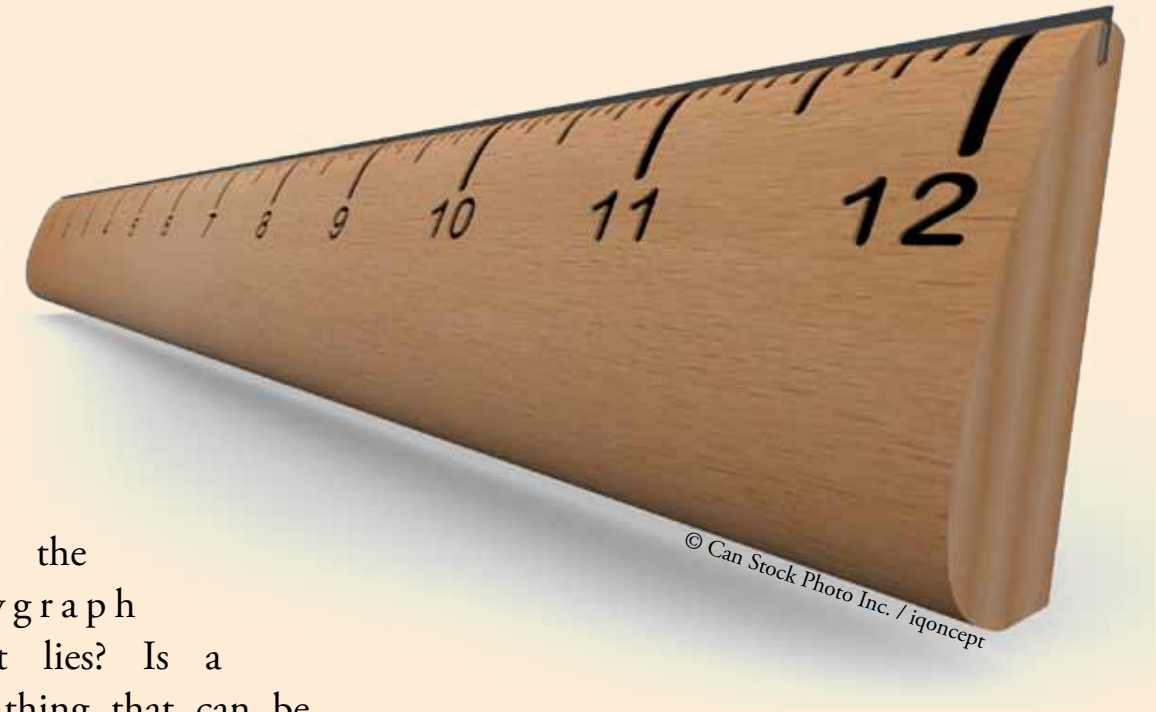
Redux: What does the polygraph measure?
(in 600 words or less)

Raymond Nelson



© Can Stock Photo Inc. / iqoncept

Does the polygraph detect lies? Is a lie a physical thing that can be measured? What does the polygraph measure? Is there any physiological response that is uniquely associated with lying? Is the test ever wrong? Why is it called a lie-detector test?

Lies and deception are not, of themselves, a form of physical substance, but are instead a form of action, event, or behavior for which overt or subtle physiological changes can be observed and recorded. Polygraph testing is a process of recording and quantifying responses to stimulus questions to which the examinee may be answering truthfully or untruthfully. A perfect test result can be achieved only through the identification of some unique physical phenomena that offer perfect correlation with the act of lying or deception, and also perfect negative correlation with all other other human activity. Such a test would be deterministic in that there would be only one possible outcome for which human behavior, human choice, and random variance would be expected to have no effect on the test result. Such a deterministic test is not

possible for two reasons. Firstly, because a successful testing outcome depends minimally on the choice to cooperate with testing, and secondly because there is no form of physiological response that is uniquely associated with any human activity. For this reason, scientific test results for most human phenomena are probability statements, and the purpose of a scientific test is to quantify the degree of uncertainty associated with a test result.

Polygraph testing works in the same manner as other scientific tests, by identifying recordable and measurable physiological responses which serve as proxy signals that are correlated with the difference in responses to test stimuli, and responses to comparison stimuli, as a function of deception and truthtelling. Like other scientific test methods, polygraph test methods consist of multiple different proxy signals. Standardized test administration and scoring procedures are intended to ensure that data from multiple different signals are aggregated in mathematically optimal ways.

Tests are said to be normed or norm-referenced when the results of individual exams are compared with data from a normative reference sample. To do this, test data from sampling groups of cases are first aggregated together to construct normative reference distributions that describe our knowledge about the phenomena being tested. In the case of polygraph testing, the reference distributions describe our knowledge about the location, variance and distribution shape of the scores normally observed among groups of deceptive and truthful persons.

Polygraph test results for an individual case can be compared to the normative reference distributions to calculate the statistical likelihood or probability of error associated with a conclusion that the test data come from a person who belongs to the population of persons represented by one of the normative reference groups. Test results can be said to be statistically significant when the probability of error (p-value) is less than a previously stated tolerance for error (alpha level). Probabilities of error and alpha levels can be expressed in terms of test scores and cutscores, and can also be transformed to other forms such as odd-ratios, risk ratios, confidence levels, or likelihood statistics. In this way, the polygraph is a test of the probability of error associated with a categorical conclusion that the examinee belongs to the population represented by the normative reference data for deceptive or truthful persons. For convenience, the polygraph test is often referred to simply as a lie-detector test.