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Column



Subject attached to a computerized polygraph. (Photo Wicklander-Zulawski)

Understanding the Polygraph

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One of the utensils in the investigator's tool box is the polygraph, more commonly known as the lie detector. The polygraph has been used for well over 90 years to assist law enforcement in their investigations. Moving from a simple recording device, today's polygraphs are multi-channel computerized instruments with algorithm scoring programs.

After the polygraph's introduction to the Berkeley, California police department by Dr. John Larson in the early 1920s, its use has grown steadily, both nationally and internationally. The polygraph has matured from those early attempts at lie detection to a highly validated and sophisticated investigative tool which has proved its utility from pre-employment to national security examinations.

Extensive research into the polygraph has validated testing methods and standardized chart scoring to achieve accuracy only dreamed of by early examiners. Unlike other methods of purported lie detection equipment the polygraph has stood the test of time and research to deliver consistently reliable results to aid the investigator. There are detractors who would argue the polygraph is of limited value, even in light of its widespread effective use in investigations and national security.

Today the polygraph is also used to monitor sex offenders and can be credited with single-handedly reducing the level of re-offending committed by those being monitored. In a pre-employment examinations the polygraph offers police departments a cost effective way to screen out high risk candidates who may have avoided a criminal record, but still participated in a variety of criminal behaviors. The polygraph is most often used to

eliminate suspects from investigations and focus the investigators attention toward the guilty.

Polygraph results are rarely admissible in court, and if they are it is under the agreed stipulation of the judge, plaintiff and defense. However, most examinations are used more informally, taking place prior to criminal charges being placed against a suspect. It is in the investigative stage of the process where innocent suspects are eliminated from suspicion and investigators are focused in other directions.

The United States Congress passed the Employee Polygraph Protection Act in 1989, severely limiting a company's use of the polygraph to test existing or potential employees. While there are some exceptions to pre-employment testing, they tend to revolve around drug, armored car, and nuclear facilities. Police departments and federal law enforcement are generally exempt from the Act and may request an examination from either an applicant or suspect. Certain states have also enacted laws which may in fact be more restrictive than federal law.

Regardless of the law, polygraph testing is voluntary. No one may be compelled to take a test against his wishes, with the exception of a law enforcement officer who has been ordered as part of an administrative investigation. The police chief, in most states, may order an officer to submit to a polygraph examination as part of an internal investigation. The officer does not have to take the examination if the investigation is of a criminal nature. If the officer refuses to submit to a polygraph examination after being ordered to do so by a superior officer in an administrative investigation he may be found guilty of failing to follow a lawful order and face discipline. If the department's investigation is criminal the officer's right to silence and legal representation remain intact and he may refuse to participate in an examination.

How the polygraph works

A polygraph examination as seen on popular television has no basis in reality other than perhaps the subject is attached to an actual polygraph instrument in the show. Unlike television, a modern polygraph examination has a structured validated testing sequence and scoring method which can achieve highly accurate results when used by an experienced examiner.

The instrument

The polygraph does not record lies as such, but records the body's reaction to telling a lie. The body's autonomic nervous system reacts to the individual's fear of detection and prepares the person to either fight or flee the perceived threat. The polygraph instrument is merely a recording device which monitors and preserves the physiological changes occurring in the subject's body while he is being asked questions. The polygraph itself comes in several different forms, from the oldest mechanical device to an electronically enhanced instrument to the computerized polygraph of today.

At a minimum, the polygraph will record the subject's respiratory pattern, galvanic skin response, heart rate, and changes in the relative blood pressure. There are a number of other parameters, but those listed previously are the ones most frequently used by examiners. The subject's physiological responses are preserved using a pen and ink on chart paper in the older versions and digitally in the new computerized polygraphs. The computerized polygraphs then allow the examiner to print out a hard copy of the charts for the file or scoring evaluation. The first photo in the gallery above shows a subject attached to a computerized polygraph.

The polygraph uses two hollow tubes, called pneumographs, which are connected around the abdomen and chest of the subject to measure the individual's respiratory pattern. As the subject breathes, the tubes constrict, causing the polygraph tracing to deflect upward and then downward as the individual exhales. This results in a cyclical tracing showing the rate and amplitude of the breaths during each test. Attached to the fingers of the left hand are small metal electrodes which measure changes in the resistance or conductance of the skin. This is called the GSR (Galvanic Skin Response) where an imperceptible electrical charge is passed through the skin and the skin's resistance or conductance to this passage is recorded. Finally, a blood pressure cuff is attached to the bicep of the right arm, which allows the subject's heart rate and the relative changes in blood pressure to be captured in the tracing.

During the examination, the examiner notes on the tracing where he begins reading the question and where he finishes reading the question. This appears as the wide vertical grey bar in the second photo. The black vertical line identifies where the subject answered the question. The background grid under the tracings measures time in five-second increments, so the examiner knows the amount of time which has passed between questions.

The questions

A polygraph examiner constructs three different types of questions to use during the examination. Each question is reviewed with the subject before it is used in the test. This is done so that the responses recorded during the examination are the result of the subject's emotional response to the question and not the surprise of being asked an unexpected question. Reviewing the questions with the subject also ensures that each question can be answered with a "yes" or "no" and that the subject understands what is being asked in the question.

The first type of question used in the examination is the Irrelevant. The Irrelevant Question is a known truth and establishes the individual's normal responses under the given set of circumstances of the polygraph examination. For example, if the subject was a 32-year old man named Mark, the following would be appropriate Irrelevant Questions;

- Do some people call you Mark?
- Are you older than 21 years of age?

In each case, the subject could answer "yes" and the response is a known truth. These questions generally begin the test and are not stressful since they are being answered truthfully and are unrelated to the issue under investigation. There are a number of additional uses for these questions, but they are primarily used for beginning the examination and separating questions during the test.

The second type of question is the Relevant Question. These questions are directly related to the issue under investigation and are most often answered in the negative. These questions must be carefully constructed by the examiner and reviewed with the subject before their use during the examination. The Relevant Question should be confined to a single incident and should not inquire into a series of unrelated events. The question must also be unambiguous and address a single action of the individual. Asking, "Did you hurt him or steal his money?" does not address a single action and is ambiguous as to how "hurt" is defined and to who "him" might refer to in the question. Better Relevant Questions would be,

- "Did you steal that missing \$1000.00 from the safe at Mike's house on December 1, 2003?"
- "Did you strike Mike in the head with a wrench on December 1, 2003?"

Generally, these questions should be stated as clearly and simply as possible, having only one unambiguous meaning for the subject. Questions relating to intent are usually unacceptable, since one's intent can be easily rationalized and may change over time. The construction of the Relevant Question is one of the most important parts of the examiner's job. An incorrect Relevant Question could cause an innocent person to fail the examination or a guilty person to pass when he was actually involved in the incident.

The final type of question is the Control Question. This is a question of the same general nature as the issue, but one to which the subject will lie or at least question the truthfulness of his answer. For example, in a theft case the Control Question might be, "Prior to this year did you ever steal anything in your life?" The broad nature of the question may cause the subject to identify an instance of stealing so the examiner would alter the question to reflect the admission. Because of the broad timeframe the subject will doubt the truthfulness of his answer and react deceptively to this question during the examination. The Control Question then becomes a comparison question to the Relevant Question. If the subject responds more strongly to the Control than the Relevant Question he is telling the truth, but if he responds more strongly to the Relevant than the Control he is lying. This is obviously an oversimplification of the theory, but it gives the reader an idea how the examination is evaluated.

The setting

The setting for a polygraph examination should be a private, quiet room with minimal distractions. The subject should sit in a comfortable, straight-backed chair that does not swivel or have wheels, and be positioned next to a desk or table where the polygraph rests. Most polygraph offices are minimally decorated to avoid distraction and are adequately lit for easy observation of the subject. In many of these rooms there are cameras or observation mirrors to provide security for the examiner and a teaching environment for new examiners.

The pre-test interview

Prior to actually meeting the subject, the examiner discusses the case with the fact-giver or investigator to fully understand the purpose of the test and discuss the types of Relevant Questions which may help to successfully resolve the investigation. It is often helpful for the examiner to brief the investigator on the polygraph technique, the types of questions which are appropriate for the examination and typical results obtained if the investigator is not experienced in its use.

The examiner then conducts a pretest interview where the subject signs a release to take the test and he then discusses any medical or psychological problems with the individual. The examiner attempts to determine if there is anything which might prevent the subject from being a good candidate for a polygraph examination.

The examiner then explores the case with the subject, asking pertinent questions about alibis, sequence of events or other aspects of the case. The subject is informed about the operation of the polygraph, the attachments which will be used during the test and the way the test will be conducted. Each of the questions to be used on the test are developed with the subject and reviewed with him making any changes that are necessary.

The testing sequence

A polygraph examination is composed of a series of short tests, which last three to four minutes each. In most examinations there will be three to five tests during which the Relevant, Irrelevant and Control questions are asked and the subject responds either "yes" or "no" to them. If there are any special instructions, the examiner will review them with the subject prior to the test. Depending in which technique the examiner was trained, there will be a structured method of conducting the examination and ordering the questions.

Once the examiner has an adequate series of charts to evaluate, he will begin the scoring process. This is done most often using a numerical scoring method which evaluates the subject's physiological responses to the Relevant and Control questions. The computer polygraph may also use an algorithm developed by the Johns Hopkins University Applied Physics Laboratory or other researchers to score the examination. The examiner can use this algorithm to independently score the examination or for quality control purposes to verify his own determination.

The training

Polygraph examiners are usually trained at an American Polygraph Association (APA) - approved schools, which are required to have their curriculum and school periodically inspected and approved by the Association. Graduating from an APA-approved polygraph school and passing the APA examination allows an examiner membership in the organization. In addition, depending where the examiner intends to practice, there may be separate state regulatory examinations in order to be licensed to perform polygraph examinations within that state. When selecting an examiner, his training, licensing and membership in the American Polygraph Association should be considered. A summary of licensing laws can be found on the American Polygraph Association web site.

Understanding the polygraph and the possible role it may play in an investigation can help the investigator establish the truth and focus resources. The polygraph has limitations, but also is a tool that should not be ignored during an investigation.

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