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Contents

The Validity and Reliability of Polygraph Testing	215
The Department of Defense Polygraph Program for FY-96	240
Fear of Consequences and Motivation as Influencing Factors on Psychophysiological Detection of Deception Tuvya T. Amsel	255
Circleville Municipal Court Polygraph Policy and Procedures Rob Reeser	268
Chinese Torture of Tibetans, Was It True? William B. Anderson	280

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**FEAR OF CONSEQUENCES AND MOTIVATION AS
INFLUENCING FACTORS IN THE
PSYCHOPHYSIOLOGICAL DETECTION OF DECEPTION**

By

Tuvya T. Amsel

Abstract

The extent of the psychophysiological reactions, as displayed on real life polygraph records of 100 subjects who were sent to take the test by an interested third party who could inflict a sanction on the subject, upon failure, such as courts, employers, etc. (The IPI Group), were compared to 100 subjects, who took the test out of their own initiative, knowing that they will represent the results, only upon being found truthful (SSI Group).

The extent of the psychophysiological reactions, of the IPI Group, was significantly stronger than the SSI Group. The mean scoring, of the IP group was 4.04, while the mean scoring of the SSI group was 2.13. The same results emerged when comparing the IPI Truthful Group vs. The SSI Truthful Group (3.88 vs. 2.88) and when comparing the IPI Deceptive Group vs. The SSI Deceptive Group (-4.27 vs. -2.58).

In addition, it was found that, 59% of the IPI Group, displayed conclusive psychophysiological reactions (between ± 4 to ± 8) vs. 19% of the SSI Group, while the 81% of the SSI Group, displayed inconclusive psychophysiological reaction (between 0 to ± 3) vs. 41% of the IPI Group.

An additional difference was found between the way the two groups focused their attention. While the IPI group displayed stronger deceptive psychophysiological reactions (average of -4.27), in comparison to truthful reactions (3.88), the SSI group displayed a stronger truthful psychophysiological reactions (average of 2.68) in comparison to deceptive reactions (-2.58).

It was concluded that the extent of psychological detection of deception reaction is a function of the extent of fear of consequences (FOC) in proportion to the extent of motivation (MOT), that exists within the subject while being tested. Fear of detection (FOD) is an additional factor existing within the IPI Deceptive Group subjects, that amplifies their psychophysiological reactions.

This study is based on the Ph.D. thesis conducted by the author. The author is a member of the American Polygraph Association and currently a partner in a commercial polygraph laboratory. The author would like to thank Dr. Eitan Elaad of the Israeli Police for reevaluating the polygraph charts, and to Dr. Jaime Amsel, of Irvine University for reevaluating the results. For reprints, write to Tuvya Amsel, 1 Ben Gurion Blvd., Tel-Aviv, 63454, Israel.

Introduction

Since early days of mankind, people believe that while lying, psychophysiological changes occur in our body. Based on this assumption, different interrogation techniques, ordeals and instruments were developed and applied, in the process of Psychophysiological Detection of Deception. Nowadays one of the most popular, as well as controversial instrument is the polygraph. Davis (1961) made the following observation:

Prima facie it seems improbable that there is a special kind of response peculiar to lying. In the early days Marston (1938) recognized that truth and falsity are not psychological categories.

So what causes the psychophysiological changes that occur in our body while lying? There is a certain degree of controversy and disagreement, as to the origin of the psychophysiological changes in the process of detection of deception. While in ancient times physiological reactions, were attributed to the "Guidance of the Divine Power" (Lea 1870), early modern research suggested Motivational-Emotional variables, as the major factor, effecting psychophysiological reactions, while later research stressed cognitive variables, as the major factor.

The Motivational-Emotional Approaches

Davis (1961) suggested three possible theories to the phenomena of psychophysiological reactions:

- (1) The Conditioned Response Theory. The critical question plays the role of a conditioned stimuli and evokes some emotional response with which they have been associated in the past.
- (2) The Conflict Theory. A specially large physiologic disturbance would occur when two incompatible reaction tendencies are aroused at the same time.
- (3) The Punishment Theory. The subject will display a large physiologic response during deception, because he anticipates serious consequences if he fails to deceive.
- (4) The Motivation Theory. Gustafson and Orne (1963; 1965) found a significant higher rate of psychophysiological detection of information reaction, displayed by motivated subjects to avoid detection, in comparison to non-motivated subjects.

The Cognitive Approaches

- (1) The Guilty Knowledge Theory. Introduced by Lykken (1959, 1960, 1974), commemoration of the Relevant Question (item) will result in psychophysiological reaction, due to the subject's guilty knowledge. Lykken's assumption is based on the orienting reactions (OR) theory of Berlyne (1960) and Sokolov (1963).

(2) The Attention Focusing Theory. Waid (Waid, *et al.* 1978; Waid and Orne 1981) found that the physiological response to a stimulus reflects the degree to which the stimulus was attended to.

(3) The Dichotomization Theory. Was developed gradually by the Jerusalem Group (*e.g.*, Ben-Shakhar, 1977; Lieblich, *et al.* 1970; Kugelmass, *et al.* 1967), the stimulus set is differentiated into two distinct categories: Relevant *vs.* Irrelevant. Subjects possessing guilty knowledge, are paying attention to just one aspect of the stimulus presented to them--whether it is the relevant or irrelevant stimulus--and they ignore the other aspect of the stimulus.

More recent studies suggest that more than one variable may be at play. Elaad and Ben Shakhar (1989) who examine their concept, based on Gustafson and Orne (1963), motivation to avoid detection and Gustafson and Orne (1965) and Horneman and O'Gorman (1985) the type of verbal response used by the subject during the polygraph test. It appears that since the psychophysiological detection of deception became a major research field in psychophysiology, there is an agreement that psychophysiological reactions occur while humans lie.

Why it occurs it is still in debate. Maybe the controversy can be simply attributed to the hopeless attempt to unify all humans? Is it possible to explain the same way the origins of the psychophysiological reactions, of a hard core criminal *vs.* A clergyman or a highly educated *vs.* A primitive? Maybe all of the theories are valid, but they are applicable, only with a certain type of personalities? Maybe all of them are wrong? Maybe a combination of theories can explain the phenomena? In view of these wonders, this study will make an attempt to explain the psychophysiological reactions in the process of psychophysiological detection of information by combining the following three variables:

- (1) Motivation (MOT) exists within the subjects to be found truthful in the polygraph test.
- (2) Fear of consequences (FOC), exists within the subjects when being sanctioned by an interested third party who initiated the test, if they will be found deceptive in the test, and
- (3) Fear of detection (FOD) exists within the deceptive subjects, that the crime or wrongdoing they committed will be revealed.

Gustafson and Orne (1963; 1965) define motivation as a drive existing within the subject to avoid detection of deception. The higher the motivation is, the stronger the psychophysiological reaction will be. Elaad and Ben-Shakhar (1989) concluded that higher motivated subjects were detected better than less motivated subjects. Davis (1961) suggested that the psychophysiological reaction detected in the subject during the test, are due to his fear of consequence, once he will fail the test. In spite of the lack of fear of consequence in laboratory experiments, Gustafson and Orne (1964), Kugelmass, Lieblich and Bergman (1967) found a higher detection rate with subjects who feared consequences (of getting a slight electric shock) during the experiment. Fear of detection, *per se*, in conjunction with psychophysiological detection of deception was not examined, but it can be defined

as the drive which initiates the motivation to avoid detection. FOD can be defined as a short term fear, which later developed into FOC, which is a long term fear.

In order to examine the existence of these variables, a comparison of the psychophysiological reactions extent, of four different types of subjects were made:

- (1) Subjects which were sent to take the test by an interested third party (IPI Group).
- (2) Subjects who took the test out of their own initiative (SSI Group).
- (3) IPI and SSI Truthful Group.
- (4) IPI and SSI Deceptive Group.

It was assumed that motivation to pass the test existed with all the four groups but fear of consequence existed only with the IPI Truthful and Deceptive Groups while fear of detection existed only with the IPI Deceptive Group. Thus, FOC and FOD will amplify the IPI Group psychophysiological reactions, which will result in stronger reactions while being tested. The hypothesis of this study is, that the extent of the psychophysiological detection of deception reaction, is a function of the subject's motivational factor in proportion with the strength of his fear of consequences and fear of detection.

Method

A sample of 200 real life polygraph tests records, that were conducted between the years 1991 to 1995, was randomly drawn from a commercial polygraph laboratory, subject to the following criteria: An equal number of records were selected. 100 records of subjects who took the test out of an interested third party initiative (such as courts, employers, insurance companies, etc.). Based on the test's results, a sanction (if found deceptive) or a reward (if found truthful) would be inflicted upon the subject, by the test initiator. [The Interested Party Initiator Group (IPI Group)]. An additional 100 records were of subjects who took the test out of their own initiative. These subjects were planning to submit the results to an interested third party, only if they were found truthful in the test. [The Subject's Self Initiative Group (SSI Group)]. The records of each of the groups were distributed equally between deceptive and truthful report results. To ensure independence of records, only one record was drawn randomly from each file, where multiple subjects existed in that case. This was done in order to avoid a situation, where the results of one subject could have influenced the results of the other. The original numerical scoring which was assigned by the examiner, to the strongest relevant question in the test (question number 5: "Did you steal/kill/etc.), was considered. The scoring was assigned to the following categories: IPI, SSI and Extent of Reaction. For uniformity reasons, only the first 3 presentations of the relevant question were considered, thus reaching a total possible scoring of ± 9 .

Polygraph Records Reliability

In order to eliminate the theoretical possibility that the polygraph charts scoring, were influenced by biased examiners, 100 charts (50 IPI and 50 SSI) were reevaluated by an independent examiner with 20 years of experience. To estimate the interscorer reliability, a Pearson correlation coefficient was computed for each physiological measure and for the total scores, across measures, assigned by the two scorers. The coefficients were .52 for respiration, .84 for GSR, .69 for the cardiovascular activity and .82 for the total score.

It should be noticed that in spite the scoring differences in the respiration and cardiovascular channels--which can be attributed to different analysis--there is a great degree of agreement in the total score reliability.

Subjects Data

79.5% of the 200 subjects were males (IPI 82%, SSI 77%). Their mean age was 39.2 (IPI 39.4, SSI 39.1) and their mean level of education was 11.4 years (IPI 10.9, SSI 11.8). The records represented various criminal and fiscal cases, such as: Theft (IPI Group 25%, SSI Group 18%), insurance fraud (IPI 8%, SSI Group 31%), monetary disputes (IPI 36%, SSI 7%), forgery (IPI 10%, SSI Group 12%), and even a murder case (IPI 0%, SSI 1%).

Apparatus

The records were of polygraph tests, which were conducted by two experienced examiners (male 15 years, female 9 years). The polygraph instruments used by the examiners were Lafayette Ambassador's 4 channel model. Each instrument recorded electronically, respiration by two pneumatic tubes positioned around the thoracic area and abdomen, skin resistance responses were recorded from two stainless steel electrodes attached to the volar side of the index and fourth finger of the hand and cardiovascular activity was recorded by a blood pressure cuff positioned around the upper arm and inflated to a pressure of between 40-60 mmHg. All the tests were conducted in small, quiet, sparsely furnished rooms. The test procedure consisted basically of a pretest interview--where the test issue is discussed with the subject and the test questions are phrased. Subjects were then asked to sign a statement of consent regarding the questions. The pretest was followed by a 3-5 times presentation of the questions. The question technique applied by the examiners was a variation of the Modified General Question Technique. The first representation was followed by a Day Stimulation Test. Each test was of a single issue specific test and consisted of 2 irrelevant questions, 1 sacrifice relevant question, and 2-3 relevant questions, 3-4 control questions. Following the test, the polygraph records were analyzed by the examiner in accordance with the numerical scoring technique of 3 point scale procedure, which is based on Backster (1963) Numerical Scoring Evaluation. According to this procedure, the examiner compares the subject's psychophysiological reactions as displayed on the chart, in each relevant question with its adjacent control questions. The comparison is made on each and every polygraph channel separately. If the reaction to the relevant question is stronger than the reaction to its adjacent control question, a -1 score will be designated, if vice versa a +1 score will be designated, if no differences in reactions were detected a 0 score will

be designated. Thus a maximum score of +3 or -3, can be designated to each question ($\pm 1 \times 3$ channels). If a relevant question was presented 3 times, the total score can be any figure between +9 and -9.

Results

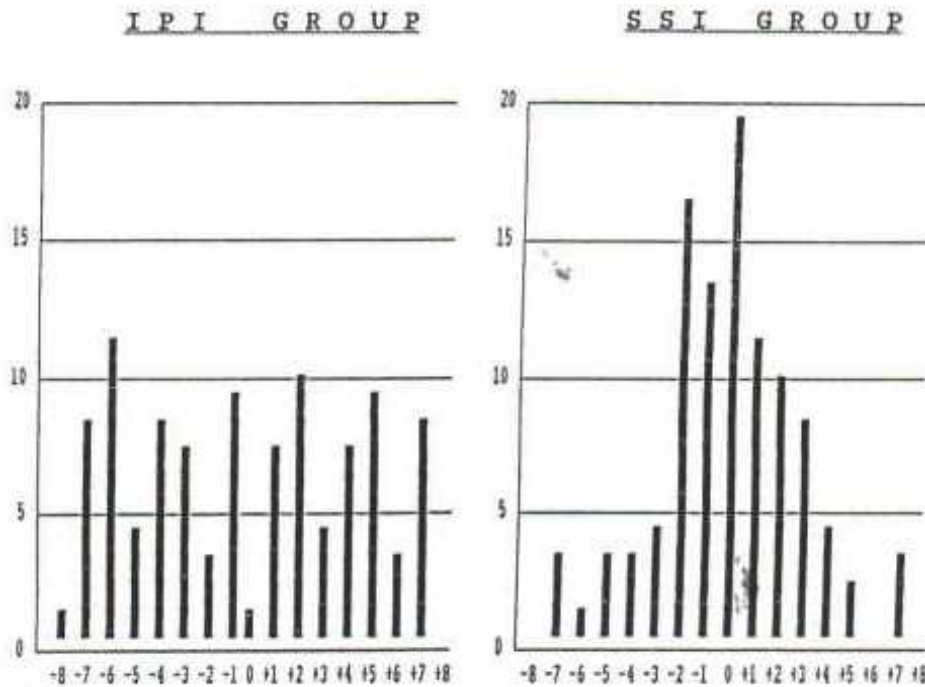
To test the hypothesis a cross-tabulation of scores by group (IPI vs. SSI) was performed. As can be seen in Table 1, while scores in the IPI Group distribute across the whole scale including the wings of the scale, scores of the SSI Group distributed heavily around the center of the scale (± 3). A chi-square test resulted in a significant difference on distribution between the two groups (Chi-square = 53.43, $df = 15$, $p < .001$) meaning that the IPI Group scores do not distribute equally to the scores of the SSI Group.

Table 1

Score Distribution

Reaction Extent Total Scoring	Number of Times	
	IPI	SSI
+7	8	3
+6	3	0
+5	9	2
+4	7	4
+3	4	8
+2	10	10
+1	7	11
0	1	19
-1	9	13
-2	3	16
-3	7	4
-4	8	3
-5	4	3
-6	11	1
-7	8	3
-8	1	0
Total	100	100

Figure 1



Further data showing the difference between the two groups distribution can be seen in Table 2. While the IPI Group has a slightly positive skewed distribution and definitely a flat kurtosis value, the SSI Group scores distributed in a fashion close to normal. Finally, a Levene test for comparing the two groups distributions rendered a significant result ($F(2/198) = 44.818, p < .001$) meaning that the two groups do not distribute equally.

Table 2

Skewness and Kurtoses Group Comparison

	IPI	SSI
Skewness	.031	-.001
Kurtosis	-1.312	.502

The distribution of the results between the groups has also an effect on the conclusivity of the final test results. In the three point scale numerical scoring the common cutoff point is ± 3 . As seen in Table 3 the IPI Group final scores, are almost three times more conclusive than the SSI Group (59% vs. 19%). While the SSI Group's final scores are almost two times more inconclusive than the IPI Group (41% vs. 81%).

Table 3

Conclusivity Rate

	3 Charts Total	N of Cases		T
		IPI	SSI	
Conclusive	± 4 to ± 8	59	19	78
Inconclusive	0 to ± 3	41	81	122
Total		100	100	200

Table 4

Mean Score

	N	Mean	S.D
IPI Group	100	4.04	3.43
SSI	100	2.13	1.85
Total	200	3.08	2.64

To test the hypothesis that there is an interaction between the test results (truthful vs. deceptive) and the test initiator (IPI vs. SSI) a 2 x 2 factorial Anova was performed. Table 3 shows the results of the test. As shown in the table there is a significant interaction effect between the participant's group assignment and the test results: Main effect $F(2/179) = 275.61, p < .001$; Interaction effect $F(1/179) = 24.12, p < .001$. As the means in Table 5 shows, this interaction effect increases the scores, to a more conclusive, truthful or deceptive, result.

Table 5

Mean Score By Result

	Mean Score	
	IPI	SSI
Truthful	3.88	2.68
N	(48)	(38)
Deceptive	-4.27	-2.58
N	(51)	(43)

Results' Conclusion

This research's results conclusions are:

1. Psychophysiological reactions of the IPI Group are significantly higher than the SSI Group (mean reaction of 4.04 vs. 2.13).
2. Psychophysiological reactions of the IPI Truthful Group are significantly higher than the SSI Truthful Group (mean reaction of 3.87 vs. 2.68), and it is similar with the Deceptive Groups, where IPI mean score is -4.28 vs. -2.58 of the SSI.
3. Most of the IPI Group psychophysiological reactions (59%) are within the conclusive area ($\pm 4 - \pm 8$), while most of the SSI Group psychophysiological reactions (81%) are within the inconclusive area ($0 - \pm 3$).
4. Psychophysiological reactions of the deceptive IPI Group, are significantly stronger than the truthful IPI Group (mean reaction of -4.28 vs. 3.87). These results are contrary to the SSI Group in where the truthful psychophysiological reactions are significantly stronger than the deceptive SSI Group (2.68 vs. -2.58).

Discussion

As mentioned, lying per se, does not create the psychological detection of deception reactions, so what does? What are the input variables responsible for the psychophysiological reactions output? If it is explained by Gustafson and Orne (1963; 1965) motivation to avoid detection or to be found truthful, then this theory can explain why any psychophysiological reactions were detected. But it still disagrees with the results that found differences in the psychophysiological reactions extent

between the IPI and SSI Groups because (1) there should be no differences in the extent of the reactions between the groups because both groups are probably motivated equally; (2) there should be no differences in the extent of the reactions between the truthful and deceptive subject groups, because probably both groups share the same motivational level.

Davis (1961) conditioned response, or Lykken (1959; 1960; 1974) guilty knowledge or Ben-Shakhar (1977) dichotomization theories are accountable for the differences in psychophysiological reactions that were found between the IPI Truthful and Deceptive Groups, assumingly because lying creates a stronger reaction than the truthfulness. But these theories contradict the reversed results with the SSI Group, where truthful subjects reaction stronger than deceptive ones. If only Davis' (1961) conflict theory accounted for the results, then it contradicts the differences in psychophysiological reactions that were found between the IPI and the SSI Groups, because one would assume that probably both groups share the same conflict. Davis' (1961) fear of consequences theory can explain the differences in the psychophysiological reactions between the IPI and SSI Groups, because obviously the SSI Group does not have any fear of sanctions inflicted on them, if failing to pass the test successfully. If FOC is the only reason for the psychophysiological reactions, there should not have been any differences between the reactions of the IPI Truthful Group vs. The IPI Deceptive Group, because both groups share the same FOC, but then there are differences and significant ones? A probable reason for a stronger psychophysiological reactions detected within the IPI Deceptive Group is the fear of being detected (FOD).

The following table represents the different variables that exist between the research groups:

Table 6

		Variable		
GROUP		MOT	FOC	FOD
IPI	Truthful	+	+	-
	Deceptive	+	+	+
SSI	Truthful	+	-	-
	Deceptive	+	-	-

+ Variable exist
 - Variable does not exist

Based on the amount of the variables, results of group classification follows:

- (1) IPI Deceptive Group (3 variables)
- (2) IPI Truthful Group (2 variables)
- (3) SSI Truthful Group (1 variable)
- (4) SSI Deceptive Group (1 variable)

This classification coexists with the extent of the mean psychophysiological reaction received in each of the groups, as shown in the following:

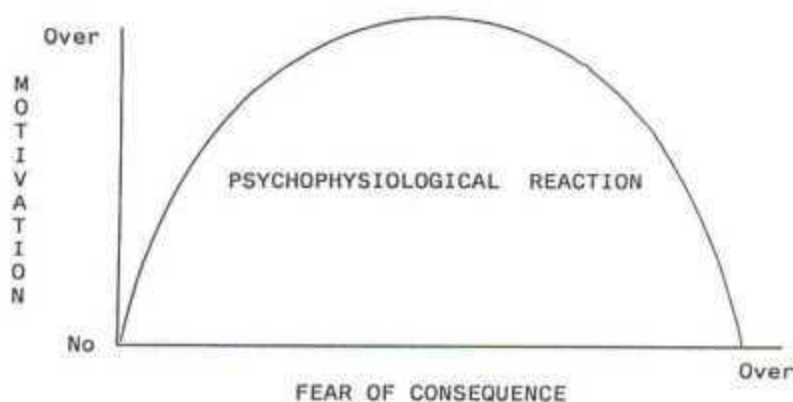
- | | |
|-------------------------|-------|
| (1) IPI Deceptive Group | -4.27 |
| (2) IPI Truthful Group | 3.88 |
| (3) SSI Truthful Group | 2.68 |
| (4) SSI Deceptive Group | -2.58 |

A possible explanation to the difference in-between the SSI Truthful and Deceptive Groups, can be attributed to the fact that the SSI Deceptive subjects lack the FOD, which amplifies the reactions.

The conclusion of this research is that the extent of psychophysiological detection of deception reaction is a function of the extent of fear of consequences (FOC) in proportion to the extent of motivation (MO), that exist within the subject while being tested. Fear of detection (FOD) is an additional factor existing within the IPI Deceptive Group subjects, that amplifies their psychophysiological reactions.

In addition, another conclusion is that the IPI group are focusing more attention to the sanctions following the results of the test, while the SSI group are focusing more attention on the reward following the results of the test. These results coincide with Waid's Focusing Attention Theory, and it may be integrated into this model as well, but it is still to be explored.

The conclusion of this research can be integrated into the following U shape curve Optimal States Theories.



As can be seen in the chart, the subject's psychophysiological detection of information deception reaches its highest peak level when his motivation and fear of consequences are at some moderate intensity. Lower and higher values are less effective. With IPI Deceptive subjects, the peak level will be elevated.

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NOTE ON STATEMENT ANALYSIS ARTICLE

In Volume 25, Number 4, 1996 issue of the *Polygraph* article entitled, "Statement Analysis: What do Suspects' Words Really Reveal?:" by Susan Adams, the following author's note was inadvertently omitted:

The author gratefully acknowledges Avinoam Sapir, Laboratory for Scientific Interrogation, whose extensive development and work in the field of statement analysis made this article possible. The author also gratefully acknowledges Don Rabon and his statement analysis book for law enforcement officers, *Investigative Discourse Analysis*.
