

**The Bill Blackwood
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Advanced Measures to Detect Deception

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ABSTRACT

Detecting deception is relevant to contemporary law enforcement because effective law enforcement depends on the truth. What the truth is has been studied for decades. Researchers have grappled with this problem of creating a machine that can tell, definitely, whether a person is lying.

The purpose of this research is to determine steps used today based on new technology, and the new measurements that may replace or compete with the polygraph machine for detecting lies. The method of inquiry used by the researcher included websites, periodicals, journals, personal interviews, and a survey. The survey was designed to determine if various agencies are familiar with or experimenting with newer devices that detect deception. It was also necessary to measure other department's perceptions of the polygraph machine today. The researcher discovered that the polygraph machine is still the number one machine used today by most departments to detect deception; however, a device called the Voice Stress Analyzer is gaining ground.

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INTRODUCTION

One of law enforcement's roles is to investigate crimes that are committed. During the investigation of a crime, various means to determine deception may be used. The polygraph machine has drawn considerable scientific scrutiny and remains inadmissible in courtrooms (Jaffe, 2007). Instruments necessary to determine deception play a vital role in law enforcement. Therefore, the relevance of this topic remains a major concern to law enforcement and the war on crime. Law enforcement seeks a more reliable tool with less false/positive results. According to a famous quotation by Albert Einstein, "Anyone who doesn't take truth seriously in small matters cannot be trusted in large ones either." According to the Australian Broadcasting Corporation's Gateway to Science, in the case of humans, the possibility for lying increases even further because of the use of oral language (as cited in Steffens, 2003). To quote Robert Wright, "we are far from the only dishonest species, but we are surely the most dishonest, if only because we do the most talking" (as cited in Steffens, 2003, p.3).

The purpose of this research is to examine future technology to detect deception and determine the benefit to law enforcement, to courts, and to society. The researcher will determine if newer instruments are more reliable, less expensive, and easier to manage. The research will determine if the polygraph has become obsolete by today's standards. The research questions to be examined focus on whether or not technology has advanced to produce a more efficient instrument. The researcher will determine how departments rate the polygraph machine today and if departments are moving toward a more advanced tool to detect deception. The researcher will identify and profile new instruments designed to detect deception.

The intended method of inquiry will include a review of articles, periodicals, journals, books, demonstrations of new technology, internet sites, and scheduled interviews. The rapid advancement of technology has the possibility of replacing the polygraph machine. The intended outcome or anticipated findings of the research is to determine if one acceptable means of detecting deception exists and if it will be accepted. The advancement of new technology to detect deception is to produce a higher percentage of positive results. Deception is not always a key element that an individual is lying. There may be other factors not associated with the incident in question that may contribute to deceptive traits. Therefore, technology that produces a higher percentage of positive results is needed.

Law enforcement and the courts are looking for an instrument that leads to a higher conviction rate and advances the profession of law enforcement. Hopefully, an instrument will be produced or discovered that is cost effective and has a higher false positive ratio. From a law enforcement perspective, there is a need to produce an instrument that is convenient to use and more compact, with a price that is cost effective.

REVIEW OF LITERATURE

Krapohl, Ryan, and Shull (2002) believed one of the most difficult aspects of law enforcement is determining when potential suspects are lying or telling the truth. Lying tends to hinder an investigation due to the lack of verifiable facts. Due to this, law enforcement has often turned to science with this problem. According to Krapohl et al. (2002), science has tried to provide a solution, and numerous methods and techniques have been used over the years to assist police in determining fact from fiction during the

interrogation of a suspect. No method, other than the polygraph, has withstood the test of time. However, in the last 25 years, other means of detecting deception has raised doubt regarding the use of the polygraph machine. A device called the Voice Stress Analyzer has caught the eye of law enforcement. The instrument in question has shown promise and has had positive results so far (Krapohl et al., 2002).

Detection devices are still new when it comes to their acceptance in society and the research community. Questioning the ability to find the truth through science has always peaked man's curiosity. Creating an instrument that validates the truth has experienced challenges throughout the years as research continues. With persistence and the development of new technology, new and improved instruments will surface as society moves forward (Gene Expression, 2004).

The invention of the polygraph machines dates back to the early 1920s and is basically a combination of medical devices that are used to monitor changes occurring in the human body. The examiner looks to see how the person's heart rate, blood pressure, respiratory, and other activity change, compared to normal body levels. Therefore, the ability to beat the polygraph can be difficult under normal circumstances. The acceptance of results provided by the polygraph instrument has mixed reviews. The discretion of military courts is not to accept results based on its use, according to the American National Academy of Science (2002). Although many jurisdictions throughout the United States see the tool as a value, certain states will only use the results under prior specified stipulations. All parties of interest, both the prosecutor and defense, must agree in advance to all stipulations. Polygraph results south of the Mason-Dixon line still

cast doubt and controversy regarding their acceptance, according to a report released in 2002 by America's National Academy of Science (Gene Expression, 2004).

According to Campbell (2005), analyzing the results of a polygraph is better for identifying honest individuals than liars. Further, some people are adept at using countermeasures to manipulate their physiological arousal to fool the polygraph. This is why the polygraph is not admissible as evidence. Fisher (2004) shed more light on the misuse of polygraph. In order for a polygraph result to be accurate, the instrument must be in good working order. The examiner must be properly trained and experienced in question formulation and line chart interpretation. Also the subject (examinee) must be a willing participant in the process. According to Silberman (n. d.), questions regarding the results provided by the polygraph have surfaced. The operator administering the test may influence the results unintentionally. Individual personalities of the operator may sway the results. This causes concerns for the validity of polygraph results.

The researcher interviewed Dr. Patrick Flood, who is certified in two tools used to detect deception. Dr. Flood has numerous years of experience in law enforcement and training with the Sacramento Sheriff's Department in California. His years of experience have prepared him in the field of criminal investigations and the use of several tools of deception. His vast experience, especially in the field of sex crimes, lead him to develop a recognized training program. Dr. Flood's analysis of both the polygraph and the voice stress analyzer casts doubt regarding the results produced by these instruments. The results are questioned due to factors other than the truth that may influence the results. It is apparent that technology advancement in this area is still ahead of law enforcement. However, the potential for both instruments to be very

effective in the area of deception is promising (P. Flood, personal communication, June 5, 2007).

Over the past 25 years, the invention of new methods other than the polygraph has evolved. Instruments such as the Voice Stress Analyzer, Functional Magnetic Resonance Imaging, and Thermal Imaging have shown promise. Besides these, there have also been technological advances for the use of Brain Fingerprinting and Automatic Face Analysis in lie detection.

Technology has developed other instruments for lie detection that may compete against the polygraph. According to Everding (2004), other parts of the human body have also shown results in the area of deception. The Voice Stress Analyzer has identified fluctuation in the voice that indicates deceptive traits. Everding (2004) identified various components used with the Voice Stress Analyzer, which are necessary to evaluate micro-tremor patterns based on the level of stress presented by a speaker. Everding (2004) felt that the indication of stress is a key measurement by an individual who is being deceptive. Also, according to him, other voice stress devices have produced results that cast doubt regarding the truth. Their ability to detect and exclude the truth has been questioned. Excluding peoples' ability to apply deception tactics will be enhanced through improved technology. Although the use of the voice analyzer tends to show promise, questions regarding research, in an attempt to validate results, have been questioned (Virginia Department of Professional and Organizational Regulation, 2003). From a scientific position, measuring the change in voice frequency is still under research.

The voice stress device offers several potential advantages over the standard polygraph. Voice stress devices offer less training time and academic standards compared to the polygraph. This provides a more cost effective device that allows the purchase of more machines for use. Other benefits include less time used per session and no sensors placed on the individual, compared to the polygraph. Since a microchip is used to detect voice fluxation, an examiner does not have to be present during the examination. Although the voice machine is convenient and cost effective, the results are uniformly poor and questionable (Krapohl et.al, 2002).

Other lie detection technologies are under research today uses near infrared light and other strategies to monitor brain activity. Functional Magnetic Resonance Imaging and Electroencephalography are two techniques being researched today. New technology has enhanced both techniques, which have produced reliable changes in both, brain activity or cognitive affect. The emerging neurotechnologies are showing promising results based on advanced measures (i.e. Canli and Amin 2002; Fisher et.al. 1997; Sugiura, Kawashima, Nakagawa, Okada, Sato, Goto, Ono, Schormann, Zilles & Fukuda, 2002). Results are based on various brain reactions associated with activity called brain waves.

Concerns regarding new technology associated with deception has been an on-going discussion throughout the research field. Violation of an individual privacy was discussed during a campus science technology seminar hosted by Greely (as cited in Saaman, 2006). While there is a potential to improve the lie detector, there is still a lot of work needed in this area to improve public confidence. It was felt that the excitement

surrounding the technique identified as Functional Magnetic Resonance is a step toward public trust as technology advances (as cited in Saaman, 2006).

Others methods being researched include a process called thermal imaging, which is a process used to detect deception by monitoring blood flow around the eyes. The technology monitors brainwaves, which is a method used to facilitate an individual's knowledge of a specific incident. However, there are questions surrounding the use of this technique, which is also referred to as brain imaging or brain fingerprinting.

Other factors may contribute to the increases flow of blood surrounding suspect's eyes, similar to the polygraph. Brain fingerprinting has been tested in court, in an Iowa case. Results of the case were not allowed based on the court's discretion. Advances over the years, which involves medical imaging, has positioned society to see the possibilities of neuroscience. The ability to measure the thought process, a person feelings, and behavior has significant implications in the legal community (Fisher et al., 1997). According to Steinhardt (2003), Director of the American Civil Liberties Union's technology and liberty program, none of the new technology has been proven to work like the scientists claim. But if it does, then it would become another weapon in the arsenal of detecting deception. Relying on the advancement of new technology is the key.

Another deception tool, identified as the Automatic Face Analysis, has been studied and observed. The tool is demeanor based and analyzes an individual's facial expression, which may be associated with deception. Although studies suggested this instrument has a better than average chance, scientific validation is probably years away. There has not been a lot of success associated with this instrument. The control

question test surrounding the Automatic Face Analysis has raised concern in several areas. Concerns associated with the Face Analysis have also been relevant to the brain-imaging technique. Validity, reliability, questionable results, biases, coercion of examinees, and possible harm has raised concern (Furedy, 1993; Kokish, 2003). The political demand to expedite and improve lie detection techniques tend to contribute to flaws that raise ethical and other concerns. The need to rush has caused premature decisions and misunderstandings of technology, which has lead to various misapplications and misuse (Fuerdy,1993; Kokish, 2003).

The ability to compete for government contracts could cause new technology to be placed on the market before sanctions are in place. The ability to actually detect lies by the imaging technologies stated was noted in the application process. Instruments targeted are those that detect physiological changes within persons who attempting to deceive. When an individual attempts deception, certain reactions occur within the brain activity. Changes in both physiological and psychological measures may affect those individuals being tested. The issue of privacy surfaces once a person's thought process is entered. The right to privacy has drawn criticism among numerous organizations regarding techniques used (Furedy, 1993; Kokish, 2003).

The collection of brain imaging data is a sensitive matter requiring federal regulations. Strict and legal standards are imposed regarding personal research throughout the United States. Other settings may not provide such protection or guarantees that include sensitive areas of the brain. The concern involves magnetic resonance for non-medical reasons, such as forensic's or matters of a security nature. The discovery of information considered to be confidential could place results in a

compromising position. Using a brain scan from a criminal issue may lead to the discovery of a medical issue (such as a tumor), which would force a sensitive and private concern (Illes, Rosen, Huang, Goldstein, Raffin, Swam & Atlas, 2004; Katzman, Dagher & Patronas, 1999). The question of reliability has also posed a concern for admissibility in most courts throughout the United States and other countries. Most feel new technology surrounding these types of measures may not provide reliable results. More research is definitely necessary, but it has to be supported by more reliable studies. The appropriate lack of documentation has been questioned in this area. As in the case the state of Iowa, evidence can be questioned reflecting the lack of credibility due to inappropriate studies. The credibility issue has caused societal concerns and doubt.

New technology has a way of looking impressive by having the ability to expedite results. With the various designs, flashy colors, and bells and whistles, the setting looks very impressive to jurors. The ability to enhance jurors' opinion through the interpretation of data provided by new technology becomes suspect. Juries' expectations of the results may reflect how the data was processed that involves new technology. Juries must understand what brain images represent and how to interpret the results. The lack of understanding produces the lack of reliable results for or against an issue. Therefore in order to move forward with acceptance of new and advanced tools, educating the public is necessary to show results and the benefit to society as a whole. As new technology progress, new training programs for operators of these machines will also encourage support and acceptance from society. Today, operators

use human judgment when evaluating deception of an individual. New technology will help eradicate this type of behavior.

METHODOLOGY

The researcher information to be examined considers whether or not the polygraph machine has become obsolete. Not all police departments see the polygraph as the tool of choice. Many departments are actively looking for new technology to detect deception. The researcher hypothesizes that new technology will surface and replace the polygraph machine completely. The idea of developing a new instrument has been measured and evaluated for several years. New measures to detect deception have drawn both positive and negative reactions.

The method of inquiry will include: a review of articles, Internet sites, periodicals, journals, a survey, and personal interviews. The researcher will seek to test various measures that may replace the polygraph machine. Evaluating the advancement of new technology as it pertains to various tools will also be observed.

The instrument that will be used to measure the researcher's findings regarding the subject of advanced measures to detect deception will include a survey. The size of the survey will consist of eight questions, distributed to participants from various states, counties, and municipalities. The researcher will speak with at least two experts in the field to determine their preferred choice of instrument. The response rate to the survey instrument resulted in approximately a 50% return rate out of the 61 surveys solicited.

FINDINGS

The research focused on distributing and collecting written survey forms from various professions in the criminal justice and law enforcement field. The researcher

received varying opinions and perceptions regarding the polygraph as a means to detect deception. Surveys were distributed both locally and nationally as a means to generate diverse points of view from a broad audience. Participants from local, state, and federal entities provided valuable input regarding this topic.

The survey included a comment section for participants input, opinions, and recommendations. The following statements are examples of comments obtained from the survey regarding participants views as it pertain to the polygraph machine: “We had a failure on a murder investigation, the suspect failed the polygraph, it turns out he was not involved in the murder, another suspect did confess.” However, the participant still believes the polygraph is a viable tool.

Another comment included the following statement: “Our command staff is opposed to its use, it is not reliable.” Another participant, employed as a polygraph examiner for a sheriff's department, felt the polygraph is a useful tool. Being optimistic, he thinks technology will improve and replace the polygraph at some point. His suggestion would be to combine the best part of each instrument on the market in an effort to design a system that will be hard to defeat.

Thirty-one out of 61 agencies surveyed responded, representing various states, counties, and cities regarding new technology to detect deception. States included New York, Michigan, Connecticut, West Virginia, Missouri, California, Oregon, Vermont, and Texas. The researcher surveyed several departments in an effort to solicit their views and knowledge regarding new measures and technology to detect deception. Results obtained from the survey are displayed in Table I. As with most states, legal issues differ regarding the use of tools to detect deception. As technology improves the various

opinions that weigh acceptance by the courts will change. In order for this to happen the false positive ratio has to increase for public acceptance.

Table I. Percentage of agencies surveyed and their response regarding new technology to detect deception.

Agencies Responses for Various Instruments of Deception	Percentage of Agencies Using Instruments
Using an Instrument	74%
Using No Instrument	22%
Familiar With Polygraph Machine	74%
Familiar With Other Instruments Besides the Polygraph	29%
Testing Other Instruments Besides the Polygraph Machine	3%
Instrument Used Not Accepted in Court	100%
Polygraph Machine is Their Instrument of Choice	58%
Polygraph Machine is the Best Instrument on the Market	54%
Polygraph is Not Their First Instrument of Choice	9%
Polygraph Machine is Not Obsolete	22%
Unsure about Whether the Polygraph Machine is Best Instrument of Choice or Obsolete	9%

Table I clearly indicate that all agencies surveyed are not within jurisdictions that accept instruments of deception in a court of law. Most agencies tend to favor the polygraph based on their familiarity of the machine. This tends to make the polygraph the number one instrument of choice. What tends to be significant is that a large number of departments do not use any form of instrument in their department. Although most departments accept the polygraph, there are still doubts and uncertainties regarding its use. Although most departments are familiar with other instruments of deception, they have not taken the time to analyze their potential as a tool of choice.

In comparison to the polygraph, the Voice Stress Analyzer has shown positive results and has drawn interest as the next tool of choice by agencies. Besides the polygraph, most departments are familiar with the voice stress system compared to

other tools. Although the voice analyzer has shown potential, there are still research and study questions surrounding the instrument. The researcher theorizes that the advancement of technology will enhance the validity of the voice analyzer towards acceptance over the polygraph machine at some point.

Although the polygraph and the Voice Stress Analyzer are the top two instruments of choice, other instruments are available. One-fourth of those surveyed indicated familiarity of a machine called the Electroencephalography. The instrument, which is associated with brainwaves, has shown potential. Other instruments with limited familiarity include the Automatic Face Analysis, Thermal Imaging, and Functional Magnetic Resonance Imaging.

DISCUSSION/CONCLUSIONS

The problem or issue examined by the researcher considered whether or not technology has advanced in the area of detecting deception. Some departments are beginning to take notice of various instruments used to detect deception beyond the polygraph. Currently, no one instrument used to detect deception has received full support from the scientific community.

The purpose of this research was to determine how far technology has advanced in the area of detecting deception. Since most police departments use some form of deception tool, the curiosity of new technology exists among peers. The researcher focused on new means and methods designed to detect deception. Technology has advanced to a point that clearly suggests that, at some point, the polygraph will become obsolete.

The researcher hypothesized that there are still varying opinions regarding the subject. There are still questions regarding the acceptance in courts regarding any results obtained by instruments to detect deception. The researcher's calculation is that technology is still several years away from identifying a foolproof instrument to detect deception. The polygraph is still valued as the number one tool of choice.

Through research, it has been determined that, over many years of research, inaccuracy in all instruments of deception has been detected. In many cases, there has not been enough experimentation to prove validity. The Voice Stress Analyzer, for example, has been determined to detect something, but it is not stress. Although the Functional Magnetic Resonance (brain mapping) activates certain regions of the brain during deception, there is no specific activation signifying when someone is telling the truth. Research supporting Thermal Imaging results was as good as results from the polygraph or lie detector test. Again, this is roughly an 85% accuracy rate.

The findings of the research did support the hypothesis. The reason why the findings did support the hypothesis is probably due to ethical concerns. The ability to explore the cognitive part of the brain applies to techniques through neuroscience. From a limited sense, research has begun to enter areas of the brain for a better understanding regarding deception and the collection of data. At the same time, limitations apply regarding methods used to detect lies and to verify truth. Exploring the brain provides promise in new ways that will lead law enforcement to new advances in the cognitive processes. There are still questionable measures associated with the brain that create doubt of finding a better lie detector. Brain images associated with medical reasons are viewed differently by research and media compared to controlled settings

associated with a questioning format. The application for both settings are on different levels and have different limitations (Wolpe, Foster, & Langleben, 2005).

The ability to market this technology cannot afford negative responses, based on the need to produce or implement new measures. Over time, premature implementation of new measures will lead to misuse and non-support by society. Society must solve the issue of privacy in advance of this technology. The potential for success surrounding new technology is jeopardized if the research is considered flawed. The threat to society is the failure of scientists and other advocates to weigh the negative consequences surrounding the threat to civil liberties based on research presented. Forums to discuss lie detection technologies to ensure reliable results should begin with those in position to further develop new and promising techniques. Researchers and scientists should develop appropriate timelines conducive to the evaluation of new technology prior to commercialization (Wolpe et al., 2005). This is what society wants, expects, and deserves.

Research validates the fact that the polygraph machine is still the number one tool used by agencies today. At some point, through the advancement of research and prolonged testing of new technology, a tool of choice will be developed that will eliminate concerns regarding the accuracy rate of this machine. Until then, the polygraph machine will continue to be an effective tool in the eyes of most agencies.

Limitations that might have hindered this study resulted because most agencies surveyed, around 60, did not respond. Out of 50% surveys returned, only 3% of departments surveyed have tested a tool outside the polygraph. Therefore, most agencies' response was not from a factual and knowledgeable point of view. Without

the familiarity of other tools, most departments' comfort zone supported the polygraph machine.

The study of advanced measures to detect deception is relevant to contemporary law enforcement because of national security, various high tech crimes, terrorism, and smarter criminals in today's society. Public transportation systems, law enforcement on all levels, and other safety sensitive positions will benefit from new technology to deter deception. The ability to design a foolproof tool is valuable to the war on crime. A machine that is considered multi-useful on both local and national levels is needed. A new machine that provides another tool of tactical weaponry, from a mental perspective, is valuable to combat crime.

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APPENDIX 1

Please Answer the Following Questions

Milton O'Gilvie, LEMIT Module III

1. Does your department or agency use a tool designed to detect deception as it pertains to the hiring of applicants, or suspects during various investigations? **Yes**____
No____
2. If yes, is the tool of choice the polygraph machine? **Yes**____ **No**____
3. Are you familiar with any of the following instruments (below) designed to detect deception? **Yes**____ **No**____

If yes please identify by marking X

- ☐ **Voice Stress Analyzer:** Measures stress in vocal flaps
 - ☐ **EEG: Electroencephalography:** Measures brain waves
 - ☐ **Automatic Face Analysis:** Analyzes facial expressions associated with deception
 - ☐ **Thermal Imaging:** Blood flow around the eyes increase when someone tells a lie
 - ☐ **fMRI (Functional Magnetic Resonance Imaging):** Measures and Map Brain activity
 - ☐ **Polygraph:** Measures body stress and monitor the Nervous system
4. Have any instrument you identified, ever been accepted in any court? **Yes**____ **No**____,or
Accepted in court only under certain stipulations? **Yes**____ **No**____
 5. Do you feel the Polygraph is obsolete or still the best tool on the market?
Obsolete____ **Still #1 on the market**____
 6. Are your agency currently testing any deception tool other than the polygraph?
If so please identify the tool by name, _____
 7. **Your agency name and City:** _____

8. **Additional comments or contact person information (optional):**

Thank you for your assistance