

## Explanation of Directed Lie Test Report

The following information explains test report results for EyeDetect which use the Directed Lie test protocol. Included is basic background information, as well as other details directly related to the question of nature and scope of directed lie questions.

### Cognitive Load

Most theories of deception detection hypothesize that lying is more cognitively demanding than telling the truth.<sup>1</sup> Deceptive individuals use cognitive resources to inhibit the truth, fabricate the lie, and maintain its consistency, coherence, and believability over time. Deceptive individuals may surveil their own behavior and internal state of arousal to monitor whether they are leaking incriminating information, especially during an interrogation or examination<sup>2</sup>.

During interrogation, they may also use cognitive resources to observe the behavior of any interviewers for feedback on their believability. Inhibiting truthful responses, maintaining credibility over time, monitoring the interviewer, and self-monitoring for signs of leakage are cognitive processes that require mental effort. Deception requires mental effort, which is measurable physiologically.

Psychologists have long known there is a correlation between increased cognitive load and certain eye behaviors. For example, pupils dilate commensurate with cognitive workload.<sup>3</sup> The pupils would dilate slightly if a person mentally multiplied 17 x 2. By contrast, pupil dilation would be more pronounced if the person multiplied 17 x 31.

In the same way, the pupils dilate slightly when a person answers questions truthfully; but when the person is deceptive, the pupils dilate more because of the mental effort associated with deception.

The following are a few other ocular-motor indicators of cognitive processes:

1. Deceptive people blink less often as they process questions answered deceptively versus those answered truthfully.
2. Deceptive people respond faster, make fewer fixations, and spend less time reading and re-reading statements about their own inappropriate behaviors than when answering questions about neutral topics or inappropriate behaviors in which they do not engage.
3. People show greater increases in pupil size when they answer test questions deceptively than when they are truthful. The differences between truthful and deceptive responses are more pronounced when test questions are less complex.

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<sup>1</sup> Johnson, Barnhardt, & Zhu, 2005; Kircher, 1981; Vrij, Fisher, Mann, & Leal, 2000.

<sup>2</sup> Kircher, 1981.

<sup>3</sup> Kahneman & Beatty, 1966.

## Test Questions

All lie detection tests use various types of questions to gather data about the examinee being tested. The question sets can include:

- **Relevant** questions (those related to the primary issue of interest)
- **Comparison** questions (those related to a secondary issue)
- **Neutral** or irrelevant questions (those unrelated to the issue).

EyeDetect and polygraph test protocols are similar in that regard. Relevant questions (e.g., Did you rob the bank?) evoke a measurable cognitive response in a guilty examinee. For an innocent examinee, that same relevant question should evoke a smaller cognitive response.

In the same way, polygraph examinations record changes in physiological reactions to relevant questions. Those changes in measured physiology load on one group of questions or the other, as a function of deception or truth telling, are shown with respect to the relevant target questions<sup>4</sup>.

Conversely, the comparison question generally invokes a larger magnitude cognitive response in innocent examinees as compared to the relevant question. These reactions are used to create a within-subject comparison of reactions to the two types of test question. In essence, the examinee's reactions to the two types of questions are compared to determine if a deceptive or truthful pattern of responses was observed.

In some test protocols, the comparison question is a crime of serious consequence, but one that the examinee is not likely to have committed. In other test protocols, the comparison question is an issue that all examinees are guilty of having committed. Each test protocol has been designed, researched, and tested to evoke specific responses in guilty and innocent examinees.

The irrelevant or neutral questions evoke a minimal cognitive response in all examinees but given that neutral questions are unrelated to the issue of primary or secondary concern, that minimal reaction is expected.

### Directed Lie Test Protocol

The EyeDetect Directed Lie Comparison (DLC) test protocol is used primarily when conducting diagnostic or specific-issue tests, but it also may be used as a screening test. This questioning technique is similar to the Directed Lie Screening Test (DLST) polygraph protocol which has been in use for three decades (Menges, 2004).

Laboratory and field studies indicate high levels of accuracy using the directed lie protocol<sup>5</sup>. In directed lie tests, EyeDetect and polygraph use similar protocols. Both use relevant questions, comparison questions, and irrelevant questions.

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<sup>4</sup> Nelson, 2015

<sup>5</sup> Honts & Alloway, 2002; American Polygraph Association, 2011; Department of Defense Polygraph Institute [DoDPI], 1997; DoDPI, 1998; Honts & Raskin, 1988; Honts & Reavy, 2009; Horowitz, Kircher, Honts & Raskin, 1997; Kircher, Packard, Bell & Bernhardt, 2001

The relevant question asks about the issue of primary concern (i.e., Did you rob the bank?)

The comparison questions are “directed lie” questions. To be specific, the examinee is asked or “directed” to lie when they answer these questions. These are questions that everyone can answer in a similar way. The directed lie questions all begin with a similar phrase, such as “In my entire life,” which is intended to prompt the examinee to remember to lie when answering that question.

The following are examples:

- In my entire life, I have never told a lie.
- In my entire life, I have never made a mistake.
- In my entire life, I have always been honest.
- In my entire life, I have never broken any laws.

In the pre-test instructions, examinees are told that they must lie to the directed lie questions and react appropriately to them, or they will fail the test. This type of instruction intends to focus the examinee on carefully reading and following instructions. Examinees are led to believe that if they do not follow their instructions, they will fail the test. They are also led to believe that if their bodies do not respond appropriately to the directed lie questions, they cannot pass the test.

Both the relevant and directed lie questions challenge the examinee’s goal of passing the test. The questions that most challenge that goal are those that will cause greater physiological changes in the examinee. Psychologically speaking, when an innocent person is asked about the relevant issue (bank robbery) and the directed lie questions (having never told a lie or made a mistake), she/he should focus more attention on the directed lie questions to ensure she/he will not fail the test.

Innocent people will be less concerned about the relevant questions since they were not involved and have no memory of involvement in the crime. The innocent person should invest more cognitive effort processing directed lie questions, as they pose the greatest threat to their goal of passing the test. An innocent person should be less concerned about the relevant issue than the directed lie issue and should exhibit a lesser cognitive response for those questions.

On the contrary, a guilty person should invest more cognitive effort while processing the relevant question because it poses the greatest threat to her/his goal of passing the test. That person may experience an emotional response to the threat of detection for the crime of which they are accused. Cognitively, she/he will exert more effort to deny involvement in that crime. The guilty person will be less concerned about the directed lie questions because those questions do not present as great a challenge as do the relevant questions.

## Test Report

The EyeDetect DLC test report includes a section “Test Response Summary” that indicates the examinee’s answers to the relevant questions and to the directed lie (comparison) questions.

The following is an example of the test report section for a relevant question (unreported illegal drug use). The left column labeled “Statement” shows the questions asked of the examinee. The second column labeled “Expected Answer” indicates what the expected answer would be from examinees taking the test. In other words, whether the examinee is innocent or guilty, unless a guilty person confesses, all examinees deny the unreported use of illegal drugs. Therefore, the “Expected Answer” indicates a denial of that issue. The green box (expected) or red box (unexpected) indicate how the examinee answered each question. If not answer, it is called a “Time Out.”

Answer Detail (R1)		Legend: <span style="color: green;">■</span> Expected Answer <span style="color: red;">■</span> Unexpected Answer <span style="color: orange;">■</span> Timed Out					
Statement	Expected Answer	Examinee's Answer					Unexpected Answers
		S1	S2	S3	S4	S5	
I reported all my involvement with illegal drugs.	True	F	T	T			0%
I provided accurate details about my involvement with illegal drugs.	True	T	T	T			0%
As described, I disclosed all my illegal drug involvement.	True	T	T	T			0%
I have not withheld info about my involvement with illegal drugs.	True	T	F	T			0%
I did not leave out details about my illegal drug involvement.	True	T	T	T			0%
I did withhold details about my involvement with illegal drugs.	False	F	F	F			0%
I admit to withholding info about my involvement with illegal drugs.	False	F	F	F			0%
I provided incorrect info about using, buying or selling illegal drugs.	False	F	F	F			0%
As described, I lied about my involvement with illegal drugs.	False	F	F	F			0%
I left out some info about my illegal drug involvement.	False	F	F	F			0%

In the example shown above, the examinee unexpectedly answered two of the relevant questions. Important note: The number of unexpected or expected answers is less important than the intention of the examinee when answering. In other words, if a few questions are answered with the unexpected answer, it will not affect the outcome of the test because when an examinee responds deceptively, the cognitive load invoked will be that which is observed in guilty examinees.

Along the same line, a guilty examinee may answer all test questions with the expected answer while still obtaining a deceptive test score. This occurs because the savvy examinee knows what the expected answers should be, but the cognitive load invoked will be that of a deceptive individual.

The following image shows a sample test report section for the comparison question (directed lie). The left column labeled “Statement” shows the questions asked of the examinee. The second column labeled “Expected Answer” indicates the requested answer for all examinees taking the directed lie test.

In other words, whether the examinee is innocent or guilty, all examinees are asked to lie to the directed lie questions. Therefore, the “Expected Answer” indicates the expected answer when lying to that issue. The green box (expected) or red box (unexpected) indicate how the examinee answered each question. If not answered, it is called a “Time Out.”

Answer Detail (R2)		Legend: <span style="color: green;">■</span> Expected Answer <span style="color: red;">■</span> Unexpected Answer <span style="color: orange;">■</span> Timed Out					
Statement	Expected Answer	Examinee's Answer					Unexpected Answers
		S1	S2	S3	S4	S5	
In my entire life as an adult, I have always followed all rules.	True	T	T	T			0%
In my entire life as an adult, I have never made a mistake.	True	T	T	T			0%
In my entire life as an adult, I have always been truthful with others.	True	T	T	T			0%
In my entire life as an adult, I have never spoken in anger.	True	T	T	T			0%
In my entire life as an adult, I have been honest with everyone.	True	T	T	T			0%
In my entire life as an adult, I have made at least one mistake.	False	F	F	F			0%
In my entire life as an adult, I have told a lie to cover up a mistake.	False	F	F	F			0%
In my entire life as an adult, I have broken the law.	False	T	T	F			66%
In my entire life as an adult, I have spoken in anger.	False	F	F	F			0%
In my entire life as an adult, I have been dishonest with others.	False	F	F	/			0%

In the example shown above, the examinee did not answer one of the directed lie questions. In some instances, this could be due to a lack of concentration or simply because of a mistake. Likewise, in the example shown above, the examinee unexpectedly answered two of the questions.

Regardless, if the examinee intended to answer the questions as instructed, but answered unexpectedly, the cognitive load invoked will be similar to that of a person that answered with the expected answer.