Misattribuations About Polygraph Results are Sometimes Rooted in Misconceptions About the Test

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AN ESSAY: MISATTRIBUTIONS ABOUT POLYGRAPH RESULTS ARE SOMETIMES ROOTED IN MISCONCEPTIONS ABOUT THE TEST

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Psychophysiological detection of deception (PDD) testing, commonly known as the polygraph or lie detection test, is frequently misunderstood by the public, media, individuals undergoing testing, and even by some professionals who refer people for testing. The physiological basis for PDD testing is often oversimplified to describe basic autonomic nervous system functions such as sweating, deep breathing, and rapid heart rate. In reality, sweating is a convenient and intuitive metaphor for a complex physiological phenomenon known as *electrodermal activity*. However, sweating is not, of itself, synonymous with changes electrodermal activity during PDD testing, which is most often recorded in the absence of observable sweating. Importantly, neither deep breathing nor rapid heart rate are scored criteria during PDD data analysis.

Misunderstandings about the psychological basis for testing can be even more profound. Psychological factors are inherently abstract, referring to personal and internal experiences that may correlate with physiological activity but most often do not have a direct linear relationship with any physical or physiological phenomena. Traditional discussions of the psychophysiological basis for polygraph testing heavily emphasized the role of the fight-or-flight response, suggesting

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[2] The views and opinions expressed in this work are those of the author and do not necessarily reflect the position of the APA or LIC.

that differences in responses to different test stimuli might result from the varying threat levels these stimuli pose to an individual's survival and well-being. This perspective can inadvertently suggest that polygraph testing is inherently dangerous (in fact PDD testing is not inherently dangerous).

Concerns about PDD testing are often expressed in overly simplistic terms, commonly focusing on three main issues. Firstly, there is no physiological response or activity uniquely associated with deception – there is no "Pinocchio's nose." Secondly, there is no linear relationship between any form of physiological activity and deception that would allow for direct physical measurement of deception. Finally, concern is often expressed that PDD testing is not infallible.

These common arguments overlook the realities of scientific testing, beginning with the fact that, no form of physiological activity is uniquely associated with any human behavior or activity. The purpose of many scientific tests, including PDD, is to quantify phenomena that cannot be directly measured or observed with deterministic perfection. Deterministic perfection implies an ideal state where a process or observation occurs without any random variation or error, yielding the exact same results under the same conditions every time. This concept is uncommon in the natural world because most phenomena are influenced by multiple variables and a level of complexity that is often charaterized as randomness.

Scientific tests achieve their objectives by using proxy signals correlated with the phenomena of interest, and which can be combined in statistical and structural models to achieve greater precision than any single index. Scientific tests rely on probabilistic models to interpret data. This means that virtually all scientific test results, including those that are simplified to categorical terms, are expressed in terms of probabilities and statistical likelihoods rather than certainties.

Because scientific tests are inherently statistical and probabilistic, and therefore not infallible, over any significant period or volume of testing, errors and unexpected results are possible. One obvious reason for unexpected test results is that lie-detection based on human intuition – the effectiveness of unassisted, non-instrumental lie-detection – has not been well-supported by scientific studies. This fact has led to long-standing interest in the value of instrumental lie detection, in which subtle correlates of deception can be recorded and analyzed for their numerical and statistical effectiveness at classifying deception and truth-telling. The effectiveness of instrumental classification of deception has truth-telling has been supported as significantly greater than chance by academic, government, and industry scientists. Nevertheless, unexpected and erroneous results may be observed, and when this occurs – when the classification of a person as either deceptive or truthful conflicts with the intuition of the examiner or referring professional, or when a PDD test result is inconsistent with other evidence – people often seek to understand the reason why.

This combination of factors – the occasional occurrence of unexpected test results, the subtlety of physiological responses, the inherently abstract nature of

psychological constructs, and the human impulse to understand and explain – can easily lead to discussions based on misunderstanding and misattribution.

Common Misattributions and Questions about PDD Test Results

The desire to explain testing errors and unexpected results is strong, and these discussions are frequent enough to be systematically categorized and analyzed. For example, since the beginning of the current calendar year, the following inquiries have arisen:

- *A person is facing a potential criminal indictment and arrest has failed a polygraph test. They continue to claim innocence and the attorney has suggested that they failed simply because they were nervous or stressed? Could general anxiety cause an innocent person to fail a polygraph test?*

- *A person has been arrested on charges of selling illegal drugs after being reported to police for theft. They were referred for polygraph testing by an attorney who has asked what happens if a person is specifically nervous about certain test questions? For example, questions about drugs and stealing could induce high levels of nervousness, or stress, potentially leading to physiological increases in blood pressure or electrodermal activity. Would this cause an innocent person to fail?*

- *A person in sex offense specific treatment is referred for polygraph testing, and has failed several previous polygraphs. They are described by the therapist as negativistic, pessimistic, passive-aggressive, and with serious trust issues. Would characterological or personality problems such as these things cause an innocent and truthful person to fail a polygraph test? What would happen if a person, who claims to be truthful, simply does not trust the polygraph test or expresses grave doubts about ever passing? Would they produce reactions that appear to be indicative of deception but are actually due to nervousness about the potential consequences associated with a particular question even if they are innocent and truthful?*

- *Two suspects have been arrested for a recent burglary and murder, and it is known that both suspects committed the burglary, but it is unknown which suspect caused the death of the victim. One suspect, with a lengthy and varied criminal history that includes a prior conviction for violent acts, has denied committing the murder and was referred for polygraph testing by the attorney. The prosecutor and the other suspect's attorney both questioned whether a high level of psychopathy would enable the person to appear truthful and pass a polygraph test while actually lying.*

- *A pre-sentence investigation was conducted on a person convicted of sexual assault. The investigation includes a*

review of the criminal history, a psychological evaluation, testing sexual arousal/deviancy, a polygraph test, and risk assessment based on both static and dynamic factors. The investigator has suggested that the person is a "pathological liar" who lies so persistently they seem to believe themselves, and might pass a polygraph test while lying. They note that it has been suggested in entertainment and popular media that believing ones' lies can be a way to beat a polygraph test. What would happen if a person is a pathological liar and believes their lies to be true? Would this enable a person to produce truthful polygraph results while lying?

- *A person convicted of a sexual offense fails a polygraph question about a restriction from viewing/using pornography. The therapy group speculates whether they failed not because of using pornography but because of fantasizing about it. Is this reasonable?*

- *An experienced polygraph examiner has suggested that one of the reasons for conducting an acquaintance test is to convince the examinee to believe in the polygraph test. However, a particular examinee has had numerous previous polygraph tests over several years, and claims to have observed both false-positive and false-negative results. What if a person simply does not believe in the polygraph test? Would this cause an innocent person to fail when they are telling the truth? Would this enable a person to pass a polygraph test when they are lying?*

These questions illustrate some of the complexities surrounding PDD testing. They often make attributions that delve into areas of misconception about how the test works, which can lead to further issues, including potential administrative and action errors. Some of these inquiries reflect a need for more accurate information about psychology and psychological diagnoses. Correctly understanding some of the nuances and detailed understanding of PDD testing can contribute to more effective use of PDD test results and reduce the occurrence of misguided attributions about unexpected and erroneous PDD results.

Nervousness, Stress and Anxiety

Among the most straightforward things to clarify is that words such as *nervousness*, *stress*, and *anxiety* are not completely synonymous terms, though they may often be used interchangeably in common usage. These terms have been used as metaphors to allude to the psychological basis of reactions to PDD test stimuli. Metaphors are extremely useful because they permit us to begin to understand new and complex or abstract phenomena by borrowing knowledge and experience from more familiar phenomena. A common mistake, when dealing with metaphors, is to take them literally –limiting one's understanding of a new phenomenon to the details or form of a specific metaphor. The effect is a constrained and limited, and to that extent inaccurate, understanding of the new phenomena. Importantly, PDD testing is not intended

to evaluate, quantify or classify stress, nervousness or anxiety. However, it may be useful to achieve some clarity on the details and nuances of these terms.

Nervousness and Stress. *Nervousness* is sometimes thought of as associated with specific temporary and short-term events, and is associated with physical symptoms such as shaking, dry mouth, increased cardiac activity and sweating. Some of these effects do parallel the recorded parameters used in PDD testing, but the PDD data analysis will be focused on brief and momentary changes that occur in response to each stimulus question. In contrast, *stress* is a concept that is associated with external factors involving lifestyle and ongoing situations. Although stress is often thought to be of longer, though still temporary, duration. Both stress and nervous symptoms often subside when circumstances and situations change.

Anxiety Disorders. In the clinical mental health context, *anxiety* differs from both stress and nervousness because it is a diagnostic term from DSM-V, with defined criteria for diagnosis. Anxiety symptoms can include restlessness, fatigue, difficulty concentrating, irritability, muscle tension, sleep disturbances, and other problems that disrupt functioning for a duration of time. Whereas nervousness and stress are somewhat normal experiences, which can sometimes improve performance and facilitate adaptation, anxiety disorders, by definition, are disruptive to a person's functioning.

A number of different types of anxiety disorder exist, including *social anxiety*, *phobic anxiety*, and others. Discussions of anxiety in the context of PDD testing commonly refer to the more common notions of stress or nervousness. When these discussions refer to clinical anxiety, a mental health disorder, it most commonly involves a diagnosis of *Generalized Anxiety Disorder* (GAD). Unlike social anxiety (associated with social contact and activities) and phobic anxiety (associated with particular stimuli), Generalized Anxiety Disorder is not necessarily associated with a single situation or stimuli. Fortunately, today many different treatment options exist for persons diagnosed with anxiety disorders, and the selection of treatment strategies may be as varied as the individuals themselves.

Although the effects of anxiety on PDD testing have not been completely studied, there is no theoretical rationale or compelling evidence to suggest that generalized anxiety will induce reactions differentially to different PDD test stimuli. Instead, it is more likely that the physiological correlates of generalized anxiety will influence the entire array of test stimuli. As with most mental health concerns, the greatest risk may not be for PDD testing error but for inconclusive results.

From a practical perspective, the most important consideration, at the time of PDD testing, may be the severity of an examinee's generalized anxiety along with the effectiveness of the current treatment strategies at reducing and managing the person's symptoms. It may be advisable to postpone PDD testing for persons who have severe mental health problems, prioritizing instead the reduction of their mental health symptoms.

Nervousness About Particular Topics or Questions

The suggestion that nervousness about particular topics or questions would cause an innocent person to fail a PDD test is premised on misunderstanding. While it is correct that polygraph tests record physiological responses such as electrodermal activity, blood pressure, and respiration, these signals are recorded and interpreted in the context of a structured and standardized procedure designed to differentiate between responses to relevant questions and comparison questions.

'Nervousness' as a metaphor. Applied to the PDD testing context, and the notion that a person may exhibit specific nervousness about a particular relevant topic or question, becomes potentially problematic because it assumes first that nervousness is a primary driver of reactions to PDD test stimuli. This problem can be somewhat rectified by accepting the notion of nervousness in this usage as a convenient metaphor for the changes in physiological activity of interest during PDD test data analysis. This may or may not be nervousness *per se* but the term 'nervousness' can serve as a placeholder to denote the observance of generally greater changes in physiological activity that occur in response to different PDD stimuli.

PDD Theory. PDD testing uses different types of questions as a basic for numerical and statistical analysis. *Comparison Questions* (which can be either probable lie comparison questions or directed lie comparison questions) are designed to elicit a response that can be compared to the physiological responses elicited by *Relevant Questions* (which describe the examinee's possible involvement in the behavior issue under investigation). The underlying principle is that while nervousness or stress might elevate physiological responses generally, the comparative analysis focuses on the relative difference in responses to these different types of questions. The basic theory of the test is that greater changes in physiological activity are loaded (that is, they occur with greater frequency) at different types of test stimuli as a function of deception or truth-telling in response to relevant target stimuli.

Behavioral Learning Theory. The argument is not that general stress or nervousness would disrupt the PDD test, but that specific nervousness, focused on a particular topic or question would do so. This notion of nervousness – in which the physiological signals of interest to the polygraph switched on and off in response to momentary test stimuli, though not due to deception – is best examined in the context of *behavioral learning theory*, which focuses on how people adapt and learn through interaction with their environment. *Learning* itself is defined as a change in behavior/functioning that occurs as a result of experience.

Learning theory is a well-studied area of psychological theory, and includes a number of constructs including associative learning, non-associative learning, reinforcement, modeling, shaping, and other constructs. The theory holds all behaviors are learned from experience (which can including observation, language, and behavioral experience) – with the exception of *reflexes* (innate behaviors that

which seem to exist as a function of the nervous system, and which occur without learning from prior experience). It is not likely that nervous responses to PDD stimuli response exist as reflexes, and it is likely that any such pattern of activity would exist as a learned or conditioned response.

Behavioral Conditioning. *Conditioning theory* can be a useful way to begin to understand PDD testing. *Conditioning* is an *associative learning* process in which the nervous system begins to recognize a relationship between a *neutral stimulus* and an *unconditioned stimulus*, resulting in a *conditioned response*. This was famously illustrated by Ivan Pavlov who described his experiments with dogs, in which a bell (a neutral stimulus) was paired with food (an unconditioned stimulus) until the bell alone could elicit salivation (a conditioned response). Through repeated trials, a neutral stimulus can become a conditioned stimulus, capable of eliciting a *conditioned response* on its own.

In the context of PDD testing, each PDD topic or question acts as a conditioned stimulus, based on the notion of single-trial conditioning that can result from behavioral involvement in serious acts of transgression. In this way, the physiological reactions of interest during PDD testing can be thought of as conditioned responses. In this theoretical model, innocent individuals who truthfully deny involvement in the behavioral issue under investigation do not have conditioning experiences, or conditioned responses, associated with the relevant target questions. Consequently, they are expected to exhibit generally smaller physiological changes in response to relevant questions than to comparison questions.

Conditioning theory does not easily support the explanation or attribution that an innocent person may exhibit specific 'nervousness', and generally greater changes in physiological activity, associated with a particular relevant target question. This is because a prior learning process may not exist for the innocent person. However, conditioning theory does not preclude the possibility that responses to PDD test questions can be conditioned by mechanisms other than behavioral involvement in the issue under investigation. For example, a person who was subject to a threatening interrogation prior to testing may develop a conditioned response to a particular topic. Ultimately, it is the role and responsibility of the field polygraph examiner to ensure that each individual is suitable for PDD testing, and to conduct the PDD interview in a manner that establishes a clear and coherent rapport and understanding of the behavioral topic and details of the examination.

Sensitization and Habituation. Behavioral learning theory also includes *sensitization theory*. Sensitization refers to an increased response to a stimulus – often as a result of previous or repeated exposure to that stimulus. Unlike associative learning, sensitization does not require the association between different stimuli; it relies solely on the nervous system's ability to recognize and increase its reaction to a single stimulus. For example, if a person hears a loud and uncomfortable noise repeatedly, they may become more easily startled by the noise over time, even if the noise itself does not change in

intensity. Their nervous system may become more reactive to the stimulus.

Sensitization theory, a *non-associative* learning process, does not easily support the notion that an innocent person may exhibit specific nervousness and generally greater changes in physiological activity associated with a particular relevant target question. However, it is possible that an improper interview approach could contribute to sensitized reactions during PDD testing. For example, an examinee may begin to exhibit sensitized responses if the PDD interview or test is conducted in a threatening, confusing, or abrasive manner. Importantly, reactions stemming from experiences prior to PDD testing would be an example of associative or conditioned learning, not sensitization.

In addition to sensitization, behavioral learning theory also includes the construct of *habituation*, wherein responses to a repeated benign stimulus decrease over time. Habituation can be understood as gradually becoming accustomed to a stimulus, leading the nervous system to stop responding to it. For example, moving to a house with a large traditional clock that chimes hourly might initially be distracting and even keep someone awake at night. However, after repeated exposure to the noise without any negative consequences, most people become less aware of the clock and are no longer distracted or awakened by the chimes.

Habituation theory does not easily support the argument that specific nervousness drives responses to particular PDD questions. However, it does highlight the importance of the PDD interview in reducing responses that may occur due to novelty or orienting (another theoretical construct) to a new and unfamiliar stimulus. In simple terms, both habituation and sensitization may play a role in the PDD interview. Innocent individuals who intend to be truthful in response to the investigation topic or target issue may become habituated to relevant questions and sensitized to comparison questions. Conversely, guilty individuals who intend to lie may become habituated to the comparison questions.

Sensitization of responses to relevant questions is not an objective of the PDD interview, as it is usually unknown whether an examinee is actually truthful or deceptive. Instead, responses to relevant questions are more accurately understood as a function of associated learning and past behavior. Achieving a correct understanding of the principles and constructs of behavioral psychology helps to clarify the need for a carefully structured PDD interview to ensure accurate interpretation of physiological responses.

Returning briefly to the metaphor of 'nervousness' as a basis for reactions to PDD stimuli, field examiners will be wise to remember that that scientific studies have not established a usable correlation between nervousness and deception. Some people may be nervous simply because they are nervous, and some people may be nervous because they are being deceptive. But some of more dangerous and deceptive individuals may present with more confidence than nervousness. The polygraph is not a test of nervousness. It is also worth remembering that nervousness is a normal experience for many people, especially when taking a test.

Personality Disorders and PDD Testing

Personality, in clinical psychology, refers to the characteristic patterns of thoughts, feelings, and behaviors that make an individual unique and influence their interactions with the environment and others. Personality disorders are a type of mental health disorder characterized by enduring, inflexible, and maladaptive patterns of behavior, cognition, and inner experience that deviate markedly from cultural and social expectations and which cause significant distress or impairment in social, occupational, or other areas of functioning. Various personality disorders are described in the DSM-5, but negativistic and passive-aggressive disorders, which were included in previous editions, have been removed from the current array of personality diagnoses.

Among the more commonly recognized personality disorders are the following: N*arcissistic Personality Disorder* (characterized by a grandiose self-image, need for admiration, and lack of empathy), *Histrionic Personality Disorder* (involving excessive attention-seeking behavior and emotionality), B*orderline Personality Disorder* (characterized by instability in relationships, self-image, and emotions, along with intense fear of abandonment and impulsive behaviors), *Antisocial Personality Disorder* (a characteristic disregard for and violation of the rights of others, deceitfulness, impulsivity, and lack of remorse).

While *psychopathy* is not included in the DSM-5, it is used in forensic contexts to describe traits such as superficial charm, high manipulativeness, deceitfulness, and versatile criminal behavior, which are not fully covered by the criteria for antisocial personality disorder.

Pathological Liars

The notion of a *"pathological liar"* is often misunderstood and misrepresented in popular culture and even among some professionals. While the term is frequently used to describe individuals who lie compulsively or persistently without apparent reason, it lacks a clear scientific definition and is not recognized as a formal diagnosis in the DSM-5. Lying behavior, especially when pervasive and detrimental, is typically a symptom of broader psychological issues. Scientific studies have not substantiated the notion of pathological lying as a standalone condition that explains perplexing deceitfulness.

Lying is most often a goal-directed behavior. For example, individuals with antisocial personality disorder may lie to manipulate others or gain personal advantage, while those with narcissistic personality disorder may lie to maintain a grandiose self-image. In these cases, lying is a behavior rooted in the broader context of the individual's personality structure and psychological needs. In a broader sense, many people lie simply to avoid consequences, shame, or embarrassment.

Deception does not equate to a loss of contact with reality. The suggestion that someone can lie so frequently that they start to believe their own lies is not grounded in scientific evidence. Believing one's lies would seem to imply a conscious or semi-conscious process where the liar knows the truth but convinces themselves otherwise, which lacks the clear,

disorienting break from reality seen in psychosis – a serious mental health condition characterized by a loss of contact with reality, leading to symptoms such as hallucinations, delusions, and disorganized thinking. Lying and deception, even when habitual, are often strategic and goal-directed (even where the goal is not readily understood by others) but do not inherently alter a person's grasp on reality. In contrast, psychosis involves profound cognitive disruptions that affect an individual's entire perception of the world and their capacity to function effectively within it.

Despite the distinction between psychosis and pathological lying, the unscientific notion of believing one's lies is still sometimes introduced in discussions of potential PDD test outcomes. The idea that pathological liars can lie so convincingly that they pass polygraph tests is not supported by empirical evidence. PDD testing relies on the recording and measurement of physiological responses such as changes in cardiovascular activity, respiration, electrodermal activity and vasomotor activity, all of which are associated with the autonomic nervous system. The notion that pathological liars can systematically bypass or manipulate these physiological responses is unfounded. Autonomic responses associated with deception are not easily controlled or suppressed, even by individuals who lie frequently.

Testing Behavior vs. Fantasy

At the center of this concern is the desire to know the truth about an examinee's past behavior. Empirical studies have supported the effectiveness of PDD testing in detecting deception regarding past behaviors, but they have not addressed the notion of deception related to thoughts, fantasies, or beliefs. PDD testing is not a mind-reading device, nor has it ever been intended as such. It is also not a tool for predicting future behavior.

The key question is whether fantasizing or thinking about a behavior, without actually engaging in it, could produce physiological changes similar to those of a person who is deceptive about actual involvement in that behavior. Unpacking this suggestion requires a discussion of both the underlying psychological and physiological processes, as well as intriguing philosophical and epistemological questions about what types of things can be considered 'true,' and what it means to say that something is 'true' or that a person's statements are 'true.'

Epistemology and Truth. For centuries, and indeed millennia, philosophers and scholars have discussed and debated concepts such as reality, knowledge, and truth, among other topics. A number of different philosophical theories of truth have been proposed over time. While many of these theories are interesting and useful, each also exhibits notable shortcomings.

In some philosophical and epistemological discussions, the notion of 'truth' is defined as the correspondence between statements about things or events (physical things and physical events) and the actual physical things or events themselves. According to this view, 'truth' exists when this correspondence is both correct and complete in all detail. In this paradigm, 'truth' does not apply to

amorphous phenomena such as beliefs, opinions, or feelings. Although this definition is appealing for many reasons, it is also challenging because there is always more detail that could be discussed regarding physical things and events, extending even to the molecular or subatomic level. Thus, statements are virtually never actually complete, making the attainment of a 'true' statement elusive and difficult within a correspondence paradigm.

In contrast, another definition of truth more readily regards beliefs and other amorphous phenomena as 'true' or possessing the quality of 'truth.' This perspective is appealing because it honors and validates individual experiences and differences. However, the difficulty with this paradigm is that truth can become a matter of culture, socialization, or personal choice. Different individuals and groups might each hold different 'truths,' which is difficult to reconcile with the practical convenience of the traditional/rational/modern philosophical perspective. This rational view holds that reality exists in only one way (a notion itself subject to some debate) and that our task is to try to understand it.

Probabilistic and Pragmatic Truth. Deception, although often simplistically regarded as the mirror opposite or binary alternative of 'truth,' may be easier to define adequately. Deception is the act of deliberately causing someone to believe something is 'true' when one knows it to be factually inconsistent with reality. This may be accomplished non-verbally, but for humans, it often involves verbal statements and interactions.

Field polygraph professionals can be said to employ a pragmatic paradigm of truth, where individuals are classified as truthful when the test data indicate patterns of physiological activity that are consistent with the reference model for truthful classifications, and where the statistical likelihood of deception is sufficiently low. Here, 'pattern' refers not to the curvilinear shape of the tracings but to the distribution of physiological responses to different types of test stimuli. However, this approach does not eliminate the need for a coherent discussion about what types of things can be said to be 'true.'

Classifications of deception and truth-telling in PDD field testing are based on data and reproducible mathematical/statistical analysis. This paradigm for 'truth' seeks concordance and corroboration with other forms of evidence from reality. This pragmatic notion of 'true' is difficult to apply to future events—for which evidence does not yet exist (assuming a rational philosophical paradigm in which the metaphorical arrow of time goes only one way). It is equally difficult to apply to subjective or internal experiences that are not associated with evidence other than individual assertion.

Importantly, a pragmatic notion of 'true' can be applied to verbal responses to PDD test questions about past behavior, for which some extra-polygraphic evidence might ideally be found to corroborate the test result. Psychological theories help explain, albeit very generally, the occurrence of recordable changes in physiological activity during PDD testing. Perhaps most importantly, the already complex notion of 'truth' becomes somewhat more complex when attempting to apply it to

thoughts or fantasies in the absence of behavior. For this, reason, standard practice in PDD field testing is to emphasize the use of behaviorally descriptive test questions.

Behavioral Experience vs Thoughts and Fantasy. Polygraph studies over the past century have demonstrated the effectiveness of PDD testing methods when the test questions describe the examinee's involvement in past behavior. However, studies have not studied or investigated effect sizes for PDD test questions about thoughts, fantasies, emotions, opinions, motivation, intention or and other subjective experiences. Nor have discussions explored the extent to which engagement in thoughts or fantasies, without actual behavior, may or may not fully mimic the changes in physiology that are characteristic of individuals who have engaged in specific behaviors.

One exception to this is that PDD test questions have been shown to be ineffective and correctly classifying an examinee's intent to answer truthfully to the relevant target questions. PDD field examiners will recognize these questions as the *'sacrifice questions'* used to introduce the relevant topic or target of a test, and will note that these questions are not subject to numerical or statistical analysis are used only absorb an examinees' physiological reaction upon hearing the relevant target issue for the first-time during data acquisition within each recording of the series of PDD test questions.

The argument here is that changes in physiology due to thoughts and fantasies, in the absence of actual behavior, will cause an innocent and truthful person to convincingly replicate the changes in physiology of a person who is actually deceptive and lying about involvement in a behavior. Theoretical discussions have not explored or described the possible psychological reasons why a person might respond physiologically to thoughts or fantasies about specific behaviors in which they have not actually engaged – though it may be implicit that similar psychological factors are expected for actual vs fantasy involvement in a behavioral concern.

One notable difference between thoughts/fantasy and behavior is that the absence of actual behavioral history will mean that thoughts and fantasies of this type are not associated with specific episodic memories. Thoughts and fantasies without actual behavioral experience will rely more heavily on creative activity vs memory, and this may invoke differences in cortical activity that may or may not induce differences in recorded changes in physiological activity.

Discussion of Directed Lie Comparison (DLC) questions provide only limited insight here because these questions are used with the examinee's endorsement and acknowledgment of some behavioral history – though the details are not elicited. The fact that DLC questions, and other questions, can elicit notable changes in physiological activity suggest an important linkage or mechanism connecting cortical activity and the autonomic nervous system.

It is known that mental imagery can be a useful form of learning and practice in some contexts and may contribute to some changes in physiological activity.

For example, a gymnast might use mental imagery to visualize themselves performing a complex routine. This involves vividly imagining each movement, the feel of the apparatus, and the sequence of actions required to execute the routine flawlessly. By repeatedly visualizing the routine, the gymnast can mentally rehearse the steps and movements, which helps to improve muscle memory and coordination, reduce anxiety, and enhance overall performance. Compared to the PDD testing context, athletic training via mental imagery is paired carefully with actual behavior.

Ultimately, PDD field examiners must conduct the PDD interview in a manner that ensures the examinee understands that the matter of interest to the test involves actual behavior, not merely thinking about it. Although little is known with any reasonable certainty, PDD responses that appear to accurately mimic the loading of changes in physiology that are expected from persons who are actually deceptive to questions about actually engaging in a particular behavior may be more likely to occur when an examinee has previous engaged in that behavior (though somehow outside the scope of the PDD test) and when the thought or fantasy activity occurs during PDD testing.

Disbelief in PDD testing

Many years ago, traditional polygraph training and field practices were based on the assumption that it was necessary to convince each examinee that the polygraph test is infallible. This involved both verbal promotion of the polygraph test and the skill and experience of the polygraph examiner. Additionally, an acquaintance test (practice test) was conducted apart from the main question sequence addressing the matter under investigation. The practice test served to familiarize the examinee with the recording sensors, instructions, and testing process. It also provided the examiner with an opportunity to adjust the recording gain levels and rectify any sensor problems before commencing the actual test.

It was believed that there was an increased risk of error associated with examinees who were not convinced of the test's infallibility. It was also assumed that the examinee should ideally know nothing about the polygraph test and that the examiner should provide all necessary information about the instrument and testing procedure, including the types of sensors, associated physiology, psychological basis, and accuracy effects. Indeed, many years ago, it was difficult to obtain information about the polygraph.

However, the internet has changed this dynamic, and today, virtually anyone anywhere in the world can access information on PDD testing. While some sources of information are undoubtedly more reliable than others, it is relatively easy to become familiar with reasonable estimates of polygraph accuracy effects, as well as some introductory knowledge of the recording sensors and physiological basis.

Virtually no examinee today will be convinced of the infallibility of the polygraph test. Most are already aware that there is some potential for testing error. And it has been suggested that guilty individuals who intent on lying will only submit to

PDD testing because they are convinced it is not infallible – that they may have a chance to pass the test, or may at least have a chance to question or disregard the accuracy of the test result if they do not pass.

Most importantly, there is no actual known or assumed reduction of PDD accuracy effect sizes as a result of the availability of information about the polygraph test on the internet. And there is no known or assumed reduction of accuracy associated with increased requirements for informed consent, wherein examinees may be entitled to accurate and correct information about how a test will be conducted, how it works, expected accuracy and potential error rates, and how all of these may or may not affect themselves.

If the assumption were correct that belief in the infallibility of PDD testing is necessary to ensure the test's effectiveness, we should expect to observe a large-scale reduction in PDD effectiveness among examiners, agencies, and communities who use the test. However, no such reduction has been described. This is actually not surprising and is to be expected of most scientific tests. Knowledge about how a test works rarely has any substantial detrimental effect on its outcomes. As Niels Bohr famously said, "It works even if you don't believe in it." Although he was humorously referring to the use of a superstitious decoration (an upside-down horseshoe over the doorway of his home), this anecdote underscores the robustness of well-founded scientific methods, including PDD testing, which rely on empirical evidence and reproducible results rather than belief in their infallibility.

Conclusion

Empirical studies from independent/academic, government, and industry research groups have consistently demonstrated that PDD testing produces effect sizes significantly greater than chance, validating its effectiveness in detecting deception regarding past behaviors. However, several misconceptions persist, often complicating professional perspectives on its use and interpretation.

A common misunderstanding is that PDD testing measures general stress, nervousness, or anxiety, potentially causing innocent individuals to fail. In reality, these terms are used largely metaphorically to discuss the psychological basis of responses. In practice, the polygraph test differentiates between responses to relevant and comparison questions through structured, standardized procedures. It is the relative difference in physiological responses, not the absolute level of activity or response, that is important to PDD test data analysis.

Another misconception is that strong personality traits or behavioral patterns involving pathological lying can enable individuals to defeat the polygraph. PDD testing relies on physiological responses that are difficult to control or suppress, even by habitual liars. Scientific evidence does not support the notion that frequent lying or specific personality traits can undermine the test's accuracy.

There is also a concern that fantasizing about a behavior could produce

physiological changes similar to those of actual deception. However, PDD tests are designed to detect responses associated with past behaviors, and there is no evidence suggesting that mere thoughts or fantasies, not associated with actual behavior can mimic these responses sufficient to cause an innocent person to fail a polygraph test.

Early polygraph practices emphasized convincing examinees of the test's infallibility, but modern approaches recognize that knowledge about the test does not significantly affect its outcomes. PDD testing relies on empirical evidence and reproducible results, not on the examinee's belief in its infallibility.

Unexpected results can occur, and it is important for professionals of all types to understand that these outcomes do not necessarily invalidate the test. When test results conflict with other evidence or the intuition of the examiner or referring professional, it is important to consider the broader context and potential sources of error. Professionals must approach these situations with a clear understanding of the statistical nature of PDD testing and be prepared to investigate further, rather than relying on simplistic explanations.

In conclusion, the effectiveness of polygraph testing hinges on a combination of careful administration, proper interpretation of physiological responses, and an informed understanding of its limitations. By addressing misconceptions and managing unexpected results professionally, PDD testing can remain a valuable tool in the detection of deception.