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DIGITAL VOICE STRESS ANALYSIS:

A Modern Alternative to Polygraph Testing

BY **JODY O'GUINN,** CEO OF CALABASH INVESTIGATIVE CONSULTANTS AND DIRECTOR OF LAW ENFORCEMENT OPERATIONS FOR BAKER INTERNATIONAL

A NEW ERA IN TRUTH DETECTION

In the evolving field of private investigations, technology continues to reshape how professionals gather information, evaluate truthfulness, and detect deception. One of the most promising tools gaining attention is Digital Voice Stress Analysis (DVSA)—a method that analyzes vocal patterns to identify stress levels and potential deception.

DVSA presents itself as a modern alternative to the traditional polygraph, offering advantages such as ease of use, accuracy, and adaptability. However, like any investigative tool, it has strengths and limitations. Understanding these factors is essential for private investigators considering adding this technology to their investigative toolkit.

WHAT IS DIGITAL VOICE STRESS ANALYSIS (DVSA)?

DVSA measures microtremors—minute variations in the voice that are believed to be involuntary responses to stress. Unlike polygraph tests, which measure physiological responses such as heart rate, blood pressure, and perspiration, DVSA focuses entirely on the voice.

The technology operates on the principle that when a person is under stress or attempting deception, the central nervous system triggers subtle changes in the vocal cords. DVSA software captures these changes and produces a visual representation of stress levels, which trained investigators can then interpret to assess the likelihood of deception.

Voice stress analysis technology is not new—it has been studied and used since the 1970s. Early systems were limited in accuracy and reliability, but recent advancements in artificial intelligence (AI) and machine learning have significantly enhanced the sensitivity and dependability of modern DVSA software. Today's systems can analyze not only pitch and tremor but also cadence, tone, and subtle variations in speech patterns, making them more effective than earlier versions.

THE EVOLUTION OF VOICE STRESS ANALYSIS (VSA)

Voice Stress Analysis (VSA) has been a well-established method for credibility assessment, truth verification, and psychological stress profiling for over 50 years. Currently, more than 25,000 VSA systems are in use worldwide, including by over 3,500 U.S. law enforcement agencies and the U.S. Department of Defense in its fight against global terrorism.

While traditional VSA technology has proven effective, Baker-DVSA software has dramatically improved upon earlier systems. Unlike polygraph tests, which often result in up to 60% "inconclusive" outcomes, DVSA provides more definitive conclusions by eliminating the "inconclusive" category altogether.

PROVEN ACCURACY

In the fall of 2000, the Air Force Research Laboratory (AFRL) in Rome, NY, along with the National Institute of Justice's National Law Enforcement and Corrections Technology Center, conducted a three-year study on VSA technology. The study concluded that VSA is 100% accurate in detecting stress related to deception.

"The Department of Defense Polygraph Institute (DoDPI) provided us with tapes of investigations from two murder cases where the suspects eventually confessed and were found guilty," the report stated. "Using voice stress analyzers, the machines were accurate on 45 out of 45 instances."

Dr. Gary Baker, Director of Baker Group International, provided VSA training to the AFRL analysts and engineers involved in the study and participated in Phase II with the DVSA system. The study validated Baker's proprietary stress pattern quantification and chart analysis techniques.

HOW DVSA TECHNOLOGY WORKS

Unlike polygraphs, which require physical sensors, blood pressure cuffs, and electrodes, DVSA relies solely on voice analysis. The subject's verbal responses are processed through proprietary Baker-DVSA software, which detects, measures, and displays stress-related components in the voice.

Superimposed on audible voice frequencies are inaudible frequency modulations (FM) whose strength and pattern are inversely related to the degree of psychological stress in the speaker at the moment of utterance. These microtremors result from minute oscillations of the vocal cord muscles, controlled by the central nervous system (CNS). Under stress, these tremors are suppressed, altering the FM

pattern and allowing DVSA to identify stress signals linked to potential deception.

Attempts to manipulate the voice or control stress responses are ineffective. Nervousness, medical disabilities, or drug use do not affect the evaluation, making DVSA highly resistant to countermeasures—something that remains a persistent problem with polygraphs.

BAKER GROUP INTERNATIONAL'S BREAKTHROUGH IN AI-GENERATED SPEECH DETECTION

A significant recent development in DVSA technology comes from Baker Group International and its Director, Dr. E. Gary Baker. Baker-DVSA software can now accurately identify AI-generated or cloned speech—a capability that sets it apart from other voice analysis tools.

Baker's DVSA software is the only method capable of displaying the audio waveform of recorded speech alongside its derived stress patterns, allowing it to detect the subtle differences between human speech and AI-generated speech.

"It only takes a three-second sample of real speech for AI to generate cloned or mimicked speech. It sounds exactly like the real speaker," Baker explained.

AI-generated speech poses significant challenges for law enforcement, private investigators, and security professionals. According to the Federal Trade Commission (FTC), impostor scams—where scammers use AI-generated voices to mimic family members, government officials, or company representatives—are among the most common types of fraud in the United States.

Baker's DVSA technology offers investigators a way to combat this growing threat by detecting and identifying AI-generated speech. This capability has significant implications for criminal investigations, fraud detection, and counterintelligence.

THE PROS OF USING DVSA
• Non-Invasive and Less Intimidating
DVSA is non-invasive and requires no physical contact, unlike polygraphs requiring sensors and electrodes. Subjects speak into a microphone, which reduces stress and increases cooperation.

• Portable and Convenient
DVSA systems can be operated using a laptop, tablet, or smartphone—allowing investigators to conduct tests in the field or remotely.

• No Medical Restrictions
DVSA is unaffected by medical conditions

such as heart problems or neurological disorders, which can interfere with polygraph results.

• Speed and Efficiency
DVSA tests can be completed in as little as 45 to 60 minutes, with immediate results. The average polygraph exam is around 2.5 hours.

• AI Detection
The ability to detect AI-generated speech gives DVSA a distinct advantage in verifying authenticity and preventing fraud.

• Versatility
One of the most compelling applications of DVSA is its ability to analyze historical recordings, breathing new life into cold cases. Investigators can revisit old interviews, interrogations, or witness statements and subject them to stress analysis. This may reveal previously unnoticed deception, inconsistencies, or stress indicators that were not evident at the time. Such insights can prompt new lines of inquiry, identify suspects who previously evaded detection, or even exonerate individuals wrongly suspected of involvement.

THE CONS OF USING DVSA
• Scientific Debate
While studies support VSA's accuracy, some researchers argue that stress does not always correlate with deception.

• False Positives and False Negatives
DVSA assesses stress rather than direct deception, meaning nervous but truthful individuals may yield false positives, while skilled deceivers may suppress stress responses, resulting in false negatives. These challenges can be mitigated through effective pre-test interviews and the strategic use of comparative control questions.

• Limited Legal Admissibility
While DVSA results are increasingly accepted in court, polygraphs have broader legal precedent. DVSA is more commonly used for intelligence gathering and internal investigations.

THE FUTURE OF DVSA IN PRIVATE INVESTIGATIONS

The Employee Polygraph Protection Act of 1988 (EPPA) prohibits private employers from using Voice Stress Analysis (VSA) in workplace settings. Under the EPPA, only polygraph examinations are permitted—and even then, only under strictly regulated circumstances. (Refer to the mandatory workplace poster displayed at all U.S.

employer locations for more details.)

However, VSA remains legally applicable in private matters, public sector employment, and government investigations. Private investigators can utilize VSA for a wide range of cases, provided it is not used to assess employees on behalf of their employers.

As Artificial Intelligence (AI) and machine learning continue to evolve, Digital Voice Stress Analysis (DVSA) technology is expected to become increasingly accurate and reliable. Advanced algorithms and enhanced pattern recognition could help minimize false positives and false negatives, bolstering the credibility of DVSA in both investigative and legal settings.

Leading firms, such as Baker Group International, are at the forefront of AI-driven speech detection. As this technology progresses, DVSA could play a crucial role in fraud prevention, misinformation detection, and identity verification. Additionally, its ability to differentiate between human speech and AI-generated content could significantly impact national security and intelligence operations.

CONCLUSION

Digital Voice Stress Analysis offers private investigators a flexible, non-invasive tool for assessing truthfulness and guiding investigative strategy. While it's not without its limitations, its portability, speed, and ability to detect AI-generated speech make it a valuable addition to the modern investigator's toolkit. As technology continues to evolve, DVSA stands poised to become a staple in the investigative process—provided investigators approach it with a critical eye and a commitment to professional standards. **PI**

Jody O'Guinn is a retired police chief with 34 years of law enforcement leadership, serving as Deputy Chief in Alton and Chief of Police in Carbondale and Freeman Spur, Illinois. A veteran SWAT and Regional WMD SRT Commander, he also held key roles with the DEA and MEGSI narcotics task forces. A graduate of the FBI National Academy and LEEDS program at Quantico, he holds an MPA from Southern Illinois University. He pioneered the world's first board-certified cryptocurrency forensic investigator course and now serves as Director of Law Enforcement Operations at Baker Group International.