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A Case Study in PDD Cooperation

Mark D. Handler and Richard Barrera

Abstract

Private and law enforcement polygraph examiners often find themselves testing for opposing sides in our adversarial judicial system. Law enforcement examiners more commonly test for the prosecution side while private examiners are generally hired by the defense. Concerns sometimes arise around the potential bias of examiners, based on their employment or affiliation. The authors provide a case study where law enforcement and private examiners collaborated in an attempt to help resolve a criminal case. The paper discusses some of the challenges faced by private and law enforcement examiners and illustrates concerns pertinent to both referring agents and professional consumers of polygraph test results. Methods for law enforcement and private examiners to help reduce or alleviate some of those challenges are discussed, and recommendations for further development are provided.

Background

During 2005, a thirty-year-old man illegally entered the United States and took up temporary residence with his brother and his brother's family. To protect his identity, we will refer to him as John Doe. John lived with his brother, his brother's wife and their two boys for approximately two months while awaiting the arrival of his own family from their home country. John slept on the floor of one boy's bedroom and took his meals with the family. Once John's family arrived, he moved out of his brother's home and into a place of his own with his family.

Several months after John moved out, one boy in the brother's home (whom we will refer to as Mike) made a disclosure of sexual abuse to his mother. Mike's mother told investigators that Mike had become quiet, and that when she questioned him about what was wrong, he stated he had been sexually assaulted by his uncle John. The local authorities scheduled a forensic interview for Mike where he told interviewers his uncle had gotten in bed with him and sexually assaulted him on numerous occasions. Mike provided explicit descriptions of invasive sexual assaults by his uncle.

John was indicted, arrested and incarcerated while he awaited trial. His wife and family fled the United States and returned to their home country. John's brother (Mike's father) became angry at Mike and his mother when he learned of the allegation and arrest and retained an expensive and well established trial law firm to defend John.

The case progressed slowly through the criminal justice system. John remained in detention throughout the entire time and consistently denied the abuse. About a year and a half into the case, the law firm hired a private polygraph examiner to test John regarding his denial of the allegations.

While discovery rules vary, unfortunately in this jurisdiction, defense attorneys are not usually given copies of police reports and statements relating to the case.

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The district attorney is considered a very fair man but the policy is such that defense counsel is allowed to review police reports but is not allowed to have actual copies of them. Usually defense attorneys take hand written notes of the reports for their case file but these notes often are not reduced to writing and given to the private examiners. This practice places the private examiners at a distinct disadvantage when designing a test. Many times (as in this case) the private examiner is simply told of the general nature of the allegations and left to create relevant questions without the benefit of clear and concise relevant issues often afforded police examiners.

With the paucity of clear information surrounding the outcry, the private examiner was relegated to testing John on four separate concerns during the first polygraph session. The private examiner tested John using an Air Force Modified General Question Technique (DoDPI, 2005) format in the interview room located just inside the first of two electronically controlled rolling doors in a detention facility.

After the first examination the private examiner contacted the law enforcement (LE) examiner and requested a quality assurance review of the test data. The defense attorney representing John had requested the private examiner review his examination of John with the LE examiner. The LE examiner conducts most of the polygraph examinations for this district attorney's office and has been asked to review other proffered examination results.

Two LE examiners agreed to blindscore faxed copies of the charts. Both LE examiners independently scored the three charts using Federal three-position scoring currently published as by the rules Department of Defense (DoDPI, 2006), and both resulted in an opinion of Inconclusive. The examinee provided a plausible reason for concern over one of the test questions to the private examiner. All three examiners conferred and the LE examiners suggested the private examiner re-test John using a singleissue polygraph technique.

The private examiner returned about one month later on a Friday night to re-test John. Friday evenings are particularly busy at this jail facility as a number of people serving weekend sentences report to jail on Friday after work. The jail deputies provided the private examiner with the same interview room in which to test John. The private examiner re-tested John using a "You-Phase" Zone Comparison Test (DoDPI, 2004) and limited the scope of the test to a single issue involving direct physical contact between John's bare penis and Mike. At this point the private examiner had still not been allowed access to the police reports.

following Monday, both LE The examiners blind-scored the second polygraph examination. While the numerical scores would have resulted in a call of "Deception Indicated" (DI) the private examiner documented numerous outside noises and other distractions. A later review of the video found that throughout the data collection phase there were loud announcements from the overhead speakers obviously audible inside the interview room where John was being tested. Also during the data collection phase the rolling door could be heard activating to open and close the door. Curious passersby could be seen looking into the window which would have been visible out of John's peripheral vision. Because of the obvious visual and audible distractions, both LE examiners formed no opinion regarding the results of the second examination charts.

While it might be easy to "arm chair quarterback" the private examiner's attempts to test John it has to be looked at in context. The private examiner was not given a choice as to where he would test John. The jail deputies are very busy on Friday nights and were unlikely to be able to accommodate the further private examiner any when considering test locations. This is not an uncommon situation by private faced examiners, and by attorneys who want to include polygraph investigation results in their legal discussions or legal proceedings. They are often times at the mercy of the jail authorities with regard to test location and access to jailed examinees.

Two months later, the private examiner arranged with one of the LE examiners to complete a third polygraph examination using the law enforcement examiner's polygraph testing suite. This suite is located in a quiet area away from the detention facility. In an effort to assist the private examiner, the LE examiner obtained copies of the pertinent case data, met with the investigating officer, and approached the test as if he were going to conduct the examination himself. On the day of the test all three examiners met and reviewed the case file information together. A single target issue was identified and clarified for the third examination. The examiners discussed the relevant and comparison questions for the test and agreed on a course of action. The private examiner set up his own equipment in the LE polygraph suite while one LE examiner escorted John from the detention facility.

The private examiner tested John again using a "You-Phase" Zone Comparison Test (DoDPI 2004) regarding the single issue the three examiners discussed. The LE examiner remained nearby in the adjacent room to take John to the restroom as needed and provide the private examiner with any logistical support. At the completion of the examination, the private examiner scored the test results and immediately provided the test data to one LE examiner to score independently. After that LE examiner scored the test data the second LE examiner also independently scored the exam. All three examiners formed independent conclusions that there were no significant reactions indicative of deception, and that John was being truthful.

The examiner scored the examination using the Objective Scoring System, Version III (OSS3), computerized algorithm (Nelson, Handler & Krapohl, 2007) which reported a finding of "No Significant Reactions" with a corresponding p-value of 0.04. Truthful reported "No results. as Significant Reactions," occur when the observed p-value indicates a statistically significant difference between the observed numerical score and that expected from deceptive test subjects, using normative data obtained through bootstrap training with the confirmed single issue examinations from the development sample. Deceptive results, in which an observed p-value indicates a statistically significant difference between the observed numerical score and that expected from truthful persons, and are reported as "Significant Reactions." When the observed pvalue fails to meet decision alpha thresholds for truthful or deceptive classification the test result will be reported as "Inconclusive." No opinion can be rendered regarding those results. The OSS-3 algorithm regards the measurable presence or absence of reactions, and observed mathematical significance, as unequivocal according to the specified decision alpha level. Professional opinions about deception or truthfulness are made by field examiners according to professional standards of practice, training, and agency policies regarding tolerance for risk or error.

About one week later one LE examiner received a conference telephone call from one of the assistant district attorneys (ADA) handling the case and the senior law partner for the firm representing John. The ADA and the senior partner asked the LE examiner numerous questions about the test. The LE examiner told the attorneys he helped in the preparation of the exam and conducted a quality assurance review of the test data. The attorneys asked the LE examiner if he supported the test and the test results. The LE examiner told the attorneys he had not watched the video of the test question presentation nor had he had the questions translated into English so he could not yet support the exam in the entirety. The LE examiner said absent verification of those items, he supported the test unequivocally. The attorneys asked the LE examiner to review the two hold out concerns and report back. The LE examiner contacted the private examiner and requested a copy of the audio and video for the test and a direct translation of the test questions. The private examiner sent the requested material via US Post express mail overnight and the LE examiner reviewed the test with an interpreter upon The interpreter reported the test receipt. questions translated accurately to what was reported and all testing fundamentals were followed. The LE examiner reported back to both attorneys he now supported John's last polygraph test without reservation.

Lessons Learned

During their "town hall meeting" at the recent American Polygraph Association meeting in New Orleans, several private examiners publicly voiced concerns of how they feel they are perceived by law enforcement and government examiners. As a fellow professional we owe our colleagues the benefit of the doubt. It should be a common practice in the profession to support the work of private examiners who will provide audio video recordings of the exam and their test data analysis so long as the examination is conducted properly.

Krapohl (2006) reminded us that valid principles are the foundation of valid techniques and there is a current move to "validate" those techniques used in field testing in order to be able to scientifically support our opinions. Scoring programs like OSS3 allow examiners to analyze data objectively, regardless of which validated technique they choose to use. Advances in computerized collection and preservation of polygraph examinations place us in a position to further support one another. Examiners can guickly email files from one computer to the next and follow up with a compact disk containing the audio video recording of the examination.

A common misconception is that polygraph examinations conducted for the defense are less valid than those conducted by law enforcement. This notion is sometimes known as the Friendly Polygraph Examiner Hypothesis (FPEH, Orne, 1973) and has been found to be without merit when addressed scientifically (Honts & Peterson, 1997). Honts addressed this issue in a paper presented to the American Psychological Society during their annual meeting held in May 1997 in Washington, DC. Honts concluded there was no empirical support for the FPEH from laboratory or field data and the notion should be abandoned.

Defense attorneys choose to have their clients examined for various reasons. They may do so because they know the prosecution will ask to test the client and they want to know if it is wise to subject their client to a police polygraph examination. The work of private examiners acting on behalf of a defense attorney comes under the umbrella of privilege. While examiners may not always claim any privilege of confidentiality on their own, their work for attorneys is regarded as work product and is shielded. If in such a case the test results in a DI finding, it is unlikely that client will warm the chair of a police examiner. Police examiners should not be angry over this fact as it is a fundamental right of all US citizens to be entitled to a zealous defense to prosecution. If however, the client's test result is NDI and the test is conducted properly (and documented completely), there should be no reason to retest the examinee. The attorney should allow the LE examiner to review the examination and the LE examiner should not be afraid to support properly conducted examinations. Consider this analogy;

A child has a successful heart surgery in Virginia and moves to Texas. During a follow up visit with the surgeon in Texas the surgeon tells the parents that he or she wants to open the child's chest and re-perform the surgery just to make sure it was done correctly even though by all appearances the original operation was conducted properly.

This situation suggests there is a need for the development of a more formalized protocol for Quality Assurance activities in private practice (and when those practices interface with the law enforcement and judicial systems). We are not advocating examiners blindly accept the work of any examiners who do not follow sound testing principles and who do not record and openly share their work for review. We do, however, suggest LE examiners consider working closely with their colleagues in private practice in their completely appropriate role in our adversarial legal system. The results can be symbiotic in that the examinee is not subjected to a second test. LE examiners can shed some of their case load and the examiners can build a mutual trust and admiration by learning from one another.

The private examiner can refer the charts to another examiner, private or law enforcement. for peer review without disclosing the questions or the identity of the subject. That preserves confidentiality and at least determines whether another examiner is reading the charts the same way. If a law enforcement examiner is willing to undertake that kind of limited chart review, then the next option is to obtain the consent of the attorney to release everything. Many attorneys are reluctant to grant that without first knowing what the other examiner's conclusion from chart evaluation is likely to be.

Colleague examiners should consider etiquette when reviewing charts. Examiners who have received charts for review should not pass them along to other examiners without the consent of the originating examiner, nor should they discuss any disagreements with outside examiners. There is an unfortunate tendency in our profession to be excessively defensive and to try to find others who support our position, occasionally the expense of another examiner's at reputation. Examiners doing a review should consider not getting too picky about question wording, recognizing that the originating examiner's questions may not be the first choice of the reviewing examiner. The ultimate concern about question wording should always be, "should these questions have worked, even if they are not what I would have asked?"

We learned that by making police report information available to the private examiner we can help them develop a better test. We found that by coordinating our efforts we can help the private examiner find a suitable location to test their subject. Private examiners should not be reluctant to reach out to their fellow professionals and seek their help in orchestrating the best test possible. Through this collaborative effort, the search for the truth can be maximized. We believe we earned the respect of the defense counsel in this case by showing them our goals were similar in that we were simply attempting to verify or refute their client's assertions and we had no hidden agenda. We decided to write this case report because we are also reminded that someday we too will be private examiners.

This is one example, that we should always remain thoughtful about some of the hazards of remaining singularly and blindly engaged in adversarial processes. Just as it is sometimes necessary for enemy nations to communicate calmly and rationally in order to effect peace and limit hostilities – much can be accomplished by incorporating a more complete range of ethical activities into our profession.

As any field begins to adopt more of the tenets of the professional model, one important component is for its practitioners to act more professionally. Collaboration and peer review are hallmarks of all professions, and we commend them to all with so great a responsibility as we bear in polygraphy.

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Credibility Assessment of Information on Police Applicants' Personal History Questionnaires

Wendell C. Rudacille¹ and Nathan A. Rettig²

Abstract

This study was undertaken to determine the credibility of information reported by police applicants on their Personal History Questionnaires (PHQs). During the year 2005, the PHQs of persons applying to the Howard County Police Department for the positions of Probationary Police Officer and Police Cadet were examined for consistency of reported information. Applicants who had passed the initial stages of screening were given polygraph examinations. At the conclusion of each examination, polygraph examiners compared significant information reported by applicants in their PHQs to information reported during their polygraph examinations. It was determined that over half of the applicants in this study failed to report significant information in their PHQs which was later obtained during their polygraph examinations. Data analyses assessed any differences in sex, race, and education levels of applicants in conjunction with consistency of reported information. Significant demographic and education level differences emerged.

Introduction

Persons applying to the Howard County Police Department for the positions of Probationary Police Officer (sworn police officer position) and Police Cadet (non-sworn, administrative service position) are required to complete an extensive Personal History (PHQ), Ouestionnaire take polygraph examinations, and undergo background investigations. In their PHQs, applicants are informed of these stages of the hiring process. Specific instructions are provided in the PHQ cautioning applicants they may be disqualified if they "practice deception at anytime during the hiring process." The following statements appear under the Notice to Applicant section of the PHO:

All statements provided in the PHQ are subject to verification during the polygraph examination and/or the background investigation.

You may be disqualified if you intentionally make a false statement of material fact, or if you practice or attempt to practice any form of deception or fraud in the PHQ, or at anytime during the hiring process (Howard County Police Department, PHQ).

The purpose of these statements is to impel applicants to provide completely truthful background information in their PHQs.

Polygraph examinations and background investigations are conducted on law applicants verify enforcement to the truthfulness and accuracy of the background information they report in their PHQs. Experienced polygraph examiners and background investigators generally agree that some applicants intentionally omit pertinent information from their PHQs with the express intent to conceal this information.

Significant omitted information usually takes the form of applicants' adverse disclosures about problems with employment, education, finances, credit, driving record, arrests and criminal charges; along with

¹Wendell C. Rudacille is a Special Investigator/Polygraph Examiner with the Howard County, MD Police Department

²Nathan A. Rettig is a Detective First Class/Polygraph Examiner with the Howard County, MD Police Department

undetected criminal activity, excessive drinking, and illegal drug use and personal involvement. (In this study, these categories of omitted information are termed "Critical Areas.") Since pertinent adverse information not reported in the PHQ is often developed during the polygraph examination, it would seem the cautionary statements in the PHQ designed to appeal to applicants' honesty may have little or no impact on some of them.

This research project was conducted to assess the credibility of information reported by applicants in their PHQs. The following questions were posed:

• In a specified group of applicants, how many omitted or under-reported significant adverse information in their PHQs which was later developed during their polygraph examinations?

• What is the type and nature of any omitted or under-reported significant adverse information?

• Does a relationship exist between the results of applicants' polygraph examinations and their honesty or dishonesty in their PHQs? (Do applicants who provide completely truthful information in their PHQs generally pass their polygraph examinations? Do applicants who are dishonest in their PHQs generally fail their polygraph examinations?)

• Do any demographic differences exist for sex, race, or education level among applicants who provide truthful or untruthful information in their PHQs?

Methods

During the calendar year 2005, the PHQs of applicants applying for the positions of Probationary Police Officer (PPO) and Police Cadet (PC) were examined for consistency or inconsistency of reported information when compared to information developed about the same issues during their polygraph examinations. This group consisted of applicants whose PHQs had passed initial screening reviews conducted by personnel assigned to the Screening Unit; and, applicants rated as Excellent or Acceptable during Panel Interviews. The following Critical Areas of the PHQ were targeted for these assessments:

1. <u>Illegal Drug Use</u>: Age and date when first and last used; type of illegal drugs used; number of times of use for each illegal drug; and, illegal use of prescription medicine for non-medical reasons.

2. <u>Illegal Drug Personal Involvement</u>: Taking part directly or indirectly in buying, selling, or trading anything for illegal drugs; involvement in growing, manufacturing, or smuggling any illegal drugs; use and/or purchase of illegal drugs in a foreign country where they are legal to use/buy; involvement in any other types of illegal drug deals or transactions; and, illegal sale or distribution of prescription medicine for non-medical reasons.

3. <u>Arrests and Criminal Charges</u>: Custodial arrests; receipt of criminal summonses or citations as an adult or juvenile.

4. <u>Serious Crimes Against Persons and</u> <u>Property</u>: Felonies and serious misdemeanors.

5. <u>Sexual Crimes</u>: Rape, sexual assault, and sexual offenses.

6. <u>Thefts</u>: Involvement in the commission of thefts of money, merchandise, or other property.

7. <u>Domestic Violence</u>: Involvement as accused or accuser.

8. <u>Employment</u>: Fired or forced to resign from any jobs; written disciplinary actions; subject of police internal affairs investigations.

9. <u>Driving Record and Accidents</u>: Serious traffic offenses and accidents.

10. <u>Financial Credit</u>: Bankruptcy, repossession of property, collections, and judgments.

11. <u>Military</u>: Judicial or non-judicial punishments; less than Honorable Discharge.

12. <u>Education</u>: Suspended or expelled from high school; suspended from college for disciplinary reasons.

13. <u>Civil Actions</u>: Involvement as a plaintiff or defendant.

14. <u>Residency</u>: Evicted or forced to vacate any places of residence; taken to Landlord-Tenant Court.

15. <u>Identity</u>: Use of false name, date/place of birth, SSN; falsification of identity on any official documents.

16. <u>Citizenship</u>: Illegal immigration; undisclosed citizenship in foreign countries; falsification of birth certificate, U.S. Naturalization Certificate or passport.

Each of these Critical Areas appears in the PHQ with questions seeking information about applicants' involvement in adverse or illegal activities.

Upon entering the polygraph room, applicants were required to show proof of identity (driver's license), and were given a overview of the polygraph general examination. Examiners then asked them a standard series of administrative (Have you taken any previous polygraph tests? Have you undergone any background investigations? etc.) and health-assessment questions (Are you sick or injured today? Do you take any prescription medicine? etc.) Applicants were then required to read and sign three forms: (1) Conditional Offer of Probationary Employment; (2) Consent and Waiver for Polygraph Examination; and, (3) Countermeasures Advisory.

Polygraph examiners then provided applicants with a simplified overview of the psycho-physiological aspects of lying, and a general explanation of the computer-based polygraph instrument and testing system. This is an important aspect of the examination, as the examiner's overview, coupled with "information elicitation appeals," encourages applicants to be completely truthful during all phases of the polygraph examination. Applicants were advised that a series of polygraph tests would be conducted to verify the truthfulness of their background information. Applicants were also instructed that their PHQs would be reviewed in detail with them, and they would be able to update or change information as necessary.

Applicants were then escorted to an interview room where they were required to answer questions in writing in a Basic Series Polygraph Booklet and a Drug Screening Ouestionnaire (Howard County Police Department, Basic Series Polygraph Booklet and Drug Screening Questionnaire). If an applicant had prior experience as a sworn police officer, military police, armed security guard, etc., that applicant was also required to complete a Police Series Polygraph Booklet (Howard County Police Department, Police Series Polygraph Booklet). The Critical Areas of each of these three Polygraph Booklets mirrored the same Critical areas of the PHQ, and also included questions about alcoholic beverage use, medical conditions and psychological problems.

All Polygraph Booklets contained lists of specific questions applicants answered either Yes or No. Each Polygraph Booklet contained an instruction page advising applicants how to complete the Booklet. The following three statements were included in these instructions:

(1) All answers and information you provide in this questionnaire will be verified during the polygraph examination.

(2) During the polygraph test(s) you will be asked a specific question as to the truthfulness of your answers and the information you provide in this questionnaire.

(3) The intentional falsification of information in this Polygraph Questionnaire will be considered as just cause for disqualification from this hiring process. (Howard County Police Department, Basic Series Polygraph Booklet)

These three statements were designed to impel applicants to provide completely truthful information in their Polygraph Booklets.

While completing Polygraph Booklets, applicants were not required to re-list their employment histories, places of residence, complete driving records, etc. With the exception of the most recent date of illegal drug use (month and year), applicants were not required to provide specific dates (other than approximate month and year) in relation to incidents. Applicants were not allowed to refer to their PHQs while completing Polygraph Questionnaires, and were under no specific time constraints for completion.

Following completion of Polygraph Booklets, applicants were escorted back to the polygraph room where examiners reviewed their answers and conducted thorough followup interviews with them. The purpose of follow-up interviews was to obtain additional clarifying information about applicants' involvements in certain issues to which they had answered Yes in their Polygraph Booklets. Examiners took detailed notes on any supplemental information obtained during follow-up interviews.

After a review of the Basic Series Polygraph Booklet, and review of test questions, applicants underwent the Basic Series Test, consisting of relevant questions about extent of use of alcoholic beverages; and involvement in the commission of serious crimes, sexual crimes, and thefts. At the completion of the Basic Series Tests. applicants were provided with the Drug Screening Questionnaire which contained questions about use and personal involvement with illegal drugs. Following completion of the Drug Screening Questionnaire, another followup interview was conducted, test questions reviewed, and the Drug Screen Series administered. Relevant questions on the Drug Screen Series focused on use of illegal drugs; taking part in buying, selling, or trading anything for illegal drugs; taking part in growing, manufacturing, or smuggling any illegal drugs; and illegal use, sale, or distribution of prescription medicine for nonmedical reasons.

If applicants had prior police experience they were also required to complete a third Polygraph Booklet on police issues. An additional follow-up interview was conducted, and the Police Series Tests administered. Relevant questions on the Police Series dealt with acceptance of bribes; falsifying information on police reports and official police documents; lying while testifying in

court; use of excessive force; compromising confidential police information; and, discharging firearms in violation of departmental regulations.

At the completion of each examination, after dismissal of that applicant, polygraph examiners compared an applicant's answers to questions in the Polygraph Booklets (and notes from follow-up interviews) to information that applicant had previously reported in the PHQ. Each Critical Area of the PHQ was compared to the same Critical Area of a Polygraph Booklet to determine if information for that Area was consistent or inconsistent.

A PHQ-PG Data Comparison Form (DCF) was completed for each applicant on which each Critical Area was noted as Consistent (CON) or Inconsistent (IN-CON). When a Critical Area was determined as inconsistent. specific information was recorded on the DCF as to the nature of that inconsistency. For example, if in the PHQ an applicant reported using Marijuana 10 times with the last date of use as "December, 2001," but in the Drug Screening Questionnaire reported using Marijuana 20 times with the last date of use as "July, 2003," such data was recorded as inconsistent. The DFCs also consisted of information for applicant's name, date of examination, testing examiner, quality control examiner, testing format, employment position; and demographics for sex, age, race, and education level. "Cut-offs" were determined as any difference between Critical Area information reported in the PHO and information reported in each of the Polygraph Booklets.

Results

A total of 148 applicants were involved in this study. This group consisted of 129 applicants for the position of Probationary Police Officer (PPO), and 19 for the position of Police Cadet (PC). Overall, it was determined that 68 (46%) of the 148 applicants provided consistent information (Con Group), while 80 (54%) of applicants provided inconsistent information (In-Con Group). Table 1 presents a general break down of these data in relation to employment position sought.

	Probationary	Police Officer (129)	Polic	e Cadet (19)
Con Group (68)	62	(48%)	б	(32%)
In-Con Group (80)	67	(52%)	13	(68%)

Table 1. Applicant Employment Position

Applicants for the position of Probationary Police Officer were almost evenly divided (48% versus 52%) between those who provided consistent or inconsistent information. The In-Con Group of Police Cadets

was over two times greater than the Con Group (68% versus 32%).

In regard to sex, applicants consisted of 125 males and 23 females. Table 2 represents the data as typed and classified by sex.

Table 2. Sex Data					
Sex	Number	Con	Group	In-Co	on Group
Males	125	50	(40%)	75	(60%)
Females	23	18	(78%)	5	(22%)

The Con Group of Females was over three times greater than the In-Con Group, while Males showed a large difference in the opposite direction, with 60% in the In-Con Group and 40% in the Con Group.

The data were typed and classified by gender and race. Table 3 shows this analysis.

Table 3. Gender / Race Data

Race / Gender	Number	Con	Group	In-Co	n Group
White Males	97	44	(45%)	53	(55%)
Black Males	22	13	(59%)	9	(41%)
Hispanic Males	5	3	(60%)	2	(40%)
Oriental Males	1	1	(100%)	0	
White Females	13	10	(77%)	3	(23%)
Black Females	4	3	(75%)	1	(25%)
Hispanic Females	3	2	(66%)	1	(34%)

Male and Female Blacks and Hispanics, and White Females showed higher percentages of consistency of information than did White Males. White and Black Females in the Con Group were uniformly three times greater than those in the In-Con Group. Black and Hispanic Males in the Con Group were approximately 1.5 times greater than those in the In-Con Group. White Males were almost evenly divided, showing 45% of applicants in the Con Group and 55% in the In-Con Group. White Male applicants comprised over 65% of the total available applicants in this study;

while Females, Blacks, Hispanics, and Orientals made up the remaining 35%. Of that group, White Females constituted 25% (13 applicants). Due to the low numbers of Black, Female. Hispanic, and Oriental applicants, the corresponding data as shown in Table 3 above should not be thought of as valid representations for a general population.

Another demographic analyzed dealt with education level. Table 4 lists the Groups in relation to applicants' education levels.

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Education Level	Number	Con C	łroup	In-Co:	n Group
BA / BS Degree	66	13	(20%)	53	(80%)
AA Degree	13	4	(31%)	9	(69%)
1 Year + College	24	8	(34%)	16	(66%)
All College	103	25	(24%)	78	(76%)
High School or GED Diploma	45	32	(71%)	13	(29%)

Table 4. Education Level Data

Applicants with high school (or GED) educations provided a significantly higher percentage of consistent information (71%), than did applicants with college educations (24%). Applicants who had earned BA/BS Degrees were the most inconsistent, showing 80% in the In-Con Group and only 20% in the Con Group. Additional analyses involved the typing of inconsistent information in conjunction with Critical Areas of assessment. The data in Table 5 were derived from examination of the Data Collection Forms of the applicants in the In-Con Group. It should be stressed that applicants in this Group failed to provide this information on their PHQs, and only did so as a result of having to take polygraph examinations.

Critical Area	Number of Applicants	Percent
Illegal drug use	47	59
Commission of thefts	32	40
Illegal drug involvement (Buy, sell, grow, produce, etc.)	23	29
Falsifying identity	19	24
Employment problems	18	23
Arrests / criminal charges	12	15
Driving record / accidents	11	14
Financial / credit problems	9	11
Residency	7	9
Domestic violence	6	8
Commission of serious crimes	5	6

Table 5. Type of Information Withheld from PHQs

Illegal drug use, thefts, and illegal drug involvement were three primary Critical Areas applicants did not report truthfully in their PHQs.

Another important relationship was discovered between applicants in both Groups and the results of their polygraph examinations. Of the 68 applicants in the Con Group, 53 (77%) passed their polygraph examinations during the first runs. Of the 80 applicants in the In-Con Group, 23 (29%) passed their polygraph examinations on their first runs.

Discussion

Honesty and integrity are two essential traits police applicants should possess. Instructions in the PHQ and Polygraph Booklets emphasize that applicants may be disqualified if they practice deception at any time during the hiring process. However, this study confirmed that 55% of applicants at this department for Probationary Police Officer and Police Cadet positions omitted significant adverse information from their PHQs, which they later admitted during their polygraph examinations.

"Honesty appeals" and their corresponding warnings about being disgualified from the hiring process apparently had no effect on this group of applicants until they were confronted with the reality of the polygraph examination. provided Additionally, applicants who inconsistent information in their PHQs and failed their first run polygraph examinations, often admitted to significant adverse information only after their second and third run tests. This indicates that these applicants deliberately concealed pertinent information they perceived as damaging to their prospects of getting hired.

Concerning the type of information withheld from PHQs, illegal drug use, thefts, and illegal drug criminal involvement were the three most significant Critical Areas. When interviewed as to why they had not reported this information truthfully in their PHQs, most applicants provided a list of excuses rather than admit they had lied (i.e., I just forgot it. My wife helped me fill out it out and I didn't want her to know what I'd done. I wasn't sure how to answer those questions. I have a bad memory, etc.)

Another of importance point determined by this study is the fact that applicants who possessed only high school (or GED) educations were almost three times more honest in their PHQs than applicants with college degrees or some college. Applicants with high school (or GED) educations provided a significantly higher percentage of consistent information (71%), than did applicants with some college, AA, or BA/BS Degrees (24%). Applicants in the In-Con Group with college degrees, or a substantial amount of college were, on the whole, more difficult to interview during their polygraph examinations. Applicants with college degrees were also more verbally evasive, argumentative, and less prone to accept responsibility for their adverse actions. This data should cause police agencies which have "up-graded" their hiring criteria to a minimum of A.A. Degree or higher to reflect on the overall honesty of applicants just out of college, as opposed to applicants with high school degrees who have been in the work

force for a number of years; and, who may have attained a higher level of maturity and responsibility.

In summary, this data verified that more than half of the applicants in this study falsified information in their PHQs. It further demonstrates the efficacy of the use of polygraph examinations to develop significant adverse information police applicants conceal during the hiring process. Additionally, it was shown that the majority of applicants who truthfully reported information in their PHQs had no problems passing their polygraph examinations.

Additional research in this area should be contemplated for the assessment of the credibility of information on the PHQs of civilian law enforcement employees who must undergo polygraph examinations. Based on this study, it is recommended that law enforcement personnel tasked with applicant recruitment and screening in the initial stages employment, inform applicants that research has demonstrated а direct relationship between complete honesty on one's Personal History Questionnaire and positive performance during the polygraph examination.

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Some Reflections on the Polygraph in the PCSOT Setting

Donald J. Krapohl*

Abstract

Post-conviction sex offender testing is a rapidly expanding application of the polygraph. Consistent with polygraph's history, field practice has outpaced formal research and full discussion of its costs and benefits. Though it is roundly praised in some quarters, a number of questions have been raised that challenge its value in the PCSOT setting. This paper outlines some of the central issues of the field and summarizes the available research.

Post-conviction sex offender testing (PCSOT) is a relatively recent and increasingly popular addition to the methods used to manage sex offenders who have been released into the community. Its unquestioned uncovering success in the previously undetected offender behaviors has gained it support among many offender treatment providers, but its expansion has also resurrected old and unsettled debates among polygraph critics and proponents regarding risks and benefits of using the polygraph in this setting. It is fair to say that the polygraph engenders controversy in all of its applications, and its use in sex offender management is no exception. While polygraph critics recite their concerns for polygraph accuracy, the lack of research, and the possibility of false accusations, proponents point out that the traditional methods of detecting or deterring illegal behaviors among sex offenders are inadequate, and that the capacity for the polygraph to expose illegal or precursor behaviors is superior to any other method. Critics point out the possibility of mistreatment of offenders as an outgrowth of polygraph examinations, while proponents focus almost exclusively on protection of the community and the vulnerable. The only common ground between these camps is an agreement that more research is needed.

A review of the existing literature on PCSOT shows that it addresses almost

exclusively the utility value of polygraph testing, that is, how useful it is in furthering the goals of the users. The issue of polygraph accuracy in this application is rarely addressed (Grubin and Madsen, 2006). This state of affairs for PCSOT is similar to the application of the polygraph to preemployment screening, where the practice extended well beyond any empirical support. Pre-employment polygraph testing was widely used in the US from the 1960s until the enactment of the Employee Polygraph Protection Act of 1988, which imposed conditions on when polygraph testing could be undertaken outside of government.

A dearth of validity research is not all that PCSOT has in common with applicant testing, and it is helpful to consider other characteristics they share. First. the polygraph is valued in both settings for its power to facilitate self-reporting. It appears unequivocal, and better supported in the PCSOT domain, that the addition of the polygraph to the existing systems significantly increases the quantity of useful examinee disclosures than do the systems without the polygraph (Ahlmeyer, Heil, McKee & English, 2000; Emerick & Dutton, 1993; Madsen, Parsons & Grubin, 2004). The polygraph also affords a means, albeit imperfect, to test the information for accuracy using the single best source, the examinee.

^{*}Donald Krapohl is Past President of the APA, and a regular contributor to this publication. Requests for reprints should be sent to dkrapohl@aol.com, or to PO Box 10411, Ft. Jackson, SC 29207.

Many US intelligence agencies use the polygraph routinely and periodically with employees to ferret out security issues ranging from mishandling of classified materials to acts of treason. This screening is not only intended to uncover security problems, but also act as one of many deterrents in place to prevent the most serious breaches. As with regular polygraph examinations of convicted sex offenders, it is believed that periodic screening of employees with high security clearances reinforces the inclination to abide by the rules, to tip their cost-benefit analysis in favor of compliance, thereby reducing the probability of engaging proscribed behaviors. The use of polygraph testing for deterrence has partial support for both PCSOT (Kokish, Levenson & Blasingame, 2005) and espionage (Central Intelligence Agency, 1990).

The similarity between PCSOT and applicant testing should not be oversold; however, as it would be an error to conclude that their main differences are the types of questions that are asked. First and foremost, the examinee populations are not identical. Job applicants are more likely to be representative of society in general than are convicted sex offenders. Though it is not unknown for job applicants to lie in an attempt to secure employment, for the most part they are seldom the practiced liar. In contrast, deception is the sine qua non of sex offenders. The success of the sex offender's socially forbidden behavior is facilitated by their studied refinements in dishonesty, manipulation, and misdirection. To continue to secure more victims, and to avoid accountability for past crimes, sex offenders must develop strategies to conceal their activities, and deception is an important tool.

Incentives are another aspect that is different for applicant and PCSOT populations, a factor which would be expected to influence the motivations of the test-takers. Applicants typically take seriously their polygraph examinations because of the impact these tests can have on hiring decisions. To do poorly during an applicant screening polygraph examination, or to make an admission of disqualifying behaviors, may jeopardize a long-sought opportunity for the applicant. However, applicants do not stand to lose something which they already have: they simply do not gain something they wished to have. Consequences for failed polygraph examinations can be more dire for convicted sex offenders. When the polygraph results are decisions factored into of imposition continued privileges or of sanctions, the offender may lose something of considerable value such as continued contact with family members, and in the most extreme cases there is a risk of revocation of parole. The potential of these elevated consequences can reasonably be expected to influence offender motivations during the polygraph Also, some offenders are examination. afforded a Hobson's choice of probation with polygraph or no probation at all. In contrast, the job seeker who can freely choose not to make application to positions requiring polygraph testing. These important differences in the conditions of PCSOT and applicant testing limit how much can be generalized between them.

What can be said about accuracy?

There exists no small disagreement between critics and proponents of polygraph testing regarding its ability to correctly classify deceptive and truthful examinees. A large part of the problem is rooted in the inadequate state of the PCSOT research, and another part that stems from an incomplete representation in the literature regarding the factors that affect polygraph validity.

Polygraphy is not a monolithic method, having a single accuracy or utility. Rather, as with all psychometric tools it can assume different forms that serve different purposes and have different accuracies. Some polygraph techniques were originally developed for use in solving crimes. As such, they have a narrow focus and specialized questions so as to avoid contaminating the testing with issues that detracted from the resolution of the case. Concentrating on a single event helps this type of examination to have the highest accuracy that is achievable in polygraphy. The narrow focus is an asset for this approach to polygraphy, but not for other settings where the interest is in determining whether the examinee has engaged in one or more categories of behavior over a specified period of time. Screening techniques, the second broad area in polygraphy, are designed with the goal of securing information from the examinee on

multiple topics where there is little or no information as to whether any of these behaviors has taken place. They are not precipitated by a known event, and consequently the test questions cast a wide net in search of useful information. Polygraph screening examinations have been shown to be highly valuable, as evidenced by their wide use bv the U.S. Government's counterintelligence agencies and their strong among sex offender growth treatment Polygraph screening combined programs. with adept interviewing skills vields information of high value that would be virtually impossible or prohibitively expensive to uncover by other means. This utility comes at a cost, as polygraph decision accuracy in the multiple-issue screening application is expected to be lower than the single-issue criminal examination (National Research Council, 2003). How much lower is an unsettled matter. It is generally agreed, however that the further the examination departs from the core principles of the singleissue criminal examination, the lower the decision accuracy. Therefore, validity is expected to decrease as the number of relevant topics increases, or as the relevant areas become more vague or push the limits of an examinee's memory or certainty.

There is general recognition that there are no perfect psychometric tools. Every method used to assess human beings will This is true for polygraph incur error. examinations, as well. The errors can be false positives (misclassification of a truthteller as deceptive) or false negatives (misclassification of deceiver as truthful). Inconclusive results, which are the result of incomplete, inadequate, contaminated, or manipulated data, can mediate error but high rates of inconclusives can reduce the usefulness of the A current concern in the sex polygraph. offender treatment community is the problem of false positives, that is, when a truthful sex offender receives a polygraph report indicating deception (Kokish, 2003). These types of results can be unwelcome news to not only the offender, but to therapists who have witnessed the progress of the offender and who may perceive the polygraph results as a setback in treatment. The false positive problem is considered one of the strongest arguments against the inclusion of the

polygraph in the therapeutic process of sex offenders.

False positives are a tractable problem. Polygraph decisions are based on scores that the examiner assigns to the polygraph data, which means that decision rules for those scores can be adjusted. It is a simple matter to alter polygraph decision rules such that false positive errors are less likely to occur. It is like changing the cutoff score on any test: the failure threshold can be moved to a more extreme value so that more test-takers pass. This brings about another obvious difficulty, of course. A generally recognized principle of decision-making is that decreasing the likelihood of one type of error increases the likelihood of the other type of error (Green & Swets, 1988). Therefore, the incidence of false positives can be reduced only by increasing false negatives, the misclassification of liars as truthtellers. Said another way, fewer truthtellers will be wrongly judged if one is willing to give up some ability to detect liars. If customers of polygraph results prefer one type of error over another type of error, it is a straightforward matter to establish polygraph decision rules that match those preferences. However, this does not increase the accuracy of the test. It only shifts the errors from one type to another. Therefore, the false positive issue is not the underlying problem, but it comes back to the question of polygraph validity: is the polygraph in the screening setting sufficiently accurate?

The answer this to question unfortunately is: it depends. There are two relevant points that address the question of adequacy of polygraph accuracy that do not rely on the incomplete empirical picture. First, if the polygraph decisions have the same or lower accuracy as veracity decisions made by the other members of the sex offender containment team, polygraph decisions have no merit and should not be reported. The research evidence suggests that the accuracy of polygraph decisions tends to be greater than chance (National Research Council, 2003) while the accuracy of human lie detectors is inconsistent (Bond & Fahey 1987; Levine, Park, & McCornack, 1999; O'Sullivan, Ekman, & Friesen, 1988; Porter, Campbell, Stapleton, & Birt, 2002; Porter, Woodworth, & Birt, 2000; Vrij, Edward, Roberts, & Bull, 2000). Therefore, it appears reasonable that

the polygraph may offer not perfect validity, but incremental validity in that it might improve the imperfect decision-making process when the results are properly The use of the polygraph as weighted. decision assistance, but not as decider, is consistent with what is known about the limits of the polygraph. The question then becomes how much weight polygraph results should have on treatment decisions. So far no one has provided a quantitative answer. The lack of any formal analysis has contributed to the over- and under-valuing of the polygraph in its various contexts, including PCSOT.

The second relevant point is related to the first: relative accuracy. According to the National Research Council (NRC, 2003) there is no other technology currently available that can compete with the polygraph in the screening role. In other words, there is no technology to turn to that is better than the polygraph in multiple-issue screening. Therefore, if assessing veracity is important to the treatment and containment of sex offenders, there is currently no other tool to bring to bear other than the polygraph.

These two points carry the discussion on the viability of the polygraph in sex offender treatment to a different destination than some would expect. If, as has been suggested, the polygraph is not sufficiently accurate to ever include in the decision processes of sex offender treatment, it is implicit that nothing may be good enough to include in the decision process of sex offender treatment. In other words, decision processes used by treatment providers should exclude everything. Such a conclusion is untrue, as a moment's thought reveals, because the argument has not been correctly framed. A better argument can be made that the polygraph should not be used indiscriminately in sex offender management. It may add value when used judiciously and when properly weighted in the management decision model. There are sensible reasons for limitations or specific exclusions of the polygraph in sex offender management, nevertheless the case against the polygraph that is based solely on the foundation that it makes errors leaves unanswered the question how using second- or third-best alternatives moves decision accuracy in a better direction. Plainly stated, arbitrary exclusion of the polygraph may actually reduce the accuracy of decisions made by sex offender managers, and increase attendant risks to the community. A rational approach to assessing decision accuracy would require examination of the polygraph in comparison to, and its use in conjunction with, the remaining decisionassistance processes in the management of sex offenders; an avenue of research that remains unexplored.

Increasing Accuracy

As outlined earlier, multiple-issue screening tests have lower accuracy than do single-issue criminal tests, and the decrement to accuracy is a function of the number of tested topics and the scope of the individual questions. The more topics, or the more ambiguous the questions are, the lower the expected accuracy will be. This principle operates in both directions, however: as the test topics are reduced and the focus of each question is narrowed, accuracy is increased. It is therefore theoretically possible to enhance the accuracy of screening examinations using a principle called "successive hurdles" (Meehl & Rosen, 1955). Meehl and Rosen observed that the use of a sequence of "hurdles" can overcome the lower accuracy associated with single screening tools used alone. This principle is applicable to all fields where imperfect tools are used to make diagnostic decisions, including those in medicine and psychology. According to this model, a test is given first that has good sensitivity (ability to detect when the condition of interest is present), even though it may have a poorer specificity (ability to detect when the condition is absent). This screening test is typically chosen because it is inexpensive, convenient, less intrusive, or more generally available. For those individuals who produce a "positive" result on the screening test, they are then given a test with the same or higher sensitivity, but better specificity. These subsequent tests typically are more expensive, inconvenient, obtrusive, or less available, and therefore are reserved for only those who test positive on the screening phase. Applying the second test to only those who do not pass the initial hurdle typically conserves resources and improves the effectiveness of the screening system. This process can be iterative, depending upon the cost of error,

and the availability and costs of subsequent tests.

Consider the medical example of the skin test for tuberculosis (TB). Also called the PDD skin test (purified protein derivative), this screening procedure is routinely given to large groups because it is convenient and relatively inexpensive. It has been responsible for helping eliminate TB as a health hazard in many parts of the world. While the decision rules for the PDD skin test make it sensitive to the presence of TB, a false positive can also be triggered by nontuberculous mycobacteria or by immunization to TB. Because medical professionals recognize the potential of false positive errors, the disease TB is never diagnosed from the screening test alone. Those who test positive in the screening test would then undergo diagnostic testing such as chest x-rays or a sputum culture, both procedures having better diagnostic power but are inconvenient or expensive.

Polygraph screening may also be amenable to the successive hurdles approach (Krapohl & Stern, 2003; NRC, 2003), though with the limitation that there is no independent technology available beyond the polygraph to perform the post-screening testing. In the proposed process, the first test given is the standard screening phase, which covers the various essential areas of interest to the polygraph client. Polygraph decision rules (scoring cutoffs) are set such that false negatives are minimized, even though they entail an increase in false positives as previously discussed. The decision rules are so designed because the successive hurdles approach permits correction for false positives, but there is no mechanism for recapturing false negatives. For all examinees who receive a negative result (No Deception Indicated, or NDI) in the screening test, the polygraph session is concluded. Because the decision rules had been set to minimize false negatives, users can have greater confidence of the NDI decision than of decisions of deception.

For those who receive positive results to a test question in the screening phase, the polygraph examiner can explore that issue with the examinee, soliciting the cause for the positive result. After an in-depth discussion, the examiner will construct another polygraph

test, with questions that focus on the topic that evoked the reactions in the screening phase. The examiner would choose a polygraph technique that more closely approximates that used in criminal testing or evidentiary examinations, the type of technique that has a larger body of supporting research and the higher accuracy. A properly conducted test, using the narrower focus, should result in an increase in decision accuracy, helping to sort out the true positives from the false positives. This process might be repeated within the limits of time, fatigue, examinee cooperation. and examiner resources, but it should be understood there will come a point of diminishing returns. Even with favorable conditions, moving polygraph decision accuracy the remaining distance to 100% is unattainable. To some it might seem an extravagance to retest an offender perhaps beyond a third iteration except when progress is being made. The successive hurdles approach to polygraph screening is standard practice to at least one U.S. Government program which uses it for counterintelligence screening (NRC, 2003).

Unfortunately, there is no published research available that shows that the successive hurdles approach used in the manner previously described has the expected positive effect on decision accuracy. Polygraph screening studies have tended to look only at the initial screening phase of the examination (Correa & Adams, 1981; Krapohl, Senter & Stern, 2005; Research Division Staff, 1995a, 1995b), leaving unanswered whether subsequent testing prompted by positive screening results would have had the predicted benefits to accuracy. Such work could help determine the effect size and how to maximize the overall accuracy. Conversely, finding that the successive hurdles а approach does not apply in polygraphy could also be significant, as it would be one of the rare exceptions to this well established principle. All else being equal, there is cause for optimism that screening polygraphy would benefit from the successive hurdles approach. Study in this area is needed.

Even if research is supportive, considerable obstacles must be overcome before the broad application of the successive hurdles approach. One of them is the level of training of polygraph examiners. Not all polygraph examiners have а complete understanding of the implications of making DI decisions on screening tests alone. It is poorly understood that, except under the conditions that virtually all examinees are lying, DI decisions will have a higher error rate than when the successive hurdles approach is used. As the base rate of deception drops, the likelihood of false positives increases, making it critical to use the successive hurdles methodology, especially when there are significant costs to false positive errors. Training examiners in the importance of follow-up testing is one of the challenges to adopting this approach.

Another is the environment in which PCSOT examiners operate. Most PCSOT polygraph examiners are in private practice and must bid for PCSOT contracts, and therefore commercial factors can come into play. Some examiners may be disinclined to use the successive hurdles method because it incurs a greater investment in time. It limits the number of polygraph examinations that can be conducted in a day, thereby affecting the examiner's bottom line. Agencies who bid out their PCSOT examinations are generally unaware of the effect of market forces on the quality of examinations they purchase, and how they can mediate polygraph decision accuracy. Enforceable standards do not exist. The one possible check on examiner practices, independent quality control oversight, is rarely made part of the PCSOT contract with examiners, and consequently little used.

Admissions

An agreed upon benefit of PCSOT is that it generates self-disclosures from offenders more effectively than the standard offender approaches in sex therapy. Verification of admissions and confessions in PCSOT examinations is usually problematic because the behaviors are often unknown to anyone but the offender, because witnesses cannot be located or cannot be interviewed, or because independent evidence is impossible to locate. Lacking verification, offender admissions are usually left to stand on their own.

Offenders are known to admit to, and deny, many behaviors in the course of their treatment both in and out of the polygraph suite. While deception remains a chronic problem in sex offender treatment, recently some research has suggested that the polygraph might induce false confessions (Cross & Saxe, 2001; Kokish, 2003, Grubin & Madsen, 2006). It has been suggested that offenders may offer fictitious information to examiners after a poor showing on the polygraph simply to satisfy the examiners. This is not an unreasonable assertion, as there is historical evidence of false confessions to polygraph examiners in criminal settings. False confessions have been extracted from innocent examinees on very serious criminal matters following police polygraph examinaconfessions which subsequently tions. resulted in criminal convictions and imprisonment of innocent persons (Lykken, 1998). Other than the handful of confirmed anecdotal reports, there are no data to estimate the prevalence of false confessions in criminal settings where the polygraph had been used as leverage.

The false confession phenomenon has been explored by Kassin and Wrightsman (1985), who suggested that they fall into three categories: voluntary false confessions, coerced-compliant false confessions, and coerced-internalized false confessions. Voluntary false confessions are defined as those in which the confessor is making statements apparently against personal interest that are prompted without police elicitation or interrogation. They can driven by complex motivation, such as desire for attention, need for self-punishment, to protect the real perpetrator, or are the product of delusion and mental illness. Coercedcompliant false confessions are fairly straightforward. They are the product of extreme forms of questioning, threats, and torture. Typical examples include the false confessions given from American sailors of the captured USS Pueblo to North Korean captors in 1968, or those routinely extracted from dissidents by the former Soviet Union. There is regular reporting of brutal interrogation tactics coming out of repressive regimes that result in false confessions. Suspect confessions are intermittently reported in modern democratic countries, though the evidence is rarely strong.

The final category of false confession in the Kassin and Wrightsman (1985) framework, the coerced-internalized, defines those confessions that the subject becomes to believe in his guilt because of fatigue or interrogational pressure and suggestiveness. In a separate writing, Kassin (1997) observes that coerced-internalized false confessions arise from two main causes. One is where the subject is unusually susceptible to pressure because of factors such as youth, innocence, suggestibility. low IO, intoxication, or exhaustion. The second cause for the coerced-internalized false confession is the rigging of evidence against the subject, such fake polygraph results, fingerprint as matches, document evidence, or biological tests.

The Kassin and Wrightsman (1985) taxonomy encompasses false confessions that generally arise in custodial settings and where officials are seeking confessions to particular There are distinct differences activities. between these and PCSOT settings, sufficient that the fit of the Kassin and Wrightsman categorization cannot be assumed in PCSOT. It should be remembered, for example, the non-custodial nature of PCSOT examinations. With the exception of special programs conducted in prisons, sex offenders who agree to PCSOT examinations are not under detention and are free to leave at any point. Terminating the polygraph session is not without cost to the offender, of course. There may be privileges withheld, or the offender may have to pay the cost of another polygraph examination, but the offender is not incarcerated or denied access to advocates after either a failed or terminated PCSOT examination.

Moreover, while allegations of abuse are not unknown during police interrogations, for offenders in PCSOT programs they are considerably less likely to be true. Offenders typically schedule their own two- or threehour PCSOT sessions, which would make claims of sleep or food deprivation easy to challenge. PCSOT examinations are also normally video recorded, unlike many law enforcement interrogations. These recordings are made available to the therapist or probation/parole officer when assertions of mistreatment are raised.

The factors raised to this point would suggest that false confessions are less likely in the PCSOT setting than in the law

enforcement setting because the conditions described by Kassim and Wrightsman (1985) that bring about these admissions do not seem to apply. Given the safeguards in place for PCSOT testing, one might be tempted to conclude that offenders have little cause to volunteer fabricated misdeeds to polygraph However, this conclusion examiners. overlooks some important characteristics of sex offender management, apart from the polygraph, that may encourage offenders to overstate their sexual behaviors. Recall that admissions in criminal settings usually lead to adverse consequences, such as prosecution and convictions. In contrast, one common condition in sex offender treatment is that offenders are not charged or prosecuted for sexual offenses that predate their conviction. These conditions are seen as necessary to secure their cooperation in the treatment process. Without fear of prosecution the chief obstacle to confession has been removed. Also, treatment providers to sex offenders consider acknowledgement of past offenses as necessary to the success of the offender's treatment, and therefore they often reward offenders with praise for admitting to their former aberrant behaviors. The effect of favorable feedback from treatment providers for self disclosures, combined with freedom from prosecution, may be fertile ground for some offenders to augment their real confessions with bogus admissions or details.

The incidence of false confessions in the non-custodial settings of PCSOT is just beginning to be explored. Kokish, Levenson and Blasingame (2005) gathered anonymous questionnaires from 95 sex offenders attending group therapy who collectively had taken 333 PCSOT examinations. Among the items on the questionnaire, the offenders were asked whether their polygraph examinations had resulted in incorrect conclusions that they had been lying, and among those who affirmatively, whether answered thev subsequently made false confessions to the polygraph examiner. A total of 3% of the examinations were characterized as false negative errors and 6% of the examinations were called false positive errors by the offenders participating in the survey. False confessions were reportedly given by 23% of respondents who claimed to have received a false positive decision during a PCSOT examination, or 5% of all of the respondents

in the study. The report did not specify whether these false admissions were of a minor nature, or ones that might incur punitive sanctions for offender, a the distinction worthy of closer scrutiny in future research. Nevertheless, the findings did provide tentative evidence that false confessions might arise during the PCSOT examinations.

Similarly, Grubin and Madsen (2006) collected questionnaires from sex offenders in community treatment programs in Georgia in a study to assess the validity and utility of Among their findings were self PCSOT. reports of false confessions from 12 of 121 men (10%) who had undergone PCSOT. The proportion of reported false confessions in the Grubin and Madsen study was not significantly different from that in the Kokish, Levenson and Blasingame (2005) study previously discussed ($\underline{z} = 1.37$, ns). These concordant data support the view that false confessions in the PCSOT setting may be taking place, and further exploration is warranted to assess to what extent these confessions are consequential.

Other writers have also singled out the polygraph as a possible source of false admissions (Cross & Saxe, 2001; Kokish, 2003), but it is important to remember that the conditions described earlier that might encourage false self-reporting in the PCSOT setting also exist in the treatment setting. Offenders who recognize that certain disclosures of their sexual histories during group therapy have no penalty, and that these disclosures may prompt favorable attention from the group and the therapist, could use false admissions to further their standing in Similarly, offenders might be the group. motivated to offer bogus admissions during group therapy simply to boast, to compete, to dupe, to impress, as an act of defiance, or in response to pressure levied by the group, just as they might fabricate admissions in the polygraph session. The degree to which offenders make false admissions during group therapy has not been adequately investigated nor has it raised concerns for mental health professionals who practice in this area. Absent more attention by scientists, the impact and sources of false admissions in sex offender management will not be resolved.

Countermeasures

Following quickly on the heels of the development of the polygraph for law enforcement came suggested methods for defeating it (Stewart, 1941). Countermeasures have been of interest to polygraph examiners since the inception of the field, although it was not until the 1980s that serious scientific attention was directed toward determining whether countermeasures were effective, and if so, what type and under The most carefully what conditions. controlled laboratory work came out of the University of Utah (Honts, 1984; Honts & Hodes, 1983; Honts, Hodes & Raskin, 1985; Honts, Raskin & Kircher, 1983; Honts, Raskin, Kircher, Hodes, 1988; Rovner, Raskin, & Kircher, 1979). These reports identified particular weaknesses to the polygraph that, under specific conditions, could be exploited by deceptive examinees. In short, they indicated that the power to detect deception was significantly compromised when examinees were given information regarding testing procedures, directions on how to selfevoke physiological reactions, and allowed practice sessions with feedback from physiologists or polygraph examiners. The ability to detect deception fell to near chance levels when these conditions were in place. In their government-funded review of the polygraph, the NRC (2003) similarly concluded that "(b)asic science and polygraph research give reason for concern that polygraph test accuracy may be degraded by countermeasures...(p5)"

It is generally agreed that a potential vulnerability to countermeasures should be worrisome to the government's counterintelligence testing programs, especially if there has been inadequate attention given to detection or mitigation countermeasure strategies. Because of the tremendous resources governments can bring to bear against other governments' polygraph programs, such as high levels of training with experts in the field, these concerns can be taken seriously. Whether PCSOT shares this vulnerability is less clear, however.

What is known is that sex offenders with access to the Internet can visit sites that claim to show how the polygraph examination can be defeated. These sites are sometimes commercial ventures, and others identify themselves as public-interest sites without necessarily revealing their funding sources. Some common features of the sites are that: they provide descriptions of the polygraph testing protocols (though with varying degrees of accuracy); they explain the types of sensors used, and; they offer suggestions on how to use self-generated reactions during testing to Though the best defeat the polygraph. Internet sites may offer a wealth of information. missing for successful countermeasure ventures are the practice sessions and feedback found necessary in the Utah research. These absent components may not only make the countermeasure ineffective, but a lack of feedback may cause the countermeasurer to produce anomalous reactions that reveal the examinee's strategy, raising rather than lowering the risk of Indeed, the NRC report (2003) discovery. stated that it is "likely that specific countermeasures...produce specific patterns of physiological responses (not necessarily limited to those measured by the polygraph) that could be reliably distinguished from each other and from patterns indicating deceptive responses" (p144).

Replicated Utah research concluded that knowledge about the polygraph and methods for self-inducing reactions were required for successful countermeasures, but not sufficient in themselves. If the Utah results are generalizable to the PCSOT environment, and that practice and feedback are indispensable to a successful countermeasure strategy, only those offenders who can secure the cooperation of an unethical but competent polygraph examiner or psychophysiologist could improve their chances of being untruthful while achieving a polygraph result of No Deception Indicated. The availability of these resources to sex offenders is unknown, but is expected to be severely limited.

Summary

Neither panacea nor placebo, given the limited tools available to uncover the deceptions of sex offenders, the polygraph may play a carefully circumscribed role to assist decision makers in treatment and supervision. Work remains in the development of best practice models, in research. and in examiner education. Concerns about false confessions need to be addressed in both the polygraph and treatment contexts. Agencies considering the addition of the polygraph to their offender management system must be made aware of the risks and benefits of using the polygraph, but also warned that the lowest-bidder approach to contracting can compromise the effectiveness of this tool unless best practices are built into the polygraph services contract. There is also an unresolved question as to the relative weight given to polygraph results as compared to opinions of treatment providers and probation supervisors. In sum, there is reason for cautious optimism that the polygraph can be value added in sex offender management programs, but whether it becomes a boon or bane will hinge upon how and why it is implemented.

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A Review and Critique of Alder's: *The Lie Detectors: The History* of an American Obsession—What Polygraph Examiners Should Know

Frank Horvath, Ph.D.*

This is an important book. It is the best work that has appeared in the field in a long, long while. It's a fascinating, terribly overdue historical assessment, a semisupplement to Trovillo's (1939; 1940) early history and a personality-focused extension of Bunn's (1998) dissertation on the history of the "lie detector." Alder's book is an account of "...the lie detector [which] promised to redeem the innocent, scarify the guilty, and ensure political loyalty..." from an examination of persons and personalities of primary historical forefathers, Leonarde Keeler, Dr. John Larson, Dr. William Moulton Marston and, in a limited and terribly understated way, Fred E. Inbau, J.D.

I wish to note that I heard no mention of this book in any of the sessions I attended at the APA seminar in New Orleans, August 19 - 25, 2007. Nor was there any comment on this book at another polygraphy-related workshop that I attended after the APA meeting. There were no casual conversations I heard about the book at either seminar. This, even though the book has been available since March, 2007. It has been widely discussed in the printed media and has been prominently featured on some internet sites. Reviews of the book have appeared in leading newspapers and magazines. Yet, those most active and directly involved in the field aren't talking about it. Why? I don't know. But, that's a shame. A better understanding of what the field is about, how it got to where it is, and how those who were instrumental in its early development, especially, Marston, Keeler, Larson and Inbau, are promising points of discussion; had they been attended to earlier, the field may well have headed off some of the difficulties it has faced. All is not lost though; careful attention to the instructional points this book has to offer could serve as a useful guide for the field in the future. I wonder if anyone will take heed.

Perhaps, many in the field are aware of this book; maybe some have even read it. It's possible that they have simply ignored it because the author is, or appears to be, in this case at least, as much a polemicist as an historian. He tends to disregard the positive and to focus on the negative. He takes some "facts" at face value and ignores others. For instance, he doesn't seem to have truly appreciated the fact that in the science related to the field there are equally sound arguments pro and con regarding issues such as accuracy, utility and so forth. There are also equally credible scientists on both sides of the The author, a distinguished arguments. academic historian, has for whatever reason ignored these facts, the two sides of the science. At various times and in various ways he offers his personal views-which he presents as if they are fully supported by science-in order to mislead or, if not that, to appeal to an audience more widely interested in the topic than those in the polygraph examiner community.

It has become a cliché to say that history repeats itself. I repeat it here because the fact that there was no mention of this book at the APA conference is strongly suggestive of the truism in that aphorism. We have learned little from our history, though it is fair to say not many have taken the time to organize that history in a coherent way. Alder has done that. But bear in mind that he is not and was not, other than having an historical interest, affiliated in any way with the field of Polygraphy. Why someone with such an affiliation didn't broach this topic

^{*}Dr. Horvath is Emeritus Professor, Michigan State University, a Past President of the APA, Associate Editor of *Polygraph*, and Director of the APA's Research Center for Credibility Assessment.

before this time is a terrible omission. (It is within my knowledge that several prominent persons in the field, with a personal knowledge of its history, were specifically invited to take on this task in years past. They declined.)

The polemical nature of this work aside, this book still provides a fascinating account of the early history of the field. The snide, unnecessary insertions of personal bias, need to be overlooked; all examiners ought to read this book. Historical analysis is by its nature interpretive and gives the author an entitlement to express his view; but, he does not seem to understand the historical development beyond what his narrow focus was. That's too bad because it has led to two serious errors in presentation. Each of these is an important prong of the author's position. And, in each case, the author is on the wrong side of the facts. However, it is possible that Alder was not and perhaps still is not aware of the importance of these errors. It's also possible that many examiners are not aware of them. I'll discuss them here in some detail before I get to a more substantive review of this book.

Alder's Major Premises

When I first entered this field I observed that one of the major points of disagreement amongst examiners was that some believed that only the testing examiner was capable of "interpreting" the data, of reaching a valid conclusion of truthfulness and deception. This was said to be the case because only that examiner had actually discussed the case with the examinee; only that examiner knew what were the circumstances when the physiological data were collected; only that examiner interacted with the examinee and could understand the real meaning of the physiological data.

On the other hand, there was another school of examiners who believed that it was possible for one examiner to interpret "blindly" another examiner's "charts" in a particular case. A reviewing evaluator could take a decision regarding truthfulness and could provide feedback and advice regarding the examination outcome. In fact, in the office where I worked, in which there were about 10 to 15 examiners at any one time, it was customary for one examiner to review another's work in a case. In important cases such a review might involve multiple evaluators, almost always including John Reid.

It is of interest to note at this point that persons holding these two schools of thought strongly believed in the correctness of their respective positions; yet neither school had actually sought to test their views empirically. Fortunately, that situation has changed but discussion of that change is not the point here. The immediate issue is that my observations about these two schools of thought separate, historically, the focus of Alder's work from more contemporary developments. That is, Alder's coverage ends close to where Polygraphy, as I came to understand it, begins.

In my early experience, the first school of thought was represented by the Keeler Polygraph (school) Institute; the second by the Reid Polygraph School. I need to note here, however, that while each of these institutions is mentioned specifically, my intent is not to single them out but merely to use them for convenience sake as clear representatives of the two opposing viewpoints about polygraph testing.

It is fair to say that at the time I attended and then worked at the Reid school a less than a positive relationship existed between John Reid and the person who headed the Keeler school; the two schools were located only a few miles apart in Chicago. This schism was based in large part on the divergence of views on how polygraphy and interrogation are, or are not, to be blended together in a properly conducted polygraph examination. Reid was of the view that interrogation followed polygraph testing once the examination revealed "deception." The head of the Keeler School held that interrogation and polygraph testing were essentially undifferentiated; the two were to be combined in some way, as determined by the examiner, to arrive at whatever was the "truth."

My observations about these two schools of thought were confirmed in a conversation I had with Lynn Marcy, one of the premier examiners in the field. He was employed at the Keeler school for some time and he understands well the principles of the teaching offered at that institution. He also understands well the position of the Reid He has confirmed that the Keeler School. school, and especially Leonarde Keeler and his direct disciples, strongly held to the conviction that polygraph testing and interrogation were inseparable arts; that polygraph testing and the charts produced during an examination took on meaning in a particular case as the examiner and the examinee interacted throughout the entire process. One could not know (infer) from access only to the charts whether a response was produced by a "lie;" to know that one had to interrogate. (A point on which I and the late Raymond Weir, another premier polygraph examiner for whom I had and have the greatest respect, strongly disagreed even though we spent many long nights and early morning hours discussing it without either of us ever changing or rearranging our positions in the slightest.)

The difference between these two schools of thought, at least as they are represented in my experience, is key to understanding one of the serious shortcomings in Alder's book. He fails to note and does not seem to understand the difference between the "old school" (Keeler) and the "new school (Reid)." He reports, for example,

Keeler's style of lie detection succeeded principal task—extracting at its confessions and intimidating subjectsonly if the operators consistently refused to be bound by even the most basic norms and standards. If polygraphers have thrived, it is because consummate antithey are professionals....Indeed, the lie detector is a placebo science in that it works to the extent the popular culture has been convinced it works-even though it works best when its operators lie.

A whiff of hokum has always trailed after the device [lie detector] since its early days in Berkeley...But, there always remains a residual skepticism about skepticism—the sort of self-doubt that P.T. Barnum knew how to exploit so well....There is always a lingering suspicion that the damn machine just might possibly work....The one major technical innovation in the polygraph since the 1930s actually confirms the power of this ruse. In the 1990s new computer algorithms were developed that could analyze the subject's physiological responses with mechanical neutrality. But because the algorithms might preclude operators from accusing subjects of lying the machine said), (whatever the nation's top examiners at the Polygraph Department of Defense Institute report that most operators turn the computer off.... In sum, Keeler and his followers operated his lie detector according to the same logic as judicial torture. This explains why the police...ultimately welcomed the device." So Keeler's lie detector in a "box" provided for almost anyone who was less interested in the polygraph record per se than in using it to screen suspects, intimidate detainees, and extract confessions.

The other school of thought, represented by the Reid School, is not, as I have said, directly discussed or even alluded to in Alder's book. Alder either doesn't know about or has deliberately ignored the six decades of history following that which was the focus of his interest. To him "lie detection" following Keeler's era is the same as that in and before that period of time. Keeler's approach, however, is not what Reid While it is true that Reid's advocated. approach, the use of a carefully structured testing process that permits independent review of collected physiological data, is still not universally adhered to in the field, there is little doubt that such an approach is a significant departure from the idiosyncratic methods of Keeler. Though Alder ignores this fact, it is of historical note that Keeler's contemporary and mentor and a prominent figure in this volume, Dr. John Larson, viewed what Keeler did with the "lie detector" with great skepticism. He was, in some sense, an early representative of what J. Reid advocated, as these quotes from Alder make clear.

Unlike Keeler...he [Larson] had always published his results in journals of criminology and psychology, as it was priority that mattered in science....He feared that Keeler would sell machines 'to every Tom, Dick and Harry,' allowing poorly trained operators to ruin the reputation of the new science. Larson obliquely condemned Keeler for 'interrogation' akin to torture.... But the device ought not be called a 'lie detector.'

Larson was adamant that exams be conducted only by a fully trained psychiatric expert, working in conjunction with experts in psychology, criminology, social work and police procedure. For Keeler...police units using polygraph his technique [demonstrated that] [of the] one-third of subjects labeled 'deceptive,' an impressive average of 60 percent were confess...This persuaded to survey...may offer the best picture we will ever have of how the police deploy the polygraph when they think no outsider is watching...The operator with the Indiana state police achieved a confession rate of only 6 percent.....Why the huge difference? The operator in Indiana was the only one trained not by Leonarde Keeler but by John Larson.

John Larson, the nation's first cop with a Ph.D, "wanted to transform the ...lie detector. He was concerned about Keeler as his 'first pupil' and his interest in 'training unethical interrogators." Larson was much more of a scientific bent and his efforts in "lie detection" were, at core,

...part of the division between early statistical approaches to psychology and sociology and those who saw an individualistic approach to problems as being the more viable method." "Larson tried to work with Marston to denounce Keeler's false claims about the lie detector and his training scheme-'a racket that had ruined the field with 'quacks.'...Behind the Taylorism and intelligence testing," [and] "Behind the public façade, the polygraph, depending on how it was operated, did not necessarily restrict the discretion of examiners. Indeed, as Keeler conceived it, the lie detector might even enhance the power of the police, by becoming a psychological third degree. And it was

here that Larson and Keeler would part company.

In summary of this point, Alder is correct in stating that the split between Larson and Keeler "would be two distinct lie detectors," but, as history shows, it was not Larson, but Reid, who turned out to endure on the opposite side of Keeler.

The other major prong of Alder's thesis is that the "lie detector" is a peculiarly American device. Americans, and Americans alone, Alder declares, have been obsessed with the "lie detector."

Keeler sold only one machine outside the United States, to Selfridges in England. Even in Canada the American instrument was spurned by both the police and business. Only in America was the lie detector used to interrogate criminals and vet employees. Abroad, it was disparaged as a typical American gimmick. Yet no country other than the United States has made use of the technique to any significant degree. ...Why, despite the avalanche of scientific denunciations, does the United States-and only the United States-continue to make significant use of the lie detector?

Alder answers the question he raises, in accord with his thesis, by stating that:

The lie detector has thrived in America because the instrument played into one of the great projects of the twentieth century: the effort to transform the central moral question of our collective life-how to fashion a just society-into a legal problem....the proponents of lie detection have packaged their technique as a mechanical oracle that can read the body's hidden signs for evidence of deceit—while they sidestep the skeptical interpretive labor that scientists ordinarily demand of such claims. The lie detector and its progeny have been repeatedly denounced by respectable science....In the end, though, we believe in the lie detector because-no matter what respectable science says—we are tempted.

Alder's position on "lie detection" being a peculiarly American phenomenon might well have been true in the formative years of its history. But it is disappointing to realize that Alder's research did not reveal the growing use of Polygraphy outside of the United States from at least the 1950's. It is true, as Alder states in his penultimate chapter titled "Pinkos," that: "In reality, neither the Soviet Union nor Nazi Germany before it saw any need for the lie detector-as the CIA secretly acknowledged. Totalitarian governments brook no impediment to their control...." However, in today's world the situation is dramatically different from what one might conclude from a reading of Alder's book. The polygraph was used in Europe, Poland in particular, since at least the 1950's, possibly earlier (Pasko-Porys, 2007; Widacki, 2007; Widacki, 2007a). In Russia, as well as in many other former Soviet Union states, polygraph testing is now widely used. When I first visited there with a delegation of polygraph examiners and police officials in 1991, there may have been, as was acknowledged by local scientists, fewer than ten examiners in Russia. Today, by all accounts there are many hundreds and according to some perhaps close to 1,000. There are several companies in Russia who today manufacture their own brand name polygraph instruments. Similarly, when I first led a delegation to China in the mid-1990s there were few examiners there, most using instruments illegally obtained from the U.S. Today there may be as many as five or six, different perhaps more, Chinese manufactured instruments in use. The total number of examiners in China is not certain but it may well be in the hundreds. And, aside from China, Russia and other former Soviet Union states, polygraph testing is widely used in many countries in Europe, Africa, Asia, South America and Latin America, including, among others, Belgium, Canada, Columbia, Egypt, Hungary, Israel, Japan, Lithuania, Mexico, Romania, Singapore, South Africa and Thailand.

Any astute observer of Polygraphy today would surely realize that the field has been and is expanding dramatically, more so outside of the U. S. than within. This is not because American gimmickry is easy to pass on to naïve audiences. And it is not because other countries wish to be foolhardy, to defy the ostensible wisdom of American criminal courts and scientific opinion in what Alder points out is the case in the U.S. wherein he states: "And even in America, the lie detector has been consistently banned from criminal courts and discredited by panels of illustrious scientists, from the Congressional Office of Technology Assessment to the National Academy of Sciences." The truth is that in spite of what Alder and like-minded observers state, Polygraphy is an invaluable technique that contributes to criminal and other investigations in ways that, as yet, are not possible with any other method. This is a lesson that Americans have learned and one that has been and is being learned in many countries across the world. Polygraphy, in contrast to what Alder speculates, is not an American phenomenon that was fashioned in the sociology of societal transformation; there is clearly something more going on here. It is simply undeniable that in spite of its many flaws and limitations, the field of Polygraphy is growing around the world. Those with a serious interest in history and science ought to be more honest about this.

Now, aside from being based on faulty premises, what is it that Alder has to say about "lie detection," about its history and those who pioneered the field? Well, there is plenty of material in this book, some never before available. That ought to be of interest to persons in the field as well as those with a special interest in policing, police science and even the broader forensic sciences.

On the Composition of the Field

In the U.S. the field of Polygraphy is male dominated, police affiliated, and short of holding advanced academic persons credentials (Horvath, 2007; Weber & Horvath, in press). It is of interest to note, however, that in policing today it is relatively easy to find sworn officers with Ph.Ds; but, that is not so in Polygraphy. Of even more interest is the fact that the very first police officer in the nation with a Ph.D. was John Larson, one of the principal figures in this book and, of course, one of the first contributors to Polygraphy. It was Larson, as pointed out in this book, who emphasized "science" as opposed to "interrogation" in his approach to "lie detection." Though not meeting the educational standard set by Larson,

examiners today do overwhelmingly represent policing, with over 80% of them being directly affiliated with law enforcement in some way (Horvath, 1995, 2007). Today, about 10% of the polygraph examiner population is female; that has not changed dramatically in the past ten years and, considering that in "...1939 Keeler set himself up as Keeler, Inc., ... and trained Jane Wilson-Katherine's [Keeler's wife] friend and the wife of his partner Charlie Wilson—as the nation's first female polygraph operator." females in the field are clearly Why hasn't the field underrepresented. organized in such a way as to try to remedy this imbalance?

On Courtroom Admissibility

With respect to courtroom admissibility almost every examiner can trace back to the Frye case in 1923. Some are even aware that that case involved the work of Dr. William Moulton Marston, not Larson or Keeler. Most may not know, however, that Keeler, a relatively uneducated but very popularized practitioner, believed that courtroom admissibility was key to the conditional success of the field. In the courtroom, Keeler recognized that: "Without a college degree,...[he] would have been an easy mark on the stand. So he immediately got on the horn and 'shouted loudly for John L. [Larson] with his experience and many degrees." Alder explains: "Then, a year later, Keeler achieved the breakthrough so far denied him: he formally presented results from his lie detector to a jury."... "According to the judge's private survey, the jurors found the lie detector offered "corroborative evidence in connection with other facts proved," and they voted to convict. "The case did, however, set a legal precedent: prior stipulation remains the sole basis for the polygraph tests in most criminal courts." During this same period, however, the judiciary invoked the same Frye rule to admit many other forensic sciences treated with considerable skepticism outside the immediate circle of practitioners: handwriting analysis, ballistic identification, and forensic psychology, to name a few. The lie detector alone has been banned. As several judges have hinted, the courts rejected the lie detector not for its failings but for its power-what one called its 'aura of near infallibility, akin to the ancient oracle of Delphi.'... "...the judiciary kept the polygraph

out of their criminal courts—while, of course, allowing it to play a role in the invisible 90 percent of criminal cases where it functioned as just another chip in a game of plea bargaining." One can see that in spite of Keeler's efforts, and in spite of the many years that have intervened between those efforts and today's world, the judicial view on Polygraphy has not changed much. Why is it that the field has not addressed this issue with greater energy and directness?

On the "Guilty Knowledge Test"

Many observers credit the late David Lykken (1959) with the development and dissemination of information about what he termed the Guilty Knowledge Test (GKT). Though his GKT is unique in important ways, Ansley (1992) reviewed the literature on this topic and found that variations of the GKT were used early in the history of the field, long before Lykken published on the topic. These uses were not, strictly speaking, only dealing with the GKT- related Peak of Tension Test (POT). The GKT, which in my view is more properly termed Information Recognition Test (IRT), seems to have been initially used by Keeler in what was known in 1935 as the Valier Mine case. Here Keeler was called to investigate an explosion at a labor-related event. He went to the crime scene and "picked out evidence of guilty knowledge," "a half-shattered alarm clock, which he assumed was the bomb's timer because of its copper leads and adhesive tape." With this knowledge in mind Keeler examined two suspects, McDonald and Robertson. His examinations led to "a physiological reaction from McDonald and Robertson after an eighteen-hour interrogation on the lie detector that was so intense that Robertson had ended it by machine smashing the with his fist."....McDonald and Robertson didn't confess but their trial was a presentation of scientific evidence, based on Keeler's crime scene findings, ... "Res ipsa loquitur"-the thing speaks for itself-that led to widespread recognition of Keeler's laboratory and colleagues in forensic science.

In another early use of a similar examination Keeler examined a person named Anderson who was a suspect in a homicide. He asked if Anderson had killed her with a stone, with a stick, with a fist, with a shoe, with an iron pipe.....And every time Keeler mentioned the iron pipe, the 'delicate needles of the detector,... wavered violently.'... Anderson, the examinee, went out to get some air....he was overheard to say, 'This is just as good a time as any.'...just before he dived headfirst through the...window and landed...four floors below.

What is most interesting regarding the reference to the IRT use by Keeler (I assume but don't know with certainty that he was the first to do what is described in this book.) is that he did what is now standard procedure in some locations. He actually visited a crime scene, collected evidence and information of value to polygraph testing, and then designed his testing approach based on such data. Though such a process is not widely practiced in the United States, the one country where the use of the IRT in this way is common is Japan, where the CQT is seldom emphasized (Mizutani, 2005). Some examiners in Slovenia reportedly also do this.

On Training

Keeler's, after the war,

...was still the only place in the nation to go for training in lie detection: either a two-week orientation course for \$30 a week, or the more extensive six-week courses for certificate as a graduate of 'Leonarde Keeler, Incorporated'—though Keeler always pointed out that it took at least a year of supervised casework to become a proficient examiner.

Keeler's approach greatly concerned Larson.

Unlike Keeler... he had always published his results in journals of criminology and psychology, as it was priority that mattered in science....He feared that Keeler would sell machines 'to every Tom, Dick and Harry,' allowing poorly trained operators to ruin the reputation of the new science.

It was Reid, however, not Larson, who challenged Keeler's training model. Reid's approach required a six month training program involving academic study and a strong, closely supervised internship with "real-life" testing carried out under the tutelage of an experienced examiner. In the U.S. the only training program that is active today with a program similar to what Reid implemented and which Larson advocated is that connected with the federal government. The Defense Academy of Credibility Assessment (DACA) program is much shorter than the Reid program but it does include an emphasis on closely monitored testing experience.

On the Court of Last Resort

In Chapter 17, Deus Ex Machina, Alder describes, in part, how Keeler was sought out to exonerate those who were or claimed to be wrongly accused and those who he could absolve of guilt, nameless or otherwise, for a real or perceived offense. Importantly, though, in a more formal effort, Keeler did, along with the help of Earle Stanley Gardner and Raymond Schindler, best selling author and famous detective, found the Court of Last Resort. There was a time when the APA actively promoted the "Court" and sought to carry on its purposes. Sadly, that activity has ceased or, at the least, does not appear to be a vital part of the APA's agenda.

Examiners will have to read this chapter with a bit of caution, perhaps restraint is a better term. Alder's perspective on Keeler, and, more generally, on the field of Polygraphy, is revealed in his concluding commentary. He says: "Quaesalid did not become a great shaman because he cured his patients; he cured his patients because he became a great shaman." "Leonard (sic) Keeler was such a shaman." No doubt, Alder believes this to be the case for all in Polygraphy.

On the Development of the "Lie Detector"

Who really invented the "lie detector?" Well, as we all know no one did; there is not now and never has been a Lie Detector. In the early years of the field there was, however, the media. It was..."the newspapers [who] baptized the lie detector; they named the device, launched its career, gave it its purpose. The machine made great copy, great pictures, great drama."

In developing his "lie detector" Keeler had at least three problems to solve: "how to register blood pressure fluctuations in quantitative terms, how to combine physiological measures on a single scale, and how to make the device portable...." He surmounted those problems, of course. And, in chapter 18, titled, "Frankenstein lives!" we learn that rightly or wrongly, deserved or not:

Leonarde Keeler got much of the credit for 'lie detection' in the popular media. But his mentor, John Larson, believed "he had created a monster: a 'salesman,' an 'exploiter,' 'a showman... Lee, Keeler and many others had allowed the 'so-called lie detector' to be turned into a 'psychological third But,..'If Larson had not degree.' invented the lie detector, someone else would have.' all of the men formerly famous for having 'invented' the lie detector have been forgotten, except Only William Moulton one Marston....has endured.....He was proud of his creation, and never seemed to suffer for it.

On Alternatives to the Keeler Polygraph

In the years covered by Alder, Polygraphy was a high-profile media topic and, as already noted, Keeler was at the forefront of this public attention. With that as a backdrop, it is perhaps no surprise that some persons tried to capitalize on this new "science." For instance, as Alder points out there was Dr. Orlando Scott, a Chicago who developed surgeon, and "outgrandstanded" the lab where Keeler worked in order to promote his "own 100-percenteffective 'Thought-Wave-Detector," which tapped, he said, "the electrical currents of the brain." Scott proudly advertised his National Detection of Deception Laboratories with the motto, "Diogenes searched for them We find them." Then there was "Darrow's Stoelting device and Lee's Berkeley Psychograph." Each promoter claimed, of course, to have developed a better "lie detector," more accurate, faster and easier than what Keeler was offering. Sound familiar? Maybe

something like what so-called voice-stress proponents today are offering to those naïve enough to believe the promotional materials?

In Conclusion

In Chapter 19—Box Populi—the last chapter, Alder states: "Over the course of the past eighty years, lie detection has been perhaps the most investigated forensic technique." This is, in my view, probably true. It is also one of the most often unstated and unrecognized facts about this field. Why?

The conclusion according to Alder is: "the techniques of lie detection, as used in investigative work by polygraphers, do not pass scientific muster. Yet lie detection lives on." "The lie detector cannot be killed by science, because it is not born of science." "The one constant is the machinery's role in political theater. For the past several decades nary a public scandal has gone by without its polygraph moment." It should be obvious that I disagree with Alder's perspective here. In resolving such scandals as well as in many other situations involving human affairs and social conflict, is there, despite the limitations in Polygraphy, a better, fairer, more accurate alternative to "lie detection"? Not yet; at least that is my view and the view of the National Academy of Sciences (2003).

There is a lot more in this book than what I have been able to cover. And, as I have stated, the historical record of this field is only partially set out by what can be found in this volume. If there is among the readers of this review one who would like to take the opportunity to update the history of the field, that would be a most welcome event. And, I might add, among those who would welcome it are many persons still available who have lived the history and are willing to share it. During certain periods of the APA's history, there was a formal attempt to record organized interviews with prominent examiners and others in order to document recollections of events in the field. I believe that some of these recordings are still available. The idea, however, is a good one and ought to be vigorously pursued on a more frequent and regular basis.

Finally, Alder states:

"...polygraph experts have urged their colleagues to set rigorous protocols for interrogation and to establish licensed training schools. In fact, only cursory standards have been adopted, and the reason is simple enough. Keeler's style of Polygraphy works best when the examiners are not constrained by norms."

Alder's point notwithstanding, we have, of course, made some inroads here and we are continuing to work at this. The history of the field, though, tells us there is a still a lot to do and maybe there are better ways to do them than what is now being done. Isn't it time to use the lessons of history to guide us into the future?

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Psychophysiological Mechanisms in Deception Detection: A Theoretical Overview

Mark D. Handler¹ and Charles R. Honts²

Abstract

This paper explores possible explanations for differential autonomic arousal measured during forensic psychophysiological detection of deception (PDD) testing. Traditional theoretical explanations of arousal generally focused on either a cognitive approach (often associated with the works of Pavlov, Sokolov and Graham) or motivational or emotional approach built on Walter Cannon's ideas of "fight or flight." This paper proposes an integration of these approaches in an attempt to better support the construct validity of PDD testing. It suggests there may be parallel paths of information processing occurring during PDD testing and one or both paths may be activated depending on the testing environment, test subject and the issue under investigation.

The Traditional View: Fight or Flight

Polygraph examiners often explain the underlying cause of differential arousal by using the fight, flight or freeze response. The Defense Academy for Credibility Assessment (DACA), formerly the Department of Defense Polygraph Institute (DoDPI) Anatomy and Physiology for the Forensic Psychophysiologist chapter (DoDPI, 1994) handout states the reactions we expect (or hope to see) during a polygraph examination result from fight, flight or freeze reactions.

These reactions include blood pressure (BP) increase, heart rate (HR) increase, an increase in the contractile force (CF) of the heart, a redistribution of blood in the body, increase in skin conductance (SC), a decrease in skin resistance (SR), dilation of the bronchi and faster deeper breathing (p. 47-48).

Polygraph schools have long taught the underlying cause of differential arousal is the "fight, flight or freeze," (F3) reaction. These responses are generally discussed in terms of motivation or emotion (Vila, Fernandez & Pegalajar, 2003).

Walter Cannon first described F3 phenomena around 1929 and limited his description to "fight or flight." Cannon believed the sympathetic nervous system (SNS) caused a response resulting in blood flow redistribution during emergency There are different possible situations. responses to fear; an animal can fight the danger, run from the danger or freeze. Fighting and running away involve an initiation of movement, while becoming immobile is just the opposite. Smith (2006) discussed fight or flight as an "active defense response" to a perceived threat. He stated these reactions are driven primarily by the sympathetic nervous system. This response is orchestrated in preparation for an extended period of physical activity. The animal engages in activity aimed at attacking or actively avoiding the perceived threat. During a polygraph examination, an examinee is unlikely to engage in either of these types of activities.

Authors' Note

¹Mark D. Handler, Montgomery County Texas Sheriff's Office ²Charles R. Honts, Boise State University

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Gray (1988) discussed the "freeze" response as what clinicians typically refer to as hypervigilence and a "passive avoidance" rather than an "active avoidance." Both natural and learned triggers can generate the freeze response. An example of a natural trigger is observed when a lab rat that has never seen a cat in its life freezes when exposed to a cat. If that same rat is shocked after ringing a bell several times, the mere ringing of the bell will also cause the rat to freeze because the bell has become a learned Smith (2006) also discussed the trigger. concept of "passive fear" or "passive defense" which seems congruent with the "freeze" theory of F3. Smith describes some of the physiological responses documented to be associated with a passive fear response. They include; decreased heart rate, decreased behavioral activity, decreased respiration depth, decreased skeletal muscle blood flow, decreased respiration rate, decreased oxygen consumption and decreased brain and heart blood flow. Freezing is a response to danger that is fairly universal in the animal kingdom (Le Doux, 2002). Automatic freezing at the detection of danger enhances survivability as predators detect movement and being detected decreases the chance of survival. Some of the physiological activities associated with the freeze response are more similar to those observed during polygraph testing.

Our innate defense systems require that we be able to perceive a potential threat quickly, assess the threat potential, and prepare an appropriate response. LeDoux (1990, 1996) worked with rats and found there was a "quick and dirty" neural link from the auditory pathway in the thalamus to the fear controlling systems in the amygdala. He this immediate transmission postulated served to get the rat's attention. The monosynaptic transmission did not transmit a great deal of information but it sent a fast warning signal to the animal. The information bypassed the usual cortical-thalamic pathway that traditionally gives full meaning to the stimulus. Once the animal's attention was aroused, it could conduct a more thorough of investigation the stimulus. neural Additional information intake could then result in an affectively motivated reaction. This pre-attentive arousal has been linked to the orienting response (OR) and described as a high pass filter (Graham, 1997). Graham

(1997) states the purpose of the pre-attentive processing is to interrupt any current processing, initiate sensory intake and engage a protective gating which is postulated to prevent processing weak stimuli.

Investigators have suggested the cortico-amygdala and autonomic responses may actually serve to "prime the emotional content of fear, and differentiate from initial stimulus novelty" (Williams, Brown, Das, Boucsein, Sokolov, Brammer, Olivieri, Peduto & Gordon, 2004). They used functional magnetic resonance imaging (fMRI) and electrodermal activity (measured as skin conductance) to study reactions to fearful faces. Their study supported the theoretical distinction between orienting responses to novel stimuli and emotional responses which function separately and yet additively. This follows the idea that basic survival instincts may incorporate a direct link between the thalamus and the amygdala and bypass the cortex to allow an initial warning. Increased salience to the stimuli will result in increased amygdala activity. Interestingly, these investigators discussed the fact that their stimulus did not rise to the level needed to evoke a defensive response. They suggest a sustained amygdala arousal allowed the subject to distinguish a novel stimulus from an affective, fear evoking one.

An Alternative View: The Orienting Response

There may be other equally probable mechanisms underlying differential the arousal that occurs during PDD testing, ones not associated with fight, flight or freeze. One such possibility is the orienting response or orienting reaction first described by Pavlov (1927). Pavlov referred to it as the "orienting reflex" and described it as a reflex that brings an immediate response in both human and animal to changes in their surroundings. Pavlov sometimes called it, the "what is it" reaction, and noted it was of great significance for survival. Some of the stimuli that are known to cause an OR include: novelty, intensity, color, surprise, a conditioned stimulus, complexity, uncertainty or conflict (Pavlov, 1927).

The orienting response increased the probability of survival. Pavlov wrote, "The

biological significance of this reflex is obvious. If the animal were not provided with such a reflex, its life would hang at any moment by a thread." (Pavlov, 1927, p. 12). Pavlov's early description of the reaction discussed the postural changes and skeletal responses that seemed to be aimed as an investigatory and assessing response. These postural changes include: momentary cessation of motor activity (freezing), an orientation of the head towards the stimulus and an adjustment in receptors (pricking up the ears or a cocking of the head) towards the source of the stimulus. Pavlov believed the purpose of the OR is to prepare for better reception and response to a possibly threatening stimulus (Barham & Boersma, 1975) and he constructed the first known sound proof room, "the silence tower," to study the OR.

Stimuli may be categorized as either signal or non-signal in nature. Signal stimuli are those that convey important information to the organism and may be regarded as significant (Sokolov, Spinks, Naatanen & Lyytinen, 2002). An example of a signal stimulus would be the sudden appearance of a deadly predator in the local area. Nonsignal stimuli are those the organism considers neutral, that is, they convey no important information, such as different pure tones (Cacioppo, Tassinary & Bernston, 2000). Novel stimuli are initially signal stimuli as they convey to the organism that something new has happened and they reliably elicit an OR. If a novel stimulus is repeated but not paired with any meaningful consequence it, and the OR associated with it, will decrease and eventually become extinct through habituation. Habituated, formerly novel stimuli do not elicit ORs.

Thus the OR is not limited to novel stimuli, but also occurs to those stimuli the organism has determined to be important. Significant stimuli (those with signal value) can evoke an enhanced OR (Gati & Ben-Shakhar, 1990). Sokolov (1963) determined that stimulus significance (or salience) can affect the magnitude of an OR. He stated "signal stimuli" were stimuli that were not novel but rather familiar and important. From a survival standpoint, perhaps it is more beneficial that an organism respond to a stimulus of known importance than one which is novel (Cacioppo, Tassinary & Bernston, 2000). Sokolov found an organism could give significance to a stimulus based on perceived importance to that particular organism. In this sense, the subject then self-assigns signal value or salience to the particular stimulus based on a previous assessment. The OR can be an affectively neutral response as well as one that occurs concomitantly with an emotional stimulus (Ohman, Hamm & Hugdahl, 2000).

The OR can be viewed as an attention response to any significant or potentially significant stimulus, depending on the current concerns of the subject. Data have shown stimuli with signal value elicit larger and more slowly habituating ORs than non-signal ORs (Siddle, Stephenson & Spinks, 1983). While the response patterns for signal and nonsignal ORs were similar, the underlying purpose may differ. Non-signal stimuli (novel stimuli) evoke responses that may signal the organism that a potentially harmful or dangerous situation exists and prepare the organism to deal with that situation. Signal value stimuli are evaluated by the organism and possibly recognized to be associated with consequences. These consequences are postulated to be tied to memory (Ohman, 1979).

The organism evaluates the stimulus and compares it to information stored in longterm or short-term memory. The current input is compared to active memory to determine if the stimulus is new (mismatch against previously encoded information) or if the stimulus matches an element of memory that has been primed to be significant (Cacioppo, Tassinary & Bernston, 2000). In either case, an assignment of novelty or significance can result in an OR. Both signal and non-signal ORs may have the initial cognitive function of information intake and processing of the stimulus. In the case of non-signal stimuli, a mismatch results in the OR occurring. The organism may compare the stimulus to information stored in memory and assign signal value (based on recognition and possible consequences) resulting in a signal value OR.

Descriptions of the physiological responses associated with the OR in humans are well documented (Darrow 1936; Lynn 1966 and Sokolov, 1963). These include; increased skin conductance, decreased heart rate, vasoconstriction in the limbs, an initial delay in respiration rate followed by an increase in amplitude and decrease in frequency, and an increase in general muscle tonus. Possible benefits of the physiological response of OR are: Increased palmer sweating allows better tactile differentiation (Darrow, 1933), better hand grip (Darrow, 1933; Boucsein, 1992), and protection against injury (Adams & Hunter, 1969). Increased allows better plantar sweating footing (Boucsein, 1992) an obvious benefit to tree climbing primates. Vasoconstriction mobilizes reserve blood flow in preparation for F3 and may make the animal less likely to bleed as well as raise systemic blood pressure. Reduction in respiration results in quieting, making the animal less likely to be seen due to reduced movement and may result in increased olfactory intake. Dilation of the bronchioles allows for a sustained level of oxygen intake with minimized movement associated with pulmonary ventilation.

repeated presentations, After а stimulus that caused an OR may cause an adaptive reflex. For example, a person sitting in a polygraph chair may initially notice the sensation of their hand against the arm rest of the chair. After a period of time, he no longer senses the chair as his tactile sensory neural circuits adapt to the feeling of hand to chair Another example might be the contact. sensation of wearing eyeglasses which is adapted to after a period of time. Additionally, repeated iterations of a stimulus may result in a defensive response (if the intensity is high enough) or fail to elicit a response (habituate). ORs are said to have "selective habituation" (Sokolov, Spinks, Naatanen & Lyytinen, 2002) as habituation rates are affected by stimulus intensity. Lower intensity stimuli habituate more quickly.

Dishabituation is the recovery of the habituated OR after the presentation of a novel stimulus and has been observed in studies of the OR. While dishabituation can result simply from the passage of time, an example of dishabituation would be a subject exposed to a particular tone which elicited an OR. After repeated presentations of that tone, the OR will likely habituate. If the subject was then exposed to a different tone (louder or significantly different in sound) the expectation is that the subject would produce an OR when exposed to the original tone thus dishabituating.

The comparator theory proposed by Sokolov (1963) discussed the OR within a cognitive context. Sokolov proposed that repeated processing of sensory information gradually builds a "mental model" of the organism's surrounding world. Sokolov believed the organism assesses a stimulus and then compares that assessment to information already stored in the brain (memory). Sokolov stated that if a mismatch of information occurs between the incoming stimulus and the neuronal model, an OR will occur because of novelty and are thus referred to as "novelty stimuli." If the organism detects no discrepancy between the stored and current input, an OR will not occur. For example, a rabbit eating grass in a field hears a rustling. It detects a difference or mismatch in local noises and it experiences an OR. This mismatch (non-signal) OR is nature's way of stopping the rabbit from eating to warn it there may be a threat nearby. If the rabbit were to keep eating the grass while a coyote was approaching, it may not survive the encounter. If the rabbit finds all is well it may well continue grazing.

In the context of a polygraph test "significant stimuli" can be in the form of polygraph test questions to which the examinee assigns the greatest importance. A match between the stimulus and the mental representation can elicit a "significance-OR" (Verschuere, Crombez, De Clercq, & Koster, 2004). Lykken (1974), while discussing the Guilty Knowledge Test, stated "...for the guilty subject only, the 'correct' alternative will have a special significance, an added 'signal value' which will tend to produce a stronger orienting reflex than a subject will show to other alternatives"(p. 728). Interestingly the strength of the OR is commensurate with stimulus intensity and can be produced at low or high intensities (Lynn, 1966). Perceived stimulus salience might well be linked to the memory that is associated with the event and it is reasonable to assume the crime related stimuli will produce significant ORs in a deceptive examinee. A person who is truthful to the relevant issue has no memory of the crime; however, they likely have memory of something when asked the comparison

questions. It is possible these comparison questions have greater salience because of their memory of a denied transgression.

Defensive Responses

The term Defensive Response (DR) is used to describe a protective response to a noxious stimulation. DRs are said to be specific to stimuli that occur at painful levels of intensity. They are slow to habituate and have a protective function which may be directed towards escape from a dangerous situation (Graham, 1997). The classic model of cardiac defense assumes an exclusively SNS mediated HR acceleration peaking at about 3-6 seconds after stimulus onset. The reaction is said to be caused by high intensity stimuli and the functional significance is a decrease in sensory intake as a form of protection (Vila, Fernandez & Pegalajar, 2003). Recent research has shown that HR responses to stimuli may reflect SNS activation, PNS withdrawal or a combination of the two (Graham, 1997). While the OR can be produced in the absence of an affective component, it is hard to think of an instance in humans where a DR would be elicited without an emotional or motivational aspect occurring concomitantly.

Differences Between Orienting and Defensive Responses

The cognitive processes of the OR and DR share many of the same physiological This makes sense in that they responses. both serve to mobilize the animal for efficient Sokolov stated the chief distinction action. between the two is cephalic vasoconstriction during DR and cephalic vasodilatation during OR as well as faster habituation for the OR (Sokolov, Spinks, Naatanen & Lyytinen, 2002). Stimulus intensity can cause a shift from an OR to a DR. For example, suppose a man quietly relaxing in a small fishing boat on a river habituates to the sounds around him. Unbeknown to him there is an A-10 jet following along the river and is approaching the area where he is fishing. The man perceives the sound of the jet as it rises above his auditory threshold and he orients towards the new sound (mismatched from his previous set of stimuli input). In a moment he recognizes the sound for what it is and quickly realizes the jet will produce an aversive noise and sensation as it passes overhead. The approaching jet has now become a significant stimulus to the man, one that will likely result in a desire to withdraw. As the A-10 flies over the man at about 300 feet it causes an earsplitting sound from which he tries to escape. It is highly likely that in the above scenario that the original OR changed to a DR as the stimulus became significant and aversive in nature. Also moderately intense stimuli can initially evoke an OR and then in later presentations can evoke a DR (Lynn, 1966). A mild pain stimulus may be interpreted as a novel stimulus and initially evoke and orienting response. Continued presentation of the painful stimulus can eventually resulted in a DR (Sokolov, Spinks, Naatanen & Lyytinen, 2002).

The demarcation between ORs and DRs is fuzzy at best and there have been reports of difficulty in distinguishing between the two in the literature (Graham, 1979; Turpin, 1986). The general cardiac response to a non-startling, long duration stimuli includes; an initial decrease in HR, an acceleration of HR peaking at about 4 seconds, and a deceleration or return to baseline (Graham, 1997). Turpin (Cook & Turpin, 1997) interpreted an additional large long-latency (35 seconds) acceleration of HR as a fight or flight response and attributed these long latency responses to motivational and emotional aspects of escape or avoidance. Turpin suggested that shorter latency (5 second) phasic ANS changes may be linked to attentional responses associated with stimulus intensity.

Some investigators proposed that the OR and DR produce different changes in heart Graham and Clifton (1966) suggested rate. ORs would be accompanied by a decrease in heart rate and DRs with an increase in HR. Raskin, Kotses, & Bever (1969) confirmed this suggestion in a study using sound. Moderate intensity sound (80 db) produced HR decelerations and high intensity or nociceptive sound (120 db) produced an increase in HR. John Lacey (1959) presented evidence "directional supporting what he termed fractionation." Lacev found that certain circumstances caused a decrease in HR and an increase in skin conductance (SCL) and other instances where they both changed in the same direction. Lacey (1967) attributed

this phenomena to the baroreceptor mechanisms located in the aorta and carotid sinus and found a reciprocal relationship between cardiovascular measurements of HR and BP and cortical alertness. Increases in cortical alertness caused a decrease in BP and decrease in cortical alertness caused an increase in BP. Lacey interpreted these results to mean sensory intake (OR) reduced HR and BP and sensory rejection (DR) was associated with things like painful stimuli and aversive stimuli and increased BP and HR. Graham and Clifton (1966) reviewed a number of studies relating to HR changes to weak and moderate stimuli. They concluded the OR was accompanied by HR deceleration and that HR acceleration was most likely attributable to stimuli of "pre-pain" intensity.

Raskin (1979) found a correlation between heart rate, relative blood pressure and peripheral vasomotor reactivity that was suggestive of a DR during comparison question test (CQT) polygraphs. Plotting a second by second analysis of the relationship among those parameters following the presentation of a relevant question, he found a heart rate increase, followed by a decrease which is indicative of a DR. The relative blood pressure measurements showed a rapid rise and then decrease, lagging the heart rate by about one second. There was a marked increase in vasoconstriction occurring concurrently with the other changes. Raskin concluded the heart rate increase and vasoconstriction caused the rise in blood pressure and baroreceptor reflexes caused a decrease in heart rate and concurrent decrease in relative blood pressure. These findings suggested a DR type response to strong signal value stimuli during CQT testing though he was unable to replicate these findings during Guilty Knowledge Testing.

Arousal Through the Cognitive Path During Polygraph

During a polygraph examination, the examiner develops and reviews all of the test with the examinee questions prior to presentation. No un-reviewed questions are asked, because their novelty would make them signal stimuli regardless of the subject's credibility. The relevant test questions are based on the examinee's discussion of any knowledge regarding the issue under investigation. The comparison questions are based on past transgressions the examinee denied or mitigated during discussions in the pre-test interview. The examiner presents each relevant and comparison question to the examinee serially during the polygraph examination. The rationale of the COT is the examinee will produce a differential reactivity based on his or her credibility to the relevant issues. It is presumed that truthful (innocent of the target issue) examinees will produce physiological stronger reactions to the comparison questions. Conversely, it is presumed that examinees practicing deception (guilty to the target issue) will produce stronger reactions to the relevant questions on the test. Polygraph examiners measure differential reactivity or differential arousal to the questions constituting the two classes of stimuli.

Arousal and attention as related to ORs and DRs may very well play a part in causation of differential reactions observed during polygraph testing. Raskin (1979) postulated differential arousal during the CQT resulted in part due to "arousal value" or salience of the test questions. Differential salience for innocent and guilty examinees results from a combination of signal value and information processing. Signal value is determined by the manner in which the subject is prepared during the examination. This generally describes an emotional or motivational desire on the part of both innocent and guilty subjects to produce a truthful outcome. Information processing, on the other hand, describes the manner in which the subject cognitively attends to the particular stimulus. The comparison questions are vague and ambiguous by design. They are purposely presented that way in order to require the examinee to engage in information processing. For truthful examinees, this difficulty in confidently answering those questions truthfully should lead to greater information processing. For the innocent subject attending to a comparison question, the combination of the signal value and processing information produce larger physiological reactions than to the relevant questions. Conversely, the guilty subject has to contend with the inherent signal value of the relevant questions which predictably will result in larger physiological reactions than do the less salient comparison questions.

As discussed earlier, stimuli can elicit "significance" OR if the stimuli have a relevance or "signal value" (Sokolov 1963). Lykken (1974) argued the OR can be enhanced by the possession of guilty knowledge regarding a criminal investigation. Verschuere, Crombez & Koster (2004)attributed slower response times to information processing (OR) during experiments with the Guilty Knowledge Test.

Ben-Shakhar (1977) proposed the dichotomization theory built on OR, habituation and signal value. Stimuli are processed as either relevant or neutral and habituate at different rates. Steller (1987) stated the assumptions of the dichotomization theory developed for the Guilty Knowledge Test (GKT) can be transferred to the comparison question test (CQT). He states guilty and innocent examinees will categorize the relevant and comparison questions differently and this will be reflected in terms of differential arousal and levels of cognitive energy required to process the stimuli will be commensurate with their degree of salience. However, examinees do not generally produce "all or nothing" reactions to one category of questions over another. This is evidenced in the published data from the Objective Scoring System (Krapohl & McManus, 1999). There the measurements of electrodermal amplitude, blood pressure amplitude change, and respiration line length are used to develop septiles for cumulative scoring. The fact that scores fall on both sides of the "zero septile" indicates there is more than an all or nothing reaction occurring. Recent research (Offe & Offe, 2007) suggests differential reactivity is achieved through differential significance of the relevant questions only and not through the comparison questions. In other words, both guilty and innocent participants reported similar levels of stress for the comparison questions. The difference in reported stress was found in the perceived salience of the relevant questions by both groups of participants. Also, a detailed review of the data produced during the development and evaluation of the Objective Scoring System, version 3 (Nelson, Handler & Krapohl, 2007) demonstrated no meaningful difference in habituation rates across the examination. Differential reactivity was not significantly different from chart one through chart three for truth tellers or liars.

Arousal through a cognitive path certainly can explain reactions observed during recognition testing. The Concealed Information Test (also known as the Guilty Knowledge Test) has been shown to be a good discriminator of those concealing information and those not in laboratory settings where knowledge of critical information can be assured through the experimental procedures (Ben-Shakhar & Elaad, 2002). The cognitive path can also explain reaction to significant Comparison stimuli presented during Question Technique PDD testing. Additionally, examinees routinely respond more strongly to selected numbers during peak of tension tests despite an arguable lack of emotion or motivation attached.

Arousal Through the Emotional and Motivational Path During Polygraph

While fear is not the only underlying cause of arousal during polygraph, it is a likely emotion present during field polygraph examinations. Davis (1961) provided three possible explanations for reactions during polygraph testing. These include the theories of: conditioned reactions, fear of punishment, and conflict. All are based on an emotional or motivational component as the underlying cause of arousal (which would likely be linked to fear in a field polygraph examination). The conditioned reaction theory states that involvement in the issue under investigation has created a learned or conditioned response potential, through the action of classical conditioning. A polygraph question becomes a conditioned stimulus and response magnitude may be commensurate with the amount of salience that stimulus holds for that examinee. LeDoux (1996) showed fear conditioning to be tied to the amygdala while working with rats. Contextual recall can result in autonomic arousal when the examiner discusses the crime with a guilty examinee during the pre-test interview. LeDoux (2002) discussed how the interaction between the amygdala and the hippocampus can result in contextual fear conditioning. punishment The fear of (or fear of consequences) theory postulates a guilty examinee will experience autonomic arousal as a result of fear of consequences of discovery or false accusation. The conflict theory suggests a "guilty" examinee will experience arousal due to internal conflict

arising from the motivational forces that cause him or her to answer the questions falsely. Mixed results were observed in experiments testing the conflict theory [see Horneman & O'Gorman, (1985) and Kugelmass, Lieblich, & Bergman (1967)].

Field vs. Laboratory Polygraph Testing

The validity of the CQT has been the subject of intense debate among scientists (Kleiner, 2002). A considerable amount of research and assessment of polygraph as applied to event specific testing has been collected in both field and laboratory settings. When such studies are properly designed (realistic settings, employing field examination techniques and using experienced examiners; see Kircher, Horowitz & Raskin, 1988) high accuracy rates can be achieved. In 1996, the 17 member ad hoc Committee of Concerned Social Scientists reviewed the scientific literature and found nine high quality laboratory studies involving 457 examinations. Those scientists found that excluding inconclusive results (approximately 10% of the cases) the examiners correctly classified about 90% of the guilty subjects and 92% of the innocent subjects (Honts & Peterson, 1997).

The Committee of Concerned Social Scientists also found four high-quality field studies to assess validity. The average accuracy for field decisions (excluding inconclusive results) was 90.5% (Kleiner, 2002). These results were based on independent evaluation of the physiological data. The accuracy results for the original examiners in those studies were actually much higher (97.5% excluding inconclusive results).

Despite arguable success, polygraph opponents have faulted analog studies for the lack of emotional impact experienced during testing in that milieu (Cacioppo, Tassinary & Bernston, 2000). Cardiovascular changes in laboratory settings were found to be diminished in relationship to those found in field testing settings (Pollina, Dollins, Senter, Krapohl & Ryan, 2004). However, Anderson, Lindsay, and Bushman (1999) conducted a study that examined empirical data across a broad range of psychological domains and found external validity of psychological tests

to be high. They reported: "Correspondence between lab and field based effect sizes of conceptually similar independent and dependent variables was considerable. In psychological laboratory brief, the has generally produced truths rather than trivialities.'

During analog lab testing it is possible the cause or differential arousal may be an increased attention and OR (Pollina et al., 2004). Comparative research has found a difference in response magnitude for lab and field testing (Pollina et al., 2004). Nevertheless, the general conclusion of that paper is that there is evidence suggesting that the two may be compared even though response magnitudes seem larger in the field.

Discussion

There has been much debate over the underlying cause of arousal during PDD testing both within and outside the polygraph community. In this paper we have proposed that the understanding of the psychophysiology of deception detection may be usefully addressed through the framework of the traditional concepts of the OR and DR and based on the signal value content or salience of the stimuli. What is lacking from our analysis is a higher-level theory that describes the purely psychological constructs that would define the processes within an individual that assign salience. The underlying causation of differential salience may or may not be very different in laboratory based polygraph examinations, relative to field examinations. Differential salience and its concomitant physiological reactivity could result from a number of causes including guilt, fear, excitement, content complexity or even delight (Vrij, 2000) to name only a few. The polygraph profession is not unique in failing to address this question, as the entire area of psychophysiology is devoid of such higher level theories, while the behavioral sciences that deal with such theories rarely attempt to connect them with underlying physiological processes or with applied needs, such as deception detection. When considering underlying cause of arousal during polygraph testing, it will likely be useful to think in terms of a continuum of causes rather than one simple explanation and it may well be that completely different

causal bases are at work across individuals. The explication of such a higher-level complete theory is work that remains to be done. Nevertheless, while it is difficult to determine the cause of the differential salience and arousal seen in deception detection tests, the clear fact remains that comparable high levels of accuracy are found in high quality studies from both the laboratory and field (see the review by Honts, Raskin and Kircher, 2005).

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