of Investigation are presently beginning a research study on actual field cases from both agencies. The data will come from actual confirmed cases where more than one person was administered an exam on the same case. Validity, reliability, false positives, and false negatives will be addressed. This will be a very significant research

project in that there are no similar studies in existence to date.

My training as a questioned document examiner involved three years of graduate school education in such areas as handwriting/ typewriter identification; paper and ink analysis, instrumental analysis; and tool mark comparisons together with two years daily O.J.T. experience with a senior certified document examiner. Thereafter, it has been necessary to attend seminars and workshops so as to upgrade my proficiency in handling new document related forensic requests. A national certification program co-sponsored by the American Academy of Forensic Sciences and the American Society of Questioned Document Examiners was implemented in 1979 with regular re-certification requirements strictly enforced. Incidentally, the Secret Service, as does most federal document laboratories, maintains rigid quality control standards by requiring a review of all positive identifications or eliminations by other competent document examiners before final lab conclusions are published.

Before discussing my training accomplishments within the Voice Identification field, I would like to attest to the complexity of achieving a thorough understanding of all the related speech science and magnetic recording skills requisite for achieving competence within this field. Within the past year, I have gained sufficient background knowledge to alert me to the ever increasing demands that I will be subjected to so as to maintain "state of the art" proficiency in this highly complex field.

Thusfar I have attended a formal one week course on Magnetic Recording Theory hosted at George Washington University; the two week indoctrination course conducted at Voice Identification Inc.; the three week Michigan State University Workshop on Sound Physics and Voice Identification; a two month O.J.T. internship program on audio tape filtering and enhancement offered by the FBI, together with receiving continued guidance and casework review by the Michigan State Police Voice Identification Unit.

As a neophyte in the field of Voice Identification, I readily admit to initially possessing nothing more than a layman's understanding of the theory of magnetic tape production and recorder operation. Upon initiation of my formal training in this field, it became readily apparent that all to often, the training instructor would incorrectly assume that I possessed adequate background knowledge and training to fully understand the concepts being discussed. I consider such assumptions concerning a trainee's background knowledge or skill of operation level in audio recording equipment as both dangerous and ill-founded. This is especially true if the trainee begins to feel overwhelmed by the complexity in operation of the more sophisticated forms of audio equipment or is hesitant to admit his or her shortcomings in a particular area of voice identification theory.

For example, in my own particular circumstance, I was provided

detailed graduate level instruction during my second month of
training in such diverse magnetic recording subjects as:

1. Frequency Response
2. Track and Transport Systems
3. Wow and Flutter anomalies
4. Fundamentals of Physics of Magnetism including
   induction of voltage and demagnetization effects
5. Signal losses in Playback including coating thick
   loss, spacing loss, and reproduce head gap losses
6. Magnetic Head Operation and Assemblies
7. Production of Magnetic tapes and Wear losses
8. Amplifiers and Equalization Effects
9. Signal to Noise improvements in audio field
10. Tape Speed Variations Effects on degraded signal
11. Timing Errors between tracks
12. Errors in Tape duplication
13. Distortion and Noise Effects
14. Drop Outs and Cross-Talk Anomalies
15. Troubleshooting Recorder Malfunctions

The above subjects were reviewed in a week long block of
instruction and before the year had ended, it became apparent that
I would have to receive formal instruction in such voice
identification related fields as:

1) Physiology and Anatomy of Human Speech
2) Acoustics
3) Sound Physics
4) Perception of Speech
5) Phonetics
6) Waveform Analysis by Fast Fourier Transform
7) Digital and Analog Filtering and Enhancement Techniques
8) Telephone line equalization effects
9) Audio Noise and Distortion effects
10) Signal Processing Devices and effects on Spectrograms

The issue I am trying to draw your attention to is that the very
diverse nature of the field itself suggests that new trainees in
the field be made aware of its potential complexity at the
outset and a rigorious but well-coordinated training and
education program be instituted for the intern which will expose
him to these different disciplines. The FBI requires a minimum
of two years of daily hands-on indoctrination in the operation
and use of the various filtering and enhancement devices prior
to accreding the technician as a forensic expert. The almost
expotential escalation in the complexity of the next generation
of sophisticated digital filtering equipment demands that a
Voice Print Examiner should continually upgrade his proficiency
in this field.

On a personal note, I assisted in the development of a Quality
Control Unit for the Secret Service Polygraph program and have
since monitored the technique's increasing acceptability both
within the judicial system and law enforcement agencies. I feel

that a similar nationally coordinated quality control effort by the IAVI should significantly enhance the reputation and acceptability of the spectrographic technique together with insuring the highest quality work product received from our examiners.

In conclusion I would like to give you my thoughts on the comparative complexities of the three forensic disciplines and my feelings of what research proposals bear merit for future IAVI consideration. Based on my limited experience in this field, it appears that more substantial technical demands are imposed on the Voice Print trainee in acquiring a working knowledge in all of the related Voice Identification and Tape Enhancement sub-disciplines. As a certified Polygraphy and Document Examiner, I agree with federal judge Greene who years earlier equated the complexities of interpreting the results of inter and intraspeaker variability as being more akin with the natural variation difficulties daily faced by the forensic document examiner. The dynamic nature of the speaker's voice operating together with a varying quality of signal to noise response in the recorded message is more analagous to the document examiner's job, both in technique and in assessing subtle differences in "class vs. individual" characteristics and "range of internal and external variation" similarities or differences.

As the voice identification field is destined to grow and thus attract additional forensic requests for support, I also feel it is incumbent on the IAVI to establish close working relationships with all of those federal, state, local, and private agencies which can provide technical knowledge and equipment-use instruction in those areas which demand "state of the art" expertise. The problem of shuffling a voice Print trainee around the country to receive the best in technical training is significant but neither is it insurmountable. The IAVI should continue in its efforts to formulate a well coordinated training curriculum for its' interns.

I further feel that the findings and recommendations of the National Research Council Report: On the Theory and Practice of Voice Identification were certainly valid when the committee concluded that "the full development of voice identification by both aural-visual and automated methods can only be attained through a longer-term program of research and development.

Specifically, it appears that the increasing efficiency of the automated speaker recognition and verification systems offer promising possibilities for a cost-effective method of speaker classification. A standard data base of recorded voice samples that are representative of particular dialects or semantic and syntactic population groups is available at the Aural/Linguistic Library of the FBI. Future research could focus on identifying and classifying dialectical differences among different speakers who sound auditorially similar. At present it appears not to be known whether certain dialects make their speakers appear more homogeneous spectrographically, thus masking individual

identity; i.e. what constitutes a dialectical from a personal characteristic of speech.

In examining the detrimental effects of variation on spectrographic comparisons, it appears that future research should examine: (1) the effects of psychological stress on spectrograms; (2) degraded signal effects caused by different room acoustic configurations; (3) distortion effects in the quality of spectrograms; and (4) changes in signal to noise levels caused by telephone line truncation and automatic switching devices. Concerning this last problem area, I've already made contact with representatives of ATT and will be conducting controlled experiments in the aforementioned area.

The National Research Committee further recommended that a "national mechanism be established to stimulate, guide, and coordinate a broad national program of scientific research on the processes of speech generation, transmission, and analysis as they pertain to the practice of voice identification."

I sense that a new era of cooperation is being generated between state, private, and federal Voice Print Examiners and am confident that both the law enforcement and private examiner can collectively pool their respective skills and knowledge to help formulate such a national research mechanism.