

### What is the polygraph and do lie detectors work?

By John Jackson © 2005

In the UK, there is currently interest in the polygraph, popularly known as the lie detector. It is regularly featured on a daytime television show where it is used to ascertain if specific guests are lying to their relatives and it is being proposed by the government to ameliorate control of known criminals in society; notably for the screening of paedophiles.

#### What is the polygraph?

The polygraph has been around since the early 20th century, its usage being mainly restricted to the USA. It is a device that detects and charts the following physiological responses: heart rate; respiration rate; skin moisture; and blood pressure. The premise is that people produce involuntary physiological responses when they tell a lie; and by measuring these responses, a trained polygrapher is able to interpret the charts produced and ascertain whether the person examined has told the truth or lied.



#### Uses of the polygraph

There are two main uses for the polygraph:

1. **Investigation**

In this instance it is used to determine whether a person is telling the truth in response to a specific allegation, which may be a crime or a civil dispute.

2. **Screening**

This use of the polygraph is deployed to determine a person's suitability for a position within a company or security service; or to routinely check on people for wrongdoing, or the potential for wrongdoing, even though no particular accusation is made against them.

#### The myths behind the polygraph

- **Polygraphs detect lies**

Polygraphs measure physiological changes in the body: they do not detect lies. Physiological responses do not directly translate into proof of lying, nor is the process an objective way of testing for lies; the results of polygraph tests are subjectively interpreted by the polygrapher who then decides whether the examinee was lying.

- **Polygraphs are infallible**

There are varying claims for the accuracy of polygraph testing. Some claim up to 99% accuracy, some say that they are closer to 50% accurate - pure chance. The truth is likely to be somewhere in between.

The true accuracy of polygraph testing is difficult to ascertain. Polygraph testing is often done in cases where other evidence is insubstantial, so there's often no other way to validate the findings. However, most attempts to ascertain the true accuracy, including scientific tests where the 'ground truth' is known,

usually give answers in the 60-70% range. This means that polygraph testing is better than guessing (50% accurate) but it's nowhere near as accurate as its proponents claim nor is it accurate enough to be considered a valid and reliable method.

Sometimes people "crack" and confess; again this does not validate the process; many people give confessions, and even false confessions, under duress. John A. Larson, a pioneer of polygraphic lie detection stated, "*The lie detector, as used in many places, is nothing more than a psychological third-degree aimed at extorting confessions as the old physical beatings were.*"

One important fact to consider is that polygraphers interpret results. This means that their findings can be influenced by their preconceptions; if they believe a person to be guilty before testing, they could be more likely to interpret the test results to reflect that belief.

In 1986, the US television programme 60 minutes did an exposé on private polygraph companies. Three different companies were told that a camera and lens had been stolen from the offices of a magazine publisher. There were four employees who were all suspects. Each polygrapher was asked to test the employees and in each case they were told, "It might have been \_\_\_\_, " with a different employee being weakly accused in each case.

The three different companies each found that the person who had been accused by the magazine was indeed the guilty party, and they were all very confident in their findings. The fact that there never was a crime, that no theft really took place, and that no one was guilty of anything, shows just how strongly the polygraphers' preconceptions can influence the way that they interpret the results of their tests.

## How are tests performed?

There are two main methods of conducting polygraph tests: the Control Question Test (CQT); and the Guilty Knowledge Test (GKT). Here we will concentrate on the CQT as it is the most widely used test, especially in the screening process. (see: [GKT http://www.ukskeptics.com/gkt.php](http://www.ukskeptics.com/gkt.php)).

It is important to understand that polygraphy is not science. The technique is fundamentally dependent on trickery; the examinee is tricked into believing the validity and infallibility of the polygraph. The purpose is to induce a fear of the polygraph into the examinee. Fear is essential; without it the examinee will not give the physiological responses required.

Polygraph tests have three distinct phases:

- The "pre-test" interview and "stimulation test" (stim test);
- The "in-test" phase (polygraph exam);
- The "post-test" interrogation (when applicable).

## The pre-test interview

The Polygrapher initially tries to establish rapport with the examinee by being friendly and light-hearted. He will then give a deliberately false explanation of how the polygraph works, which is designed to instill fear by exaggerating the effectiveness of the polygraph and the body's responses to lying (see: [textbook example](#)).

## The stim test

This is where the examinee is hooked up to the polygraph, some questions are asked, and the polygrapher "fine tunes" the machine. Again though, this is another form of deception designed to convince the examinee that they cannot fool the machine.

This used to be done by asking the examinee to pick a card from a deck, memorise it, and then answer "no" to every question asked. If, for example, a seven of hearts was picked the polygrapher would ask:

- Is the card red? (no);
- Is the card black? (no);
- Is it a heart? (no);
- Is it a diamond? (no);
- Is it a face, picture; is it odd, even; is it a 3,5,7,9.

It's the seven of hearts, correct?

This demonstration of the accuracy of the polygraph is a trick. In this case the deck of cards is a trick deck; every card is the seven of hearts, and the polygrapher knew all along. Other tricks are employed these days, but they are all tricks at this phase of the test, the purpose of which is to convince the examinee that they cannot lie without the polygraph detecting it.

The next phase is to test the examinees' responses. This is done by asking different types of questions:

- **Relevant questions**

These are questions that are directly associated with the matter in hand. In the case of a suspected crime they would be of the nature: "did you steal the car?". If in screening, they would be of the nature: "Have you ever provided classified information to any unauthorised individuals?"

- **Control questions**

These questions do not provide control in the scientific sense; they are more accurately called "comparison questions". These questions are designed to induce a mild reaction in the examinee from admitting to small misdemeanours and these responses can be compared to the responses of relevant questions. The polygrapher assumes that physiological responses as measured by the polygraph which are stronger when answering a relevant question than when answering a control question, indicate that the examinee must have been lying when answering the relevant question.

Control questions come in two types:

1. **Probable lie questions**

These questions are assumed by the examiner to be answered with a lie in many instances. Questions like, "have you ever lied to a loved one to avoid an argument?" are used to elicit denials. Any probable lie question that is answered with a "no" will be revisited by the examiner as though the polygraph had indicated the response to be a lie: again this is a deliberate deception by the polygrapher.

2. **Direct lie questions**

Here the examinee is told to answer questions and to purposely lie to make sure that they are responding correctly to lying. This in itself is another lie by the polygrapher; the purpose is to raise anxiety in the examinee as to whether they are providing the correct physiological responses.

- **The in test (polygraph) phase**

In this phase the examinee is asked questions; usually at thirty second intervals to allow the physiological responses to be recorded. Normally ten questions at a time are asked and may be repeated more than once. The polygrapher may leave the room for up to fifteen minutes between question sets. The examinee will be observed during this time with hidden cameras or possibly two-way mirrors.

In between question sets the charts produced will be "scored" by the polygrapher by comparing responses to relevant questions against those of the control questions. Scores are assigned to each question individually and they are also totaled to give an overall score. There are different methods for scoring, although they are all based on the comparison between relevant and control question responses.

The results of scoring give the following possible outcomes: deception indicated; no deception indicated; or inconclusive.

- **The post test interrogation**

This phase is not always done, but where applicable it is used to go through the test report with the examinee. This phase is still relevant to the test; it is often used to gain a confession by implying that the examinee has responded very strongly to some relevant questions even if this is not true. The polygrapher

is relying on the deception in the pre-test phase of the process to have convinced the examinee of the infallibility of the polygraph and that therefore there is no point in denying that they were lying.

The polygraph is a lie detection tool which itself relies on deception. Its use could be justified if it were highly effective in detecting when a person is lying, or proving that they are not lying when telling the truth: sadly this is not the case.

## Problems with polygraphy

- **False negatives**

A false negative is where someone who is guilty "passes" the test and is considered to be innocent. Most studies show that the rate of false negatives is in the region of 10% (example 7-12% see: antipolygraph.org). One in ten guilty people will be deemed to be innocent, and that is in people who do not know how to employ countermeasures to fool the polygraph.

- **False positives**

Just as the guilty can be deemed innocent, the innocent can be deemed guilty. It is quite common for studies to show that 40% to 50% of innocent examinees "fail" the polygraph test (Lykken 1998; NRC2003).

Ironically, the more truthful a person is, the more likely it is that they will fail the polygraph test. The reason being that they are very comfortable answering the control questions and so do not produce a marked physiological response to them. When they are questioned about a crime, for example, they can become very nervous about facing such questions and produce a physiological response that is more pronounced than they did to the non-threatening control questions: this may be interpreted as lying.

The problem of false positives/negatives is studied more commonly with regard to investigation of specific incidents rather than with screening; however, the problem is an inherent one with polygraph testing. This, for example, will impact on companies which use the polygraph to pre-screen potential employees: they could be rejecting the most honest and truthful candidates due to false positive testing; the very people they want.

It should be quite clear that more serious consequences are likely if polygraph testing were ever to be used in sex abuse cases or for the supervision of paedophiles as a public protection measure.

## Countermeasures - fooling the polygraph

**NOTE:** We will not reveal the actual methods by which the polygraph can be fooled but it is important to realise that armed with the right knowledge, anyone can pass a polygraph test.

The polygraph is a device which is fundamentally based on deception. The polygrapher will intentionally deceive the examinee, particularly in the pre-test phase, into believing that the device can detect the smallest lie that is told. The deception, however, can work both ways. An examinee who knows the truth about the polygraph and the methods employed by the polygrapher can employ countermeasures. This means that innocent and truthful people can avoid false positives: it also means that the guilty can avoid detection and consequently, may even be ruled out as a suspect.

The polygrapher actually measures the difference between the physiological responses produced by answering relevant questions to those produced by answering control questions.

The first line of defence is to produce a false strong physiological response to control questions; the second is to produce a false weak response to relevant questions. There are several methods for achieving both responses, and the result is that they will be interpreted as truthful or inconclusive answers as the control questions will have produced a larger response than the relevant questions.

An example of a countermeasure that was once used was the "drawing pin-in-the-shoe" method. When a control question was identified by the examinee, they would press their foot into the drawing pin to produce mild pain, resulting in an increased physiological response. These days polygraphers are aware of this method and will simply ask the examinee to remove their shoes before testing to eliminate it. That is an illustration of just how simple countermeasures are; there is nothing highly sophisticated about them.

Never trust a polygrapher. They may come across as friendly, helpful and sympathetic but they are not there to help examinees; they are there to interrogate them. That is what a polygraph test is; an interrogation. The false sense of empathy is just another form of deception that polygraphers use to elicit admissions.

The most famous case in which the polygraph was fooled is the Aldrich Ames case. Ames was a CIA agent who was spying for the Soviet Union. The CIA knew there was a mole in its ranks and so decided to polygraph everyone. Ames passed the test in 1986, and a subsequent one in 1991, which not only allowed him to continue to spy, but suspicion was moved from him and onto other agents who had difficulty in passing their polygraph tests.

Polygraphers state that they know when countermeasures are being employed. Again, this is a deception. There is no evidence that they can tell the difference between genuine and faked responses.

The important point to realise is that a polygraph is not foolproof: it is relatively straightforward to fool it.

## Conclusion

Polygraph testing displays many characteristics of a pseudo-scientific practice: it is based upon deception - the polygrapher needs to lie and deceive; its effectiveness is based on fear and intimidation; it is biased against the truthful; and it is easily defeated with countermeasures. As such, polygraphy has little scientific validity.

As a tool of intimidation the polygraph may be useful in gaining confessions. In other cases, however, there is such a large margin of error in the outcomes of tests, especially with false positives, that it is dubious whether it can be relied upon for anything. The fact that results are based on interpretation means that polygraphers' biases and preconceptions will count towards the result too.

This inaccurate, unscientific, easy to fool, system is an unreliable way of separating truth from deception: to place trust in it would not only be foolish, it could be dangerous.