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Spontaneous Countermeasures During Polygraph Examinations: An Apparent Exercise in Futility

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The frequency and effects of spontaneous countermeasures against a polygraph examination were examined in a mock employment screening study. Eighty subjects were debriefed concerning their use of spontaneous countermeasure following the completion of their Relevant-irrelevant employment screening polygraph examination. Overall, 53.8% of the participants reported the use of at least one spontaneous countermeasure. In a departure from other studies in this area, 30% of the truthful subjects reported trying some intervention in an effort to make themselves look more truthful. An ANOVA revealed neither main effects nor interactions involving the use of a spontaneous countermeasure.

Polygraph tests are used to assess the veracity of criminal suspects, witnesses, and job applicants. The payoff matrix associated with identifying truthfulness varies dependent upon the context of the situation, but regardless of the situation, it is imperative that the polygraph identifies those individuals who are attempting deception.

Research has examined the influence of a number of factors on the validity of polygraph exams, including the physiological bases (i.e., psychophysiology and psychophysiological measurement issues), antisocial personality disorders, and countermeasures. The area of interest in this study concerns spontaneous countermeasures used during polygraph examinations.

Countermeasures are anything that a subject does in a deliberate effort to defeat or distort a polygraph test (Honts, Hodes, & Raskin, 1985). Countermeasures can be implemented in two ways: premeditatedly (with or without training) or spontaneously without forethought or training.

Although a number of studies have examined the use of premeditated countermeasures (e.g., Ben-Shakhar & Dolev, 1996; Honts, Raskin, & Kircher, 1994; Iacono & Cerri, 1992; and see the review by Honts, 1987), only one published study has examined the use of spontaneous countermeasures (Honts, Raskin, Kircher, & Hodes, 1988). Honts et al. (1988) found that although 65% percent of their guilty subjects reported the use of spontaneous countermeasures, such countermeasures were ineffective. None of the deceptive subjects who used spontaneous countermeasures produced a truthful outcome, nor were inconclusive rates increased. Honts et al. also reported that none of the innocent participants made any attempt to utilize countermeasures during their examinations.

METHOD

Participants

Participants were 80 paid subjects who were solicited through a temporary employment advertisement in the local newspaper. The ad stated that the participants would be paid fifteen dollars per hour for two hours work and there was the possibility of a fifty dollar bonus. The ad also stated a list of criteria that needed to be met in order to participate. Each participant: (a) must have completed at least one semester of college, and (b) had to be 18 years of age or older. When interested parties responded to the ad, they were screened further regarding the following participation criteria: (c) they were not under the care of a psychologist or psychiatrist, (d) did not have any medical problems requiring prescription medication, and (e) had never previously taken a polygraph test. These criteria were selected to: protect the more vulnerable (physically and emotionally) candidates, filter out any possible physiological response issues, and to obtain a subject pool that would accurately reflect the possible job applicants for positions at a government facility. Of the eighty participants accepted into the study, 69% (n=55) were female and 31% (n=25) were male. Participant ages ranged from 18 to 68 (M = 33).

Apparatus

A CPS-LAB system (Scientific Assessment Technologies, Salt Lake City, UT) was used to control hardware data acquisition. The CPS-LAB specified the hardware configuration, storage rates, and the data collection protocol. CPS V. 2.20 (Kircher & Raskin, 1998) was used to edit artifacts from the physiological data.

The physiological acquisition subsystem (PDAS) of the CPS-LAB generated analog signals for thoracic and abdominal respiration, skin conductance, cardio, and finger pulse amplitude. The output from the signals were routed to a PC, where each of the six analog channels were digitized at 1000 Hz with a Metrabyte DAS 16F analog-to digital converter installed in the PC compatible computer. This process enabled the signals from the sensors to feed into the CPS-LAB. Respiration was recorded from two strain gage respiration transducers secured with Velcro straps around the upper chest and the abdomen just below the rib cage. Palmer Skin conductance was obtained with constant voltage circuit from two AgAgCl electrodes placed on the distal phalanx of the first and middle fingers of the right hand. Changes in cardiovascular activity (cardio) were transduced from a blood pressure cuff placed around the upper left arm and inflated to approximately 45 mm Hg at the beginning of each chart. Finger pulse amplitude was obtained from a photoelectric plethysmograph placed on the palmar surface of the right thumb. The plethysmograph signal was AC-coupled with a .2-second time constant and a 2-pole, low-pass filter.

Although all channels were sampled at 1000 Hz, the data were reduced before they were stored in files on the hard disk by averaging the samples for successive epochs. Respiration and skin conductance data were stored in data files at 10 Hz. Cardio and finger pulse were stored at 100 Hz. These storage rates are the standard psychphysiological practice for these measures and retain all the necessary detail for extracting meaningful measurements form the waveforms.

Procedure

When a participant would call to schedule an appointment the screening criteria were discussed and if they were met, inquires were made as to the availability of the necessary documentation to complete the job application. There were eight documents necessary for the verification of the information provided by the participant on the job application: (a) driver's license, (b) birth certificate, (c) proof of current address, (d) social security card, (e) current automobile registration or insurance bill, (f) check or recent bank statement, and (g) proof of college and (h) high school attendance. If the participant met the criteria and was able to present all eight pieces of information, they were scheduled for an appointment.

Upon arrival at the laboratory, a research assistant informed the participants of their role in the experiment, their rights as a participant, and informed consent. The research assistants then verified that the participants had all of the necessary documentation. Participants were instructed to complete the first job application (see Appendix A) truthfully. The information they furnished was then correlated and verified with the documentation they had provided. The following information was verified with documentation: last name, date of birth, college attendance, make of automobile, current

address, social security number, high school and checking account. Following the completion of the truthful application participants were given their condition in a sealed envelope, the contents of which were unknown to the research assistants and the polygrapher.

Participants in the innocent condition were instructed via written instructions and videotape to complete a second application (identical to original printed on a different color of paper) truthfully and to place all of the contents of the envelope back into it accept the second application. Participants in the deceptive condition were instructed via video and written instructions to select one item from each of two groups (Group 1: Last name, Date of birth, College attended, & Make of automobile; Group 2: Current Address, Social Security Number, High school attended, & Bank for checking account).

Participants were then instructed to develop deceptive information about the two chosen items, and to put that deceptive information on the second application. They also indicated, on a separate form, which items of information they falsified. Thus, on their second application all information with the exception of the two deceptive items were verified as truthful and replicated from the first application.

Participants were further instructed to maintain innocence at all times regarding the false information they provided on the second application. They were instructed to place all of the contents back into the envelope except for the second application and to then seal the envelope. All participants were escorted to the polygraph examiner and were introduced by their first name only (in case they had falsified their last name.) They were then given a polygraph examination regarding the information they had provided on the second application. Half of the subjects were tested by a human examiner who used representative field polygraph techniques, and half of the subjects were tested with an automated procedure. Following the polygraph examination, participants were debriefed by a research assistant. The information provided on the second application was verified via supporting documentation, thus, confirming the deception manipulation.

Each subject was given two polygraph examinations covering the application items. Subjects were either truthful on both examinations, or attempted deception to one of the relevant questions on each of their examinations. The polygraph examinations performed at significantly better than chance levels in both the human and automated conditions correctly classifying 65% and 77.5% of the subjects, respectively (Honts & Amato, 1999).

During the post-session debriefing, both deceptive and truthful participants were asked about their use of spontaneous countermeasures. The question often elicited an inquiry to the definition of a countermeasure; further explanation of a countermeasure was given by rephrasing the question as, "Did you do anything during the examination to make yourself seem more truthful? " Their responses were recorded. If they indicated that they had used some type of countermeasure they were asked what method they used and where they had learned about the use of such countermeasures.

The research assistants recorded the participant's responses verbatim and then encoded the responses qualitatively for analysis. Participant's responses were placed into one of four categories: (a) alterations in breathing, (b) mental countermeasures, (c) physical countermeasures, (d) combination (more than one of the preceding three categories reported). Two research assistants independently coded responses to the countermeasures question. After coding, the two assistants met and reached consensus on the few situations where they had disagreement.

RESULTS

Overall, 53.8% (43 of 80) of the participants reported the use of at least one spontaneous countermeasure. Of these, 77.5% (31 of 40) of the deceptive subjects and 30% (12 of 40) of the truthful subjects reported the use of one or more of the following spontaneous countermeasures: altered breathing (n=12), mental countermeasures (e.g., tried to think of something other than the examination questions or situations; n=10), and physical countermeasures (e.g., applying pressure to a hurt foot or biting their tongue; n=9). Twelve participants reported using more than one of the above countermeasures.

The following analysis was conducted: A 2 (Guilt;

deception attempted vs. completely truthful) by 2 (Countermeasure; used vs. not) by 2 (Test, a within-subjects factor) was run on the largest Relevant/Irrelevant (R/I) score value on Test 1 and the Largest R/I score value on Test 2. The R/I Scores generated by the computer analysis system (for a detailed discussion of R/I scores see Honts & Amato, 1999; also see, Kircher, Woltz, Bell & Bernhardt 1998).

The R/I scores variable is a weighted composite score of the physiological responses and provides a single value describing the physiological reactivity of the subject to each question on the polygraph examination. Truthful/ deceptive decisions are made by evaluating the largest R/I score on a test against an absolute criterion (Honts & Amato, 1999). Larger R/I scores indicate greater response magnitude. ANOVA revealed a significant main effect of Guilt, $F(1, 76) = 8.44$, $p = 0.005$. As expected, deceptive subjects produced larger R/I Scores ($M = 2.32$, $SD = 1.68$) than did truthful subjects ($M = 1.57$, $SD = 1.55$). None of the main effects nor the interactions involving the Countermeasure use variable were significant.

DISCUSSION

The results of this study, along with those of Honts et al. (1988), suggest that the use of spontaneous countermeasures by deceptive participants does not affect polygraph examination outcomes. However, this study, unlike Honts et al., found that a substantial number of truthful subjects (30%) also tried to "appear more innocent" through the use of spontaneous countermeasures. Importantly, these maneuvers by truthful participants did not make them appear deceptive. This is an important new finding because it is traditional in the polygraph profession to interpret the presence of countermeasures as synonymous with guilt. Clearly in the today's population that is not the case. If the presence of countermeasures was equated with deception, then 30% of the truthful subjects in this study would have been misclassified as deceptive. These results are supportive of the continued use of polygraph tests in applied settings. Despite the widespread availability of information concerning countermeasures, laypersons appear to be either unaware of such information or they are unable to make effective use of it.

One possible limitation of this study concerns the subject population . We screened the participants for extraneous variables such as mental illness or instability. This is generally not an option for "real world" scenarios where polygraphs are given without the possibility to screen for such characteristics. However, mental stability or a history or mental illness is generally taken into account during the majority of polygraph examinations. Of further consideration is the amount of exposure that these individuals have had to countermeasures. Individuals who are involved in the criminal system may be more knowledgeable regarding different techniques that could be used to alter responses on the polygraph examinations. Given these concerns for the population, the results of the study may generalize better to individuals who have been screened and are unaware of specific countermeasures.

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APPENDIX A

EMPLOYMENT APPLICATION

Name (First, Middle Initial, Last)_____
Social Security Number_____
Address
Street_____
City/State/Zip_____
Place of Birth _____
City/State_____
Date of Birth (MM/DD/YY)_____
Citizenship U.S.A. Other
Marital Status
Single Divorced
Married Widowed
High School that Granted Diploma_____
College Major_____
Year/Make of Automobile_____
Auto Insurance Company_____

Place of Banking _____
Credit Cards
Expiration Date (MM/YY)
American Express
Discover
MasterCard
Visa

Clubs/Organization Membership_____