

A First Look at Electrodermal Monitoring during Polygraph Pretest Interviews: The LPI Experience

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Abstract

While the value of physiological data during polygraph testing has been subject to repeated research, investigations regarding the usefulness of polygraph data for pretest interview-assistance have not been previously published. Five experienced polygraph examiners conducted a total of 92 field screening polygraph examinations, and during the pretest interview monitored each examinee's electrodermal activity as well as movements via a motion pad. The examinees were not told of the real time-monitoring. Dependent measures included examiner attitudes regarding the usefulness of these data to the interview process, and the proportions of polygraph results for DI, NDI, and Inconclusive compared to pre-study levels. Our findings suggest that monitoring phasic EDRs during the pretest interview had only a modest benefit with selecting DLCs, no effect on garnering pretest information, and none on the proportion of No Significant Response (NSR), Significant Response (SR) and No Opinion (NO) results as compared to historical averages. Suggestions are offered for future lines of research.

Introduction

Most polygraph examiners use some form of examinee assessment during their polygraph examinations to help conduct the sessions more effectively. A majority of these assessments are based on behavioral observations during the pretest interview. Examiners are taught to pay attention to gestures, word choices, hesitations, eye movement, and facial expression among other

indicators for clues to statements for which examinees are deceptive, evasive, or doubtful. Pretest assessment of examinees is considered so important that it is included in virtually all initial polygraph courses, and in many continuing education offerings. While the evidence is mixed as to the validity of many behavioral clues, without some sort of feedback examiners believe they would have more difficulty tailoring the examination questions for individual examinees.

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It became our interest to determine whether unobtrusive physiological recording might also be exploited for the same purposes, that is, whether it could help examiners during the structured pretest interview determine which topics engender more examinee concern. If so, the practical applications would be readily apparent. For example, physiological monitoring may help examiners focus their interviews better, especially in multiple-issue screening applications where responsivity could alert the examiner to areas warranting additional attention. It might also allow examiners to determine the evocative power of comparison question topics before testing, rather than waiting for the test data to reveal whether they were effective. A third benefit may arise if the examinee were aware that the monitoring is taking place, thereby encouraging a more accurate self-disclosure (Roese & Jamieson, 1993) from which better polygraph test questions can be based.

The idea of using physiological information during interviewing is not new. As far back as the early years of the 20th century writers suggested that electrodermal responding could be used as an adjunct to clinical impressions to guide psychoanalytic interviews. In a compiled text by famed psychoanalyst Carl Jung titled *Studies in Word Analysis* (1906), Dr. Binswanger described the use of hand-electrodes with his patients that, when combined with his clinical observations, would help him determine which topical areas were more likely to hold memories over which patients were most conflicted. This approach has attracted intermittent interest in clinical psychology in the ensuing decades, including the use of electrodermal measures while a questionnaire is administered (Lukens, 1979).

Similarly, Dr. William Marston devised a method in which he intermittently took a subject's blood pressure during discussions of various topics, including the crime under investigation, and compared the systolic blood pressure across the topics. From this he was reportedly able to discern truthfulness and deception. While he referred to his methodology as a "test", it more closely approximated a physiologically based interview. He reported:

The effectiveness of the test depends almost entirely upon the construction and arrangement of the cross-examination and its proper correlation with the blood pressure readings, a system of signals between examiner and b.p. operator being necessary. Other tests of the nature of which the subject is ignorant, as well as periods of rest and series of questions upon irrelevant and indifferent subjects are also interjected into the examination of the subject in such a way as may, in each particular case, best enable the operator to determine the normal blood pressure of the subject and also the normal blood pressure plus the fixed increase presumably present throughout the whole examination due to the excitement caused by the test or by court procedure. The form of the blood pressure curve as correlated with the cross-examination is then carefully studied by the operators, and is found to indicate with surprising accuracy and minuteness the fluctuation of the witness' emotions during the telling of his story. It was found that in the cases of actual defendants it was of great practical advantage to request the person to tell his entire story first in his own way without either prompting or questions from the examiner. Irrelevant matter was next interposed, and the cross-examination could then be built up with great effectiveness upon the elements of the defendant's own voluntary story. (Marston, 1921)

Both Jung and Marston recognized that physiological data collected during interviews could be of value. It is not a far stretch, therefore, that the exploitation of physiological information in structured interviews in other settings, such as polygraph pretest interviews, could also prove helpful.

The potential for this application was not lost on the polygraph community. For a period in the early 1980s Stoelting Instruments offered a device that allowed polygraph examiners to indirectly see EDRs using a light that changed colors according to electrodermal reactivity. The Stoelting advertisement read, in part:

The patented Color-Cue GSR Meter provides the examiner with a fool-proof way to quickly determine sensitive topics during the pre- and post-test interview. It also provides a convenient visual GSR indicator of arousal during the exam...Whenever a sensitive topic is mentioned, the Meter changes color...the green glow fades out and the red glow fades in.

A proposed use of electrodermal data during police field interviews came even earlier. In 1961 *Electrographic Laboratories* carried an advertisement in *Law and Order Magazine* directed toward police officers. It featured a depiction of an officer at an apparent traffic stop holding a GSR meter

(called the “Autonometer”) with leads attached to an automobile driver who is facing the officer with his car door open. See Figure 1. The ad announced:

The advantages of GSR interrogation are now available to the investigator on the scene. It's done with THE AUTONOMETER. A product of modern electronics and miniaturization, the Autonometer is an instrument for measuring changes in electrical conductivity of the skin which accompanies emotional strain and responses. Self-powered, the unit can be carried as part of patrol car's equipment and used immediately – right on the spot.

Figure 1. Advertisement for the Autonometer (*Law and Order*, 1961).



NOW, A SCIENTIFIC AID TO INTERROGATION
INSTANTLY AVAILABLE!

A-S-

The advantages of GSR interrogation are available to the investigator on the scene. It's done with

THE AUTONOMETER

A product of modern electronics and miniaturization, the Autonometer is an instrument for measuring changes in electrical conductivity of the skin which accompanies emotional strain and responses. Self-powered, the unit can be carried as part of patrol car's equipment and used immediately—right on the spot. No waiting for laboratory appointment and transportation to another location.

OUTSTANDING FEATURES

- COMPACT** – Measures 3x3x1.5 inches. Weighs only 8 oz.
- RUGGED** – May be carried in car or pocket. Easily replaceable batteries last more than a year under normal operation.
- SIMPLE** – Comfortable, finger-tip electrodes easily applied. No long technical training required, only the investigator's ability to interrogate. Instant resistance measurement with use of a monograph.

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For unknown reasons neither the Stoelting nor Autonometer devices remained commercially viable, and they are not available today. One challenge for these devices may have been the state of technology at the time they were marketed. Neither device allowed users to record EDA over periods of time so to compare responsivity on a longer scale. Moreover, at that time no one

had developed an interview strategy that would permit the extraction of meaning from the resultant electrodermal data.

Recent advances in polygraph instrumentation have opened the opportunity to reexamine the usefulness of the EDA signal during interviews. Using computer instrumentation, examiners can record EDA

virtually indefinitely, and using the software they can compress the visual display to look for longer-term trends that would not be obvious from shorter segments of data. Also, thoughtful and sequential ordering of topic areas during the interview may help users distinguish informative responses from random responding. This new perspective, the evaluation of broader responsivity to topic areas rather than phasic responses to individual questions, has not been previously reported in the credibility assessment literature.

Because there was virtually no foundational research to help direct our investigation, the project was heavily piloted to develop procedures that were effective and not disruptive to the polygraph examination process. The resulting procedures arose from the observations of the LPI examiners, and are discussed later in this report.

In this exploratory study we set out to gather information, by survey, of the following issues:

Question 1: Do examiners find electrodermal information during the pretest interview useful?

Question 2: At what rate do examinees, uninformed of the electrodermal monitoring, self-disclose information on relevant topics.

Question 3: Are there any changes in the proportions of different polygraph results from historical average for examinees undergoing electrodermal monitoring?

Question 4: Did examiners find electrodermal monitoring interfered with polygraph testing?

Methodology

Examiners

The five participating polygraph examiners all received their initial polygraph training at the Latinamerican Polygraph

Institute (LPI), an educational facility accredited by the American Polygraph Association, and were employed full time as polygraph examiners for LPI conducting screening and diagnostic examinations for private companies and public agencies in Colombia. Four examiners were female. The field experience of the five examiners ranged from 10 to 67 months at the beginning of the study, with an average of 33.8 months. In that time they conducted an average of 2157 examinations, with a range of 345 to 5440. During practice sessions all became proficient at interviewing applicants while intermittently viewing the physiological tracings, which appeared on the same computer screen they used for data entry during the interview.

Examinees

There were 92 examinees in this study, 73 of whom were male. All were applicants for employment for LPI clients. The average age of the applicants was 28.1 years, with a range of 18 to 44 years, and the average level of education was 12.7 years, and ranged from 7 to 17 years.

Instrumentation

All five examiners use computerized instrumentation, the Limestone Professional Suite version 2.8.0.4. The standard physiological channels of cardiograph, pneumograph, electrodermal and movement channels were available in the instrument, though the cardiograph and pneumograph channels were not used during the interview phase. The movement sensor was the StingRay SE version⁴.

Examination topics:

Clients of the LPI specify which relevant areas they wish to have tested. Though there was considerable overlap in coverage across these examinees, not all of them had the exact same test topics. However, all examinees were tested on two core topics: involvement with illegal drugs, and relationships with illegal persons (i.e., criminals, insurgents, terrorists). For

⁴ During the pilot phase of this study, one of the examiners (Andrea Arevalo Murcia) observed that EDRs were often prompted by examinee movement. To track the association between movements and EDRs, we adopted her

suggestion to also record the motion sensor channel during the pretest interview. Those data were not analyzed in this project, however, but were used by the interviewing polygraph examiner in assessing the EDRs.

consistency, only those topics were evaluated in this project. All examinations were conducted using the Directed Lie Screening Test (DLST; Handler, Nelson, Blalock, 2008).

Procedure

All examinations were conducted in Spanish. When the examinee arrived for the scheduled polygraph appointment, the examiner met him⁵ in a waiting room before they both went to the polygraph testing room. The examiner explained the examinee's rights, obtained his signature on a consent form, and then she detailed the instrumentation and testing process.

The examiner next placed the polygraph sensors on the examinee and conducted a known-number acquaintance test (DoD Polygraph Institute, 1994). The purpose of this procedure is to familiarize the examinee with the testing process, to ensure the sensors are properly placed and functioning, to establish the proper gain settings, and to demonstrate to the examinee the sensitivity of the instrument. After the acquaintance test she turned off the pneumograph and cardiograph sensors, but continued to record the electrodermal and motion sensors. It was at this point in the interview the examiner began discussion of the test topics.

The interview was conducted with the examiner facing the examinee from across the desk. On the desk was a laptop computer which the examinee could see, though the examinee could not see what was on the examiner's computer screen. The examiner conducted the interview while intermittently typing notes into the laptop. Unknown to the examinee, the examiner was also monitoring his movements and electrodermal responses, and annotating the recordings to denote the time period and the topics under discussion.

The examiners were free to pursue clarifications from the examinee at any time,

including when they saw electrodermal responses (EDRs) that appeared to be significantly more intense or frequent on a topic area than in other topic areas. Examiners were also permitted to return the interview to topics to determine whether EDR response patterns reappeared.

At the conclusion of each examination the examiner responded to five survey items, written in the Spanish language. The following is the English equivalent of the survey items:

1. Make a checkmark next to the phrase below that best describes the effect of the EDA monitoring in your ability to obtain information during the pretest interview.

- ☐ a. Very disruptive
- ☐ b. Disruptive
- ☐ c. Neither helpful nor disruptive
- ☐ d. Helpful
- ☐ e. Very Helpful

2. Make a checkmark next to the phrase below that best describes the effect of the EDA monitoring in choosing DLCs for the test.

- ☐ a. Very disruptive
- ☐ b. Disruptive
- ☐ c. Neither helpful nor disruptive
- ☐ d. Helpful
- ☐ e. Very Helpful

3. Did the applicant make any disqualifying admissions during the pretest interview?

- ☐ a. Yes
- ☐ b. No
- ☐ c. Unsure

4. What were the test results for this case?

- ☐ a. NSR
- ☐ b. Inconclusive
- ☐ c. SR
- ☐ d. Other _____

⁵ Because most of the examinees were men, we elected to use the generic male terms in this report to avoid cumbersome sentence structures that include both genders in each reference. Similarly, as most examiners in this project were women, female pronouns were used when referring to the examiners.

5. Was the examinee aware during the interview that you were monitoring his EDA?

- ___a. Yes
___b. No
___c. Unsure

There was also a space reserved for comments.

Results

The following are the survey results for each question. All statistics used an alpha of .05.

Question 1. Effect of EDA monitoring on information gathering.

<u>Choice</u>	<u>Number</u>
very disruptive	0
disruptive	4
neither helpful nor disruptive	77
helpful	3
very helpful	8

These data indicate that in about 83.7% of the cases the EDA monitoring provided no advantage or disadvantage in gathering information during the pretest interview. In 4 cases the EDA monitoring was disruptive, and 11 where it provided perceived benefit. A test of proportion looking at differences between cases showing benefit and the cases showing disruption approached but did not exceed chance probability ($z=1.88$, $p=.06$).

Question 2. Effect of EDA monitoring on choosing DLCs.

<u>Choice</u>	<u>Number</u>
very disruptive	0
disruptive	1
neither helpful nor disruptive	68

helpful	20
very helpful	4

As with question 1, EDA monitoring had no effect on the majority of cases (73.9%). However, in another test of proportions, it did appear to be more often helpful than disruptive ($z=4.95$, $p<.05$).

Question 3. Did the examinee make disqualifying admissions in the pretest interview?

<u>Answer</u>	<u>Number</u>
yes	19
no	62
unsure	11

In about two-thirds of the cases the examinee made no disqualifying admissions during the pretest interview during EDA monitoring. In 20.6% of the cases the examinees did make serious admissions, and in the remainder of the cases it was unclear whether the examinee's admissions were disqualifying.

Question 4. What were the test results for this case?

<u>Results</u>	<u>Number</u>	<u>%</u>	<u>Historical % Average</u>
NSR	65	70.6	77.3
SR	25	27.1	20.8
NO	1	1.1	2.0
Other	1	1.1	0.0

At 70.6%, most cases were reported as NSR, followed by SR at 27.1%. The above table also includes the historical average for these examiners for the previous year. Tests of proportions found no significant differences in the proportions of test results during this study as compared to the historical averages. In other words, effects of EDA monitoring on the proportions of test

results were not manifested in the study data.

Question 5. Was the examinee aware during the interview that you were monitoring his EDA?

<u>Answer</u>	<u>Number</u>
Yes	22
No	51
Unsure	19

Examiners were instructed not to inform examinees of the EDA monitoring during the pretest interview, and the present data suggest that slightly more than a majority of the examinees remained naïve of the monitoring (55.4%). However, a substantial minority (23.9%) apparently surmised that the monitoring was taking place.

Discussion

This first-ever report of EDA monitoring during the pretest interview produced mixed findings. It did not appear to help examiners develop new information during the pretest interview, though it may have been of value in choosing effective DLCs for use during testing. There were no effects on test results.

These preliminary findings offer some promise that EDA monitoring could be useful during polygraph examinations in the limited context of helping examiners assess comparison questions prior to adding them to the question list. A replication is needed, however, not only to determine the stability of the present findings, but also to explore whether examinees volunteer more frequent serious admissions when they are told of the EDA monitoring.

Lessons Learned

For the ease of examiners, only the self-centering mode of the EDA channel was employed. This mode displays phasic responses without the distraction of manual recenterings, but it also filters out tonic trends. It is unknown whether tonic responses carry useful information during interviewing, and it would be a fruitful avenue of future research.

Testing examiners repeatedly remarked that the EDA wires were an annoyance to examinees as they attempted to use gestures during the interview. The movements also created spikes and data dropouts. Future research should look to resolve this problem, perhaps by rerouting the EDA cables to a less bothersome configuration, or by experimenting with wireless systems.

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