

LIE DETECTOR

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Primary Disciplinary Field(s): Forensic Psychology, Criminology, Psychophysiology

1. Core Definition

The lie detector, most frequently embodied by the apparatus known as the polygraph, is a psychophysiological instrument designed to detect attempts at deception by measuring concurrent changes in the subject's autonomic nervous system. The fundamental principle underpinning its operation is the hypothesis that the act of lying generates emotional stress, which in turn triggers involuntary physiological reactions not consciously controllable by the subject. Therefore, the apparatus does not directly measure "lies," but rather the emotional changes--such as fear or anxiety--that are presumed to be indicators of guilt or deceptive intent when critical questions are posed.

2. Etymology and Historical Development

Attempts to discern guilt through observable physical and psychological signs are ancient. Historically, various cultures developed rudimentary stress tests based on autonomic responses. The ancient Hindus observed that indicators of guilt included refusal to answer questions, evasiveness, nonsensical speech, shivering, and facial flushing. Perhaps the most famous historical example comes from China, where suspects were required to fill their mouths with dry rice; if they were unable to swallow the rice, they were pronounced guilty, as stress inhibits the production of saliva. Modern lie detection procedures formalize these ancient observations by employing technological apparatus to continuously measure and record multiple physiological changes simultaneously, leading to the development of the polygraph.

3. Key Apparatus and Measurements

The most widely utilized apparatus for lie detection is the **polygraph**, which means "many writings," reflecting its capacity to record several different physiological data streams concurrently. This multiple-measure approach is preferred because individuals may express stress differently (e.g., one through cardiovascular changes, another through respiration), maximizing the potential for detection. The standard physiological parameters recorded by the polygraph include:

Respiration: Changes in breathing patterns, measured typically via a pneumograph wrapped around the chest or abdomen. Sudden fluctuations or suppression of normal respiratory rhythms are considered significant.

Cardiovascular Activity: Recording of pulse rate and blood pressure, which tend to increase when a subject experiences acute emotional stress during questioning.

Galvanic Skin Response (GSR): Also known as skin conductance or electrodermal activity, the GSR measures changes in the electrical conductivity of the skin, primarily due to increased sweating, a classic involuntary response associated with emotional arousal.

4. Testing Methodology

A trained operator conducts the test by attaching the apparatus to the subject's body and administering a long series of questions. The interrogation sequence is carefully structured to establish a baseline of normal emotional reactivity and distinguish between general anxiety and specific reactions to incriminating information. The questions are categorized into three types:

Neutral Questions: Non-stressful inquiries used to establish a baseline of the subject's typical physiological responses (e.g., "Did you have breakfast this morning?").

Critical Questions: Inquiries designed to elicit guilty knowledge relevant to the investigation (e.g., "Have you recently had an ax in your hands?").

Emotional Baseline Questions: Questions intended to provoke a general emotional reaction unrelated to the crime, helping to gauge the subject's individual level of reactivity, since emotional responses vary widely even among innocent persons (e.g., "Do you have a girl friend?").

Following the test, the operator performs a careful comparison of the subject's physiological responses to the critical questions against their responses to the neutral and emotional baseline stimuli. A judgment of truth-telling or lying is then formulated based on significant and sustained deviations in the measurements following the critical stimuli.

5. Accuracy and Experimental Validation

Various surveys regarding the efficacy of the lie detector suggest that experienced examiners typically make correct judgments in approximately 80% of cases, with some proponents claiming accuracy rates exceeding 90%. Due to the inherent nature of the technique, errors are typically weighted toward **failures to detect guilt**, meaning that innocent persons are reportedly rarely, if ever, falsely judged guilty by the apparatus.

Experimental validation, often using simulated crimes, has consistently shown accuracy well above chance. A notable 1962 study by Kubis, which involved students simulating theft, showed correct identification rates ranging from 73% to 92%. Other research, such as that conducted by Lykken (1960), demonstrated impressive accuracy (100% in a controlled setting) even using only the GSR, particularly when the test structure involved multiple-choice questions on verifiable facts, even when subjects attempted to practice countermeasures.

6. Significance and Application

The lie detector has significant practical applications across various sectors. In law enforcement, the test is primarily employed for the preliminary examination and screening of suspects, often serving as a highly persuasive tool to encourage criminals to confess. However, its use extends far beyond police departments and courts.

The apparatus is frequently utilized by governmental agencies, including the Atomic Energy Commission and military services, as well as by private enterprises such as banks, retail stores, hotels, and industrial plants. In these settings, lie detectors are integrated into **personnel selection** processes and periodic examination of current employees. Despite its widespread use, judicial acceptance of polygraph data remains highly limited; generally, courts admit the findings as evidence only when both prosecuting and defense parties agree to the test and consent to the use of a mutually acceptable examiner, presenting the findings only as expert testimony to be weighed alongside other evidence.

7. Debates and Criticisms

The effectiveness of the lie detector is compromised when dealing with specific types of individuals whose emotional or cognitive states deviate from the norm. The test cannot be relied upon for **psychopathic or antisocial personalities** who do not experience the typical guilt or fear response necessary to trigger autonomic changes. Similarly, retarded individuals who fail to appreciate the significance of the situation, highly emotional persons who overreact to nearly all questions (thereby masking critical responses), and false confessors present significant challenges to accurate interpretation.

A major criticism revolves around the potential for subjects to successfully implement **countermeasures**. While naive subjects find it nearly impossible to deceive the apparatus, determined individuals may train themselves to consciously or subconsciously control their physiological responses to mislead the examiner. For example, in one documented case, a suspect controlled his breathing so completely that the polygraph recorded none of the normal physiological variations expected under intense questioning, necessitating confrontation by the examiner to elicit a confession.

Further Reading

[Polygraph \(Wikipedia\)](#)

[Galvanic Skin Response \(GSR\)](#)

[Deception \(Wikipedia\)](#)

[Emotional Stress \(Wikipedia\)](#)

United States Atomic Energy Commission (AEC)

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