

VOLUME 36

2007

NUMBER 1

Contents	
An introduction to the APA's Panel on International Developments in Polygraphy Frank Horvath	1
Overview of Polygraphy in the United Kingdom Shay Addison	3
The Use and Benefits of the Photoelectric Plethysmograph in Polygraph Testing Mark Handler and Donald J. Krapohl	18
History of the Backster Zone Comparison Technique Cleve Backster	26
A Personal View of Donald Krapohl's "Validated Polygraph Techniques" Nathan J. Gordon	28
Critical Analysis of Krapohl's Validated Polygraph Techniques James Allan Matte	29
Rejoinder to Criticisms by Messrs Backster, Gordon and Matte: A closer look at the evidence Donald J. Krapohl	35
A Reply to Krapohl's Rejoinder to Criticism of his Article on Validated Polygraph Techniques James Allen Matte	45
Rejoinder to Criticisms by Matte: Closing Comments Donald J. Krapohl	48

An introduction to the APA's Panel on International Developments in Polygraphy

Frank Horvath, Ph.D.

In 2005, at the APA seminar in San Antonio, the first-ever APA "International" panel was organized. The purpose of the Panel was to serve as a forum for discussion of contemporary events in Polygraphy and Credibility Assessment in countries outside of the U.S. The advent of the internet, changes in social, political and legal areas, the menace of terrorism and the growing problem of transnational crime have raised the need for an awareness of developments in the field of Polygraphy. The panel was the APA's initial step in that direction.

The International Panel presentations, hopefully, will be a continuing feature of the annual seminar. Generally the organization will be as follows: Each Panel will consist of three or four presenters, each from a different country. Panelists will make a 20-30 minute presentation, after opening remarks from the After the featured "country" moderator. presentations, the moderator will summarize and integrate the important points. That will be followed by a question and answer session, with questions posed by audience members to the panelists. This organization is intended to promote greater interest in international issues and a better understanding of how practices and policies in other countries are related to those in the U.S.

In addition to a presentation at the seminar, each panelist also agrees to prepare a more detailed paper, in a relatively consistent way, that will be submitted to the APA's Editor for publication consideration. Examples of items that are to be covered in each of the papers include: Who is credited with the initial development of polygraph testing in the country? When? Who uses polygraph testing? How many examiners are there and how are they selected and trained? What kind of instrumentation is used? What are the dominant procedures ("techniques") in use? What are the legal issues of most concern? What is the public perception of Polygraphy?

In the first-ever Panel in 2005, the presenters were: Ms. Shay Addison, from the United Kingdom, Mitsuyoshi Mizutani from Japan and Dr. Yung Hyeock Lee from South Korea. Col. Adrian Coman, Romania, was also scheduled to be a panelist but a medical problem forced him to cancel his attendance.

In this issue of Polygraph we are pleased to publish the first paper from the first International Panel in 2005. In this paper, Ms. Shay Addison describes Polygraphy in the United Kingdom.

About the Author

Shay Addison (United Kingdom) completed a Bachelor of Arts (psychology) at the University of Queensland in 1993 and completed a post-graduate diploma in psychology from Bond University in 1995. Thereafter she trained for a further two years to fulfil the requirements for registration as a psychologist in Queensland, Australia. She has worked as a psychologist with forensic populations, predominantly within the prison system in Queensland, which included the specific assessment and treatment of sex offenders.

Ms. Addison moved to the United Kingdom in 2000, working and consulting for a period of time with agencies in the north of England who provide services for children and young people with behavioural problems and those involved in the criminal justice system.

In Newcastle-upon-Tyne in mid-2003, she completed a basic polygraph training program and a one week program in postconviction sex offender testing (PCSOT), both provided by the International Academy of Polygraph. The basic course was the first polygraph training school conducted in the UK.

Ms. Addison is one of five people employed by the University of Newcastle-upon-Tyne since 2003 to conduct PCSOT with

community-based sex offenders. This testing is part of a pilot project funded jointly by the Home Office and National Probation Directorate in order to evaluate the utility of PCSOT within England. It is being implemented by Don Grubin, Professor of Forensic Psychiatry at the University of Newcastle-upon-Tyne and is the first polygraphy project of its kind in the UK. The project was recently extended for a third year up to May 2006.

With the exception of one exam, all of Ms Addison's polygraph testing has been

carried out in relation to sex offenders. The one exception occurred recently. At the request of a large English police force Ms. Addison conducted polygraph testing of a suspect in a murder investigation. This is the first known example of this type of polygraph testing being utilized by the police in the UK. Ms. Addison is a frequent presenter at conferences in England on topics related to the utility and implementation of PCSOT.

Shay Addison

Shay.Addison@northumbria.probation.gsx.gov.uk

Overview of Polygraphy in the United Kingdom

Shay Addison

History

Background to polygraphy in the United Kingdom (UK).

Interest in the value of polygraph testing was first ignited in the early 1980s as a result of one of the biggest spy scandals in recent UK history. Geoffrey Prime was employed by the British government at Government Communications Head Quarters (GCHQ). In the early 1980s it was discovered that he had been working for the Soviet government as a double agent for up to 20 years. An investigation was conducted by the security commission which issued a report on the "Prime Case". Recommendations in this report prompted the government to investigate additional means of vetting and monitoring their security personnel.

In 1984 the British Government, through the House of Commons, convened a select committee of Members of Parliament (MPs) to hear evidence in relation to the potential uses of polygraphy. The minutes of evidence presented to the committee are contained in a 55 page document titled "The Implications for Industrial Relations and Employment of the Introduction of the Polygraph".

Four individuals gave evidence to the Employment Committee over a period of days in 1984. A core group of three individuals were partners in a private company trading in the UK as "Polygraph Security Services Ltd". The fourth person to give evidence was a professor of psychology from the University of Utah in the United States of America.

Polygraph Security Services Ltd was managed by four people, described as follows: Sir George Terry, Chairman, and a retired Chief Constable of the Sussex force and a former chair of the Association of Chief Police Constables (ACPO). Jeremy Barrett, Managing Director, a former director of the British School of Motoring, an ex-serviceman, described as a specialist on the subject of "executive protection". Martin Seligson, Director, a private businessman and American citizen resident in the UK. The last director was Philip Tite, general manager of a UK film distribution company.

Sir Terry, Mr Barrett and Mr Seligson were questioned by the committee and Mr Barrett provided a demonstration of the instrument to the committee members. They presented information on basic polygraphy, gave examples of possible test situations, research findings and limited information on the specifics of their own testing in the UK.

Polygraph Security Services Ltd was identified as having been incorporated on 30/06/83 and is the first known provider of polygraph testing in the UK. At that time it was affiliated to the Zonn Corporation of America which they stated had a 35 year history of polygraph training and practice across the USA with both police and civilian personnel.

The process by which Polygraph Security Services Ltd was in the position of giving evidence to a government committee in respect of polygraphy is unknown. Furthermore, it is not clear how these men came to know each other or how their interest in polygraphy developed.

The minutes of the select committee highlight that the government was considering the feasibility of piloting polygraph testing at GCHQ, and that the prime minister had recently informed parliament that the security commission report recommended if polygraphy were introduced, the tests would need to be made mandatory.

The minutes also highlight a claim by Polygraph Security Services Ltd of ongoing media speculation at the time that the government (which neither confirmed nor denied the rumours) had already purchased six instruments from the Stoelting Instrument Company, in addition to having eight polygraphists in its employ.

Dr David Raskin was the academic who gave detailed evidence about polygraph. The minutes suggest that he was invited as a recognised expert in the field, although the process by which he specifically was selected to appear is not known.

Dr Raskin discussed the general state of polygraphy in the USA at that time. He gave detailed information and opinion on issues of accuracy, utility, training and ethics. He was supportive of the use of polygraphy for specific incidents bv competent. well trained examiners, which he said could achieve an accurate outcome 90% of the time. He was very critical of using polygraphy for preemployment screening due to unacceptable levels of error. His major criticism of polygraphy was reserved for the process of training examiners. He described polygraph sophisticated exams as being highly psychological procedures, and considered the general standard of recruitment and training as inadequate, and one which produced incompetent examiners.

The British Psychological Society (BPS) also conducted a review on the use of polygraphy in criminal investigation and personnel screening. This report was published in 1986 with the major findings being:

• There was insufficient research evidence to support the claims that polygraphy was adequately valid and reliable

• Polygraphy was insufficiently standardised to be considered a scientific procedure

• It highlighted ethical problems such as the need for examiners to induce anxiety in their subjects as part of the procedure

Overall, the 1986 BPS review was highly critical of polygraphy and did not support its use in any context. Consequently, government plans for piloting polygraph testing were considered infeasible for use with security personnel at GCHQ or for any other purpose. Officially in the mid-1980s, polygraphy was effectively "shelved" by the government. The British government did not become involved in openly considering the use of polygraphy again until 2001.

How long has polygraph been used in England / United Kingdom? Who is generally recognised as the originator (initiator) of polygraph testing in your country? When did this occur and under what circumstances?

Private sector

The use of polygraphy in the UK is a relatively recent phenomenon. Information suggests that polygraphy was first used in the UK in the early 1980s within the private sector by Polygraph Security Services Ltd.

This company has continued to function since 1983 despite the outcome of the mid-80s government investigation. During evidence given to the employment committee in 1984, directors of this company indicated that they were possibly conducting tests in three areas: pre-employment, employee honesty maintenance and specific employer losses. They did not divulge the number of tests conducted, but stated that testing occurred "most weeks". Mr Jeremy Barrett remains the core individual within this company and continues to conduct polygraph exams within the private sector.

More recently, since 1999 the number of other private companies offering polygraph examinations in the UK has steadily increased. At present there are up to 10 companies within the private sector advertising polygraphy as a service they offer. Information from a number of these companies informed me that the majority contract out their polygraph exams to one of three private examiners working in the UK.

Government sector

Within the government arena, unconfirmed sources suggest that the British government may periodically use polygraph examiners from abroad to monitor their security personnel at MI5 and MI6, despite publicly shelving plans in the mid-80s for British personnel to perform this function. Given the sensitivity of this issue, and the potential controversy surrounding it, the use of polygraphy within the British security services will no doubt continue to remain a topic of speculation.

The most recent and prominent advancement in polygraph testing in the UK has occurred hand in hand with academia. Don Grubin, NHS Honorary Consultant Forensic Psychiatrist and Professor of Forensic Psychiatry at the University of Newcastleupon-Tyne is generally considered responsible for initiating the first systematic governmentsupported use of polygraph testing within the UK.

This has occurred within the context of research conducted at the University of Newcastle-upon-Tyne by Professor Grubin and colleagues about the potential value of using polygraph testing in a post-conviction capacity with sex offenders. Professor Grubin has published widely in the area of sexual offending and is a recognised expert in this field.

Professor Grubin was initially introduced to post-conviction sex offender testing (PCSOT) in the late 1990s by Dr Daniel Wilcox, a clinical forensic psychologist who runs a private practice in Birmingham, UK. Dr Wilcox specialises in working with learning disabled sex offenders and was interested in what impact polygraphy may have within his clinical work. Through the American Polygraph Association (APA) Dr Wilcox arranged for an examiner experienced in conducting sex offender testing to conduct exams for a small research study involving the men he treated in his practice. This research study looked at the utility of polygraph in relation to the reporting of sexual histories. Wilcox (2000) found that men who had taken a polygraph exam reported significantly more about their sexual history than those who did not take a polygraph exam. The testing was completed for this study by Dan Sosnowski represents the first known clinical use of polygraphy in the UK.

On the basis of these results, Professor Grubin subsequently made the decision to conduct empirical research on the utility of polygraph testing with community-based sex offenders. Since 2000 he has headed research at the University of Newcastle-upon-Tyne for this purpose.

In response to the results of the initial utility research project carried out on men in the UK in 2001 & 2002 (published as Grubin, Madsen, Parsons, Sosnowski & Warberg, 2004; & Madsen, L., Parsons, S. & Grubin, D, 2004), the government bodies responsible for offender management (i.e. the Home Office and National Probation Directorate) funded a twoyear project piloting PCSOT within the probation service. The pilot was funded specifically to conduct examinations with sex offenders engaged in treatment in the community and was implemented as a voluntary process.

Recruitment of examiners for this project took place in early 2003. Initial training began in May 2003 and testing began in England in September 2003. The funding for this pilot project was extended for a further third year to enable PCSOT to continue to operate in 10 probation areas throughout England. This project is due to run until the end of June 2006, with further funding expected to be made beyond this date.

Research

What academics & / or researchers in your country have done research in polygraph testing or related areas?

Empirical research has been conducted in the UK in relation to the use of polygraph within a number of specific clinical settings.

The first known studies were published by Gisli Gudjonsson, Professor of Forensic Psychology, British Institute of Psychiatry, who has published widely in the area of deception and confession. Professor Gudjonsson informed me that he conducted a number of studies for his PhD in the UK in the late 70s & early 80s, using polygraph in clinical forensic settings. The BPS reviews of 1986 and 2004 highlight specific examples, such as utilising polygraph to assist establish the identity of a patient who alleged amnesia; and looking at polygraph testing with 'drunk driver's' who alleged having a blood injury phobia.

Dr Daniel Wilcox, a private clinical forensic psychologist, published results of a research project he conducted using postconviction sex offender testing with clients from his psychology clinic in Birmingham, UK (Wilcox, 2000). He has also published another paper relating to this topic (Wilcox, Sosnowski & Middleton, 2000).

More recently, since 2000, Professor Grubin has headed research in evaluating the use of polygraphy in a post-conviction capacity with sex offenders subject to probation. Mr Lars Madsen, clinical psychologist, St Nicholas Hospital, Newcastle-upon-Tyne completed a PhD from 2000 to 2006 about PCSOT at the University of Newcastle-upon-Tyne and was supervised by Professor Grubin. Dr Shaun Parsons. forensic psychologist has also contributed to this polygraphy research. Mr Madsen's PhD research with Professor Grubin culminated in two major studies and six publications to date: Grubin, D., Madsen, L., Parsons, S., Sosnowski, D. & Warberg, B. (2004); Madsen, L., Parsons, S. & Grubin, D. (2004); Grubin, D. & Madsen, L. (2005), Madsen, L., Parsons, S. & Grubin, D. (2006); Grubin, D. & Madsen, L. (in press); Madsen, L. & Grubin, D. (submitted 2006).

The first study was carried out in the UK in 2001 / 2002 and examined the utility of PSCOT. Dan Sosnowski and Brent Warberg, both private examiners based in Georgia, conducted the testing for this project. The general findings were that PCSOT assisted offenders to disclose information about risk behaviours that they had failed to disclose in Repeated testing also any other context. appeared to help offenders reduce the extent to which they engaged in high risk behaviour. Finally, after having the experience of a polygraph test, offenders reported more information to their probation officers about their risk behaviours.

The second study was carried out in Georgia, USA in 2003-05 and focussed upon issues relating to accuracy within a PCSOT context. Overall the findings support the view that polygraph is both accurate and useful with community-based sex offender populations. The research utilised a field study methodology where "ground truth" was identified by using hair sample analysis to test for drug-taking. This was then matched to the outcome of a drug-taking question on a multiple issue polygraph maintenance exam.

In this study, truth-tellers (i.e. those who said they did not use drugs and the hair concurred) sample test were correctly identified approximately 80% of the time. Liars, though small in number, were correctly identified up to 100%. However, these accuracy figures differ significantly depending on whether you use the outcomes (i.e. 'DI' or 'NDI') of the original examiners or of examiners who blindly scored the charts. Results demonstrate that blind scoring of charts produced far more accurate results. Implications of this are discussed.

Dr Keith Ashcroft, a forensic psychologist based in Manchester, UK, has also conducted polygraph research in relation to assessing malingering in the mentally ill. This research has been conducted through the Psychology Department at the University of Mainz, Germany. Dr Ashcroft has referenced research conducted with colleagues at various university and medical institutions which are published on his website www.forensiccentre.com/research.html.

The seven publications identified by Dr Ashcroft deal primarily with an alternate technology for the detection of deception, which is referred to as "Silent Talker". This technology is described as being a system which uses artificial neural networks to analyse changes in facial features and other non-verbal behaviours to diagnose deception.

What is the nature of the relationship between examiners and researchers?

All of the examiners who have conducted PCSOT in the probation service have been recruited by Professor Grubin and remain under his supervision. Professor Grubin was awarded the tender by the British government to implement the polygraphy pilot throughout the national probation service, and as such five examiners are currently employed directly by the University of Newcastle-upon-Tyne for this purpose. Given that academia has facilitated polygraph's implementation in the UK, there remains a continuously high level of professional contact between examiners and researchers involved with the University of Newcastle-upon-Tyne. Dr Daniel Wilcox also maintains professional contact with researchers and examiners employed by the University of Newcastle. Contact between other examiners and researchers based in the UK remains limited.

Is there any research being done in your country now and if so, who is doing it and what is its nature?

The PCSOT pilot project, being implemented in the national probation service, continues to be evaluated at the present time. The criteria for evaluation are not empirical measures, but rely upon a comparison of qualitative data relating to polygraph utility. Essentially, probation officers and treatment facilitators are required to fill out an 'actions taken' form after each offender they supervise has had a polygraph exam. This form is designed to show changes in the offender's management made in response to any disclosures or the outcome of the polygraph exam. The same 'actions taken' form is also being filled out periodically for sex offenders in probation areas where polygraphy is not being used. The information between the 'polygraphy' and 'no polygraphy' sites is then compared. This evaluation has continued throughout the third year of the pilot.

Is the research being supported by the government? If so, which agencies?

Mr Madsen was awarded funding for a period of two years to conduct the PCSOT accuracy study in Georgia, USA, as part of his PhD at the University of Newcastle-upon-Tyne. Funding for approximately £100,000 was provided by the National Health Service National Research & Development Programme on Forensic Mental Health Fellowship. Details of this fellowship can be found at: http://www.nfmhp.org.uk/research.htm#cppf

The PCSOT probation pilot headed by Professor Grubin is funded wholly by the government, jointly through the Home Office and the National Probation Directorate.

Is it being privately supported? By Whom?

I am not aware of private funding for polygraph research in the UK in relation to PCSOT. No information is available in relation to funding for Dr Ashcroft's research projects.

Examiners

How many examiners are there in your country?

According to the information I have had access to, at present there are 14 examiners practicing in the UK and one in training in the USA. Five of these examiners are females, nine males.

I also have unconfirmed information about a psychologist from the Northern Ireland prison service who has recently trained as a polygraph examiner.

Types of examiners and characteristics of examiners

Private examiners

There are three completely private examiners in the UK, all of whom have a primary background in the business arena. Mr Jeremy Barrett continues to operate Polygraph Security Services Ltd. The other two examiners, Mr Bruce Burgess and Mr Guy Heseldine, run a private company called Distress Services.

Police examiners

Currently three serving police officers have been trained as examiners. One of these is Detective Sergeant Jackie Coleman, of the Northumbria police force. DS Coleman has been a police officer for twenty years and currently works with supervising and monitoring community-based sex offenders through the Multi Agency Public Protection protocols. She has conducted a number of PCSOT exams.

The other two officers are both from the Metropolitan police force and have been serving officers for many years. These officers are yet to conduct examinations in the UK. They have however conducted approximately 70 exams with criminal suspects in Canada.

Government examiners

None known.

University / prison / hospital

There are a total of eight examiners employed by university, prison and hospital to conduct PCSOT within various contexts.

Five examiners are employed by the University of Newcastle-upon-Tyne to conduct PCSOT within the national probation service. Two of these examiners are full-time, three part-time. These examiners are Ms Shay Addison, Ms Caroline Oliver, Ms Zarine O'Keeffe, Ms Nikki Collins and Mr John Meredith. The first four examiners are psychologists and have varied experience within the forensic arena, including working within adult and juvenile prison and probation services. forensic psychiatric hospital. university research and private psychological practice. The fifth PSCOT examiner, Mr John Meredith, is a retired detective inspector who specialised in child protection and investigating sexual abuse within the Thames Valley police force.

Ms Nikki Collins is also employed parttime as a forensic psychologist at a secure forensic psychiatric hospital. Procedures are currently being considered to enable Ms Collins to conduct tests within the unit for patients who have committed sexual offences and are diagnosed as having a dangerous and severe personality disorder (DSPD).

The sixth examiner, Mr Craig Testo, is employed full-time as a psychologist within Her Majesty's prison service. He conducts PCSOT within the probation service, whilst awaiting procedures to be enacted which will enable Mr Testo to test offenders within the Durham prison DSPD unit. This will include sex offenders, but is not limited to that population.

In September 2005 Mr Testo enrolled at the University of Newcastle-upon-Tyne as a PhD student, supervised by Professor Grubin. It is envisaged that his research will focus upon evaluating the use of polygraph with the prisoners from the DSPD unit at Durham prison.

The other two examiners are Dr Keith Ashcroft and Dr Junjie Wang, forensic psychologist and forensic psychiatrist respectively. Drs Ashcroft and Junjie are colleagues who conduct examinations and research via Dr Ashcroft's private clinic in Manchester and through the University of Mainz in Germany.

Licensing laws regulating examiners

There are currently no laws pertaining to the regulation of examiners or polygraph testing in the UK.

Examiners residing outside of your country who test in your country?

No information.

Who are noted as the leading, prominent polygraph examiners in your country? Provide a short biographical sketch of these persons and identify what is / was their noted contribution?

Given that polygraph testing is in its infancy within the UK, the profession has yet to produce examiners that would be considered 'leading or prominent' within the field.

Training

What was the training / background of the first examiners?

The majority of polygraph examiners within the UK have undertaken formal training within an APA approved training school.

Private examiners

Mr Jeremy Barrett, who appears to have been testing in the UK since 1983 provided information to the commons select committee in 1984 saying at that time he was "partially trained" as an examiner, although he did not provide any further details with regard to the type of training. No further information has been made available to me in this regard. The other two private examiners currently operating Distress Services in the UK provided the following information about their company, training and testing practices. Distress Services was formed in 1999 by Mr Blake Burgess who qualified at the Maryland Institute of Criminal Justice (MIJC). He no longer conducts tests. His father and brotherin-law continue to operate this small company.

Mr Bruce Burgess attended the Backster School of Lie Detection for core formal training in San Diego in 2001 and later completed the PCSOT course at the International Academy of Polygraph. Mr Guy Heseldine trained at the MIJC in Spring 2003 and completed the PCSOT course at the MICJ in November 2003.

University / prison / hospital examiners

The International Academy of Polygraph, based in Fort Lauderdale, Florida ran a polygraph school at the University of Newcastle-upon-Tyne, England, from 5th May, 2003 until 8th July, 2003 where six people completed the basic eight week training programme, in addition to the 40 hour PCSOT training.

This school was specifically set up to train examiners employed by the University for the implementation of the PCSOT pilot within the probation service and involved the following people: Ms Shay Addison, Ms Caroline Oliver, Ms Zarine O'Keeffe, Mr John Meredith, DS Jackie Coleman and Mr Jos Buschman.

Mr Jos Buschman, a Dutch national and psychologist working within the Dutch health system, was funded to complete the formal training by his employer. He has not conducted exams in the UK.

Both Ms Nikki Collins and Mr Craig Testo attended formal polygraph schools in the USA at the International Academy of Polygraph, Fort Lauderdale, in 2004 and 2005 respectively.

Dr Keith Ashcroft reports being trained as an examiner by Professor Udo Undeutsch in Cologne, Germany. The training appears to have been done within a research capacity at the University of Mainz, Department of Psychology, Germany. Dr Ashcroft also reports that Dr Wang was trained at the Chinese Institute of Science by the Chinese Public Security Ministry. Further details were not provided.

Police

The two police officers from the Metropolitan police force were trained formally at the Canadian police polygraph school in 2004.

What is the current status of training? Is there a training school in your country?

There are currently no formal training schools set up within the UK. However, trainers from the International Academy of Polygraph have continued to function as consultants and supervisors to University of Newcastle-upon-Tyne examiners who are conducting PCSOT within the probation, hospital and prison services.

Mr Lou Criscella has been retained by the project to provide continuous supervision in this regard and have conducted advanced training in England twice a year since the initial training programme in mid-2003. Additionally, all examiners associated with the University of Newcastle-upon-Tyne have attended the annual APA conference as part of further training and professional development.

Mr Heseldine informed me that both he and Mr Burgess Snr have attended further training in the USA at the Backster school of Lie Detection.

At present all examiners, with the exception of Mr Barrett and Drs Ashcroft and Wang are either associate or intern members of the APA. There are no polygraph examiner associations within the UK.

Training concerns

One of the issues highlighted, particularly by private examiners, is the cost associated with ongoing training. This is generally because the majority of training requires examiners to attend the USA. It has been noted that the APA has attempted to address these issues by providing website training seminars and also by offering PCSOT examiners peer review (i.e. quality assurance) of one exam a year.

However, despite examiners' professionalism or best intentions, a lack of access to systematic training and professional development will have adverse effects on examiner performance. This principle extends to any profession (e.g. psychology, medicine, mechanics, ballet) where the outcome can be affected profoundly by the procedure used to obtain it. It is well documented that regular, objective, external peer review of practice it necessary for any practitioner to ensure that they are applying relevant skills to an acceptable standard. This will continue to remain an issue for examiners in the UK for the foreseeable future due to the infancy of the profession and the geographic isolation from sources of expertise.

Examinations

Approximately how many polygraph examinations are carried out in your country each year and what is the primary from of testing being done in your country?

Post Conviction Sex Offender Testing and fidelity testing appear to be the primary forms of testing being conducted in the UK at present.

Private

Mr Heseldine had advised me that since 1999 he and Mr Burgess have conducted approximately 700 private tests, covering a variety of issues, including employee theft and misuse of company information, allegations of abuse, fidelity testing and a small amount of pre-employment screening for a US company who has employees in the UK. Mr Heseldine identified their primary form of testing as being fidelity testing.

University / prison / hospital

Examiners attached to the University of Newcastle-upon-Tyne are not at liberty to disclose the number of sex offenders tested in the PCSOT pilot within the probation service. As yet, no tests have been conducted within the DSPD units. A small number of other tests focusing upon sexual behaviour have been conducted for child protection and risk assessment purposes with men and women who have been referred from government agencies outside of the criminal justice system (i.e. social services, forensic hospitals).

Dr Ashcroft

Dr Ashcroft informed me that he conducts tests in relation to malingering in the mentally ill, but was unable to disclose numbers of test conducted. He said that he and Dr Wang conduct tests in the UK, Germany and China. Dr Ashcroft's website indicates that he uses alternate technology for investigating issues such as criminal investigations, foreign and counterintelligence operations, security issues and requests for exoneration.

Testing Issues

Countermeasures. What is the experience of examiners in your country in dealing with this issue? Are the internet sites that purport to teach examiners how to defeat polygraph testing a concern?

Examiners in the private sector report that they have experienced people using countermeasures, although specific information about the type and frequency of this problem is not available. Mr Heseldine informed me that a client very recently admitted to using techniques he researched through consulting "How to Sting the Polygraph". They use movement sensors to assist manage this problem and highlight it as a training issue.

Examiners conducting tests within the probation service have experienced limited problems with overt use of countermeasures by sex offenders. In the two and half years that tests have been conducted, examiners have occasionally been made aware by staff within the probation service of offenders who have told them about accessing information about polygraphy via internet websites. Whilst examiners have strongly suspected countermeasure use in some tests, to date, no offender has acknowledged doing so.

Distortion in the pneumograph channel (i.e. suspected deliberate alteration of respiration) is the issue which has caused most concern about possible countermeasure use (or deliberate non-co-operation) to date. Because the PCSOT probation pilot is a voluntary measure at present, an examiner's scope to challenge an offender they suspect of using countermeasures or not co-operating is limited by two main issues. Firstly, voluntary testing means that examiners are working to maintain offenders within the project beyond their initial exam, so that they can be tested over time, which is difficult to do if you of effectively accuse people cheating. Secondly, even if the offender admitted to using countermeasures, no sanction can be imposed by their probation officer on the basis of an offender's lack of co-operation when participating in a voluntary polygraph exam.

All examiners use a movement sensor pad. Examiners have found that whilst it has been useful for identifying minor movements unseen by the eye, there have not been any tests where the movement sensor identified gross physical movements made by the subject that were not also readily visible to the examiner. It is of course possible that the sensor has had a deterrent effect for offenders who may have intended to use physical countermeaures. However without information on base rates for this behaviour in the UK (due to recency of testing) the extent to which this may be the case is unknown.

Covert use of countermeasures (i.e. those psychological or mental in nature) is obviously a more difficult issue to assess. Whilst none have been disclosed to probation examiners, it is probably naïve to think that the sex offenders being tested have not at least attempted to employ these techniques. This is especially so when considering the following anecdotes from training conducted with probation staff.

As part of implementing the PCSOT pilot within the probation service many training seminars were conducted with probation staff in the 10 areas across England. These seminars consisted of providing probation staff with a general understanding of PCSOT, including a demonstration of the equipment in the form of a standard acquaintance test. The acquaintance test used is a known solution peak of tension, where the volunteer chooses a number (4, 5 or 6); writes it on a sheet of paper displayed on the wall in front of them and was then is asked: Did you write the number 1? and so on through to the number 8.

On a number of occasions, volunteer (i.e. subjects, probation staff). have automatically attempted beat the to acquaintance test using mental countermeasures. This first became apparent early on in the seminar circuit, when a subject's response to the peak of tension test was not as theory would predict. That is, the volunteer's greatest GSR response was to a number other than the one he had written. This number was also sequentially after the number he had written. The relevant or "hot" number that he did actually write elicited the second greatest GSR response.

This situation has occurred a number of times when conducting probation demonstrations. On each occasion, when discussing the test outcome the volunteer subject, they have confirmed that they intentionally and deliberately focussed upon another number to try and evoke a response to that number.

Although this example is based upon limited experience of a small number of people in an artificial situation, two key points may be generalised to real-test situations: 1. this strategy was automatically adopted by some people without any prior countermeasure knowledge training or of polygraphy whatsoever. 2. They were successful in affecting physiological responsiveness when the only apparent 'outcome gain' for the subject was the satisfaction of knowing they beat the polygraph.

It is deemed, however, as highly improbable that an un-knowledgeable examinee could achieve similar success during the in-test phase of a PCSOT exam, due to the different relevance of the situation and format (comparison question rather used than known-solution peak of tension). However, the effects of mental countermeasures when employed bv an examinee who is

knowledgeable about polygraphy remains largely unknown.

polygraph community The have highlighted community-based sex offenders as one of the groups of people they believe most likely to employ countermeasures. This is primarily due to PCSOT becoming more common place in the USA with the advent of legislation in many states requiring sex offenders to undertake polygraph exams. It is interesting to note that Grubin and Madsen (in press) found that only 1% (2 out of a sample of 168) sex offenders in the state of Georgia, USA, who were mandated to take bi-annual polygraph exams, anonymously reported using countermeasures to try and beat the test. In both instances they reported doing so by using drugs. Despite the fact that this figure does not represent an empirical finding, it does provide an alternative picture of the extent to which countermeasures are possibly being employed within this context.

Dr Ashcroft reports not having encountered countermeasures in his work.

What are the dominant testing formats or techniques that are in use?

Private examiners have indicated that they use the following formats:

• Zone Comparison Test (ZCT), bi-spot, and using the third relevant question in a secondary position

• Backster's exploratory zone test

• Air Force Modified General Question Technique (AFMGQT)

The PCSOT pilot uses two general formats:

• The Department of Defense Zone test (DODPI Zone) for single issue tests.

• The Air Force Modified General Question Test (AFMGQT) for single and multiple issue tests. Mixed chart series are also utilised with the AFMGQT.

Two other formats have been used to a lesser extent in the course of PCSOT:

• Bi-Zone format to investigate a single issue. The bi-zone test is generally used when a 'break-out' test is required after a deception

indicated outcome to one spot on a multiple issue test. It is also used to test the veracity of any further post-test admissions on either a single issue or multiple issue test.

• Concealed Information Peak of Tension test. As described in the next question this format has been used to test for countermeasure knowledge.

Dr Ashcroft reports generally using the concealed information test and to a lesser extent the directed lie test. No other details were provided.

Are there any novel or special procedures that are used there but not widely used elsewhere?

In response to suspected countermeasure use by examinees where they have denied doing so, a Concealed Information Peak of Tension test has been administered on two occasions. This was done in an attempt to test whether the examinee did possess knowledge of George Maschke and / or Doug William's countermeasure manuals, "How to Sting the Polygraph" and "The Lie Behind the Lie Detector".

The critical item (i.e. the author's name or manual title) was randomly allocated into a sequence of five other non-critical, but similar items. The items were not reviewed with the subject. Random allocation was used to enable statistical calculation of the likelihood of obtaining a false positive outcome.

Dr Gordon Barland advised examiners in relation to conducting the testing, stating that to his knowledge it was a novel use of this procedure.

Testing "Techniques"

What are the major techniques formats that are now used? (Comparison question technique, concealed info, relevant / irrelevant)

PCSOT utilises primarily the comparison question technique, with the exception of the CITs outlined above. Dr Ashcroft informs me that he generally uses the concealed information test and directed lie tests. . Private examiners, Mr Burgess and Mr Heseldine inform me that they exclusively use the comparison question technique.

Provide examples cases / applications of each of the major formats and for each provide a samples question list in a common criminal investigation (e.g.: theft or serious crime)

To my knowledge the first UK polygraph test used in a police investigation with a criminal suspect was conducted in June 2005 for a large police force in the south of England. This enquiry involved a missing woman whose partner was suspected of her murder. The polygraph procedure devised for this investigation was a specific issue (DODPI Zone) to test for whether the suspect had any involvement the direct in woman's disappearance, in addition to a series of searching peaks-of-tension (POT) tests. The searching POT tests were used to assist identify whether the suspect was concealing any information about important aspects of the case, including a possible body deposition site using maps.

This police force has highlighted its intention to consider using polygraphy in similar cases involving missing people, where murder is suspected.

Instrumentation

What brand & type of instrumentation is in use? Are the instruments in use primarily analogue or computerized?

Instruments used in the UK are computerised, mainly Lafayette LX 4000. A Limestone instrument is also being trialled.

Is there any emerging technology e.g.: new instruments, new sensors being used or under development?

No information.

Legal Issues

Have the courts in your country considered the admissibility of polygraph testing results? Have such results been admitted as evidence? There have been no legal test cases involving polygraphy in the UK. To date, there have been two cases where judges have allowed the use of polygraphy to form part of an assessment of sexual risk within child protection hearings.

In both cases the judge presiding in the case allowed the polygraph examination results to be included and presented as part of the risk assessment, after all relevant parties had provided consent. In both cases the subjects failed the test without making disclosure and the information was used to inform the risk assessment process without challenge. To date, no-one has testified in a court of law in the UK in relation to polygraph examination results.

Dr Ashcroft indicated that he was unable to disclose information about testifying in relation to polygraph.

Are confessions that occur after polygraph testing admissible in court?

However within No. PCSOT, disclosures (i.e. confessions) made by the offender during the course of an exam are addressed by the offender's probation officer. The process is designed so that the offender discusses their disclosures and thus confirms the contents of the polygraph examination report. The information then is treated as disclosure to the probation officer and can be used as evidence, in the same way offender disclosure is treated when given in any other type of context (i.e. in treatment group, in supervision, to hostel staff).

There have been cases where information which was originally disclosed in a polygraph exam has been passed on by probation staff to police, who have then used the disclosure (confirmed to the probation officer) as evidence to secure further courtimposed sanctions, such as sex offender prevention orders, exclusion zones, the imposition of additional supervision conditions or breaches of order resulting in recall to prison.

Are there important legal decisions that have occurred in your country that have a

direct or indirect bearing on polygraph testing? If so, please identify these cases.

No.

Political and Social Issues

Is polygraph testing publicly accepted in your country? Are there any television shows on which polygraph testing is featured?

Polygraphy is generally not well accepted in the UK. In fact, although there is a general familiarity with the stereotype of what a "lie detector" is, the term "polygraph" remains an unfamiliar term to many people.

In recent years, the general public have been exposed to polygraph testing through two popular UK television programmes, where the question of a particular subject's veracity generally revolves around the issue of infidelity. A private examiner hired for one of these programmes was filmed using an analogue instrument to conduct a procedure which did not adhere to even the most basic polygraph protocols.

Whilst images of this type have obvious entertainment value for TV, they fail to promote the use of polygraphy as a serious and credible pursuit for investigating behaviour. Instead it tends to reinforce the use of any polygraph instrument as some kind of strange American gimmick.

What are the concerns that have been voiced by the public?

Whilst PCSOT in the UK has been reported upon in the national press at various times, there is no real forum for public debate of this issue.

By professional organisations / individuals?

Concerns have been raised by various professionals when research information has been disseminated via seminars or conferences. Whilst most support the potential utility of PCSOT, the greatest area of concern remains the error rate, specifically the likely false positive rate, which some people deem as "unacceptably high".

Some fears have also been expressed by professionals involved in treating and managing sex offenders that polygraphy may be used in a very punitive manner with a group of people are generally already treated in a punitive way. This concern relates to fear that polygraphy may become used as a type of "Magic Lasso". That is, blind confidence in the outcome of polygraph tests can result in professionals ascribing disproportionate prominence to this one source of information decisions when making about the management of offenders.

The British Psychological Society conducted another review of polygraphy, published in 2004, with broadly similar conclusions to the review published in 1986:

a) Polygraph can be accurate and useful in specific contexts, but concerns remain about error rates, specifically false positives.

b) Use of polygraphy in screening settings is not justifiable.

c) Use of polygraphy in clinical settings, specifically with sex offenders, has potential but has received too little research attention to date.

d) More quality research is needed in relation to all types of polygraph application, as well as other methods which may detect deception.

e) Concerns are raised about human rights and professional codes of conduct.

By political forces?

As part of extending the current PSCOT pilot, the government published the Management of Offenders and Sentencing Bill in January 2005, part of which sought to trial polygraph testing as a mandatory condition for sex offenders who received a custodial sentence in excess of 12 months and were then released from prison onto licence.

The Labour party were re-elected in the UK general election on the 5th May, 2005. Part of their law and order policy manifesto for reelection included trialling mandatory PSCOT. A timetable for further progress is not yet known, however this issue continues to be on the political agenda.

In response to press releases from the Labour government, opposition political parties have made various press statements expressing concern about the accuracy "of this new technology". Such is the adversarial nature of two party politics in the UK that opinions of this kind are unlikely to be based upon informed knowledge of the issues relevant to polygraphy. To date, there has been no debate between parties in relation to polygraphy.

Is it common to find that polygraph testing results in specific cases are reported in the media?

This has never occurred in the UK, with the exception of TV shows.

Problems / Issues

What are the major social / political / legal problems that examiners in your country are now facing?

Regulation of polygraphy is the single greatest problem faced by the polygraph community within the UK. This has been highlighted by examiners across the range of sectors.

Although there are very few practicing examiners, the lack of regulation currently allows any person in the UK to advertise and offer what they call "polygraph examinations", which is obviously problematic given that exams may not be conducted in a proper manner. This situation also leaves people who may pay privately for examinations without any recourse for complaint.

I have been made aware of one incident where a member of the public attempted to sue an examiner in order to recoup the cost of the exam. The court however indicated that they could not preside over the case because there was no precedent in the British legal system to enable the court to effectively evaluate the complaint.

At present, it is likely that the first piece of polygraph legislation will be presented

in another bill to parliament about mandating testing for sex offenders being released onto licence after serving a term of imprisonment. It is hoped that in conjunction with this initiative, the government legislates specifically to register examiners and identifies minimum requirements for training and supervision.

Are there "advanced" training seminars that are held in your country?

People conducting PCSOT tests have regular training / supervision provided by Professor Grubin and US-based trainers. These training seminars address a wide range of advanced training needs, including interviewing techniques, scoring procedures, dealing with countermeasures and mental health and medication issues. There are not other training seminars to my knowledge.

What are the advanced training needs? (Are there particular concerns that examiners face for which they feel advanced and specialized training would be useful? (Dealing with countermeasures etc)

One of the areas that PCSOT examiners face with regularity is testing men who have personality dysfunction. Given that literature identifies sex offenders as a population with a high incidence of personality disorder, specialised training about how this impacts upon a range of testing issues is vital. This will become more pertinent should mandatory testing be introduced.

Training in alternative (i.e. simplified), empirically validated test formats which can be used with different populations of examinee, such as those with learning disability is another area for further training.

What is the nature of media reporting on polygraph testing in your country? Is it generally positive / negative?

Media reporting about polygraphy is periodic and generally occurs in response to government press releases relating to PCSOT. So far it has generally been reported in a positive light.

Is there a lot of public interest?

This is difficult to ascertain.

What, if any, are the country-specific issues that you face?

The implementation of PCSOT in the probation service has been done in a rather more cautious manner compared to programmes in the USA. The Home Office and the National Probation Directorate have a number of restrictions upon the way the tests are carried out at present.

These differences in practice include:

• Polygraph exams are voluntary and not a condition of a court order. As such no sanctions can be imposed on the basis of an offender refusing to take an exam or if the offender fails an exam (actions can be taken upon the basis of disclosure, but only when the disclosures made to the polygraph examiner have also then been confirmed in probation supervision).

• Sex offenders are not specifically asked about "new" offences in maintenance exams. Relevant questions focus upon high risk behaviours instead (i.e. being alone with children, association with people who have children, but *not* sexual contact with children). It is intended to be used as a preventive measure, not as something to prosecute people with.

• Information for sexual history exams is gained verbally during the pre-test interview phase, rather than testing a pre-prepared booklet. This is primarily because current probation practice does not have the flexibility to facilitate this process. This is affected to some degree by the 'pilot' status of polygraphy, in that probation areas are unlikely to devote resources for extra procedures for what is officially a time-limited, voluntary procedure.

The changes in practice from normal PCSOT procedures were put in place as the way of enabling polygraphy to be introduced within the criminal justice system in the UK. Generally it was seen as the strategy to ensure initial success of the pilot.

Whilst it can be argued that restrictions dilute the potential effectiveness of PCSOT in the UK, it remains the platform upon which future testing procedures with sex offenders will be based.

Given the voluntary, pilot nature of PCSOT at present, other important issues relating to this testing also remain undeveloped. The most obvious issue being the need to create standard policy about how to manage disclosure of unknown victims. An appropriate sanction for test failure is also an important issue, as a lack of consequences has been suggested as a link to increased rates of inconclusive test outcomes.

Use within the police forces / criminal investigations

A general lack of familiarity with polygraph combined with an absence of legal framework for it in the UK, has made introducing polygraph tests within police investigations more difficult. Using polygraph for this purpose is currently limited to individual police officers taking the initiative to organise for a suspect / criminal to be tested. There is no overall strategy or general support for criminal testing at present within any police force in the UK.

References

- British Psychological Society. (1986). Report of the working group on the use of the polygraph in criminal investigation and personnel screening. *Bulletin of the British Psychological Society*, 39, 81-94.
- British Psychological Society. (2004). A review of the current scientific status and fields of application of Polygraphic Deception Detection, Final report of the BPS working party 06/10/04. www.bps.co.uk

Grubin, D. & Madsen, L. (in press). Accuracy and utility of post-conviction polygraph testing of sex offenders. *British Journal of Psychiatry*

- Grubin, D. & Madsen, L. (2005). Lie detection and the polygraph: A historical review. Journal of Forensic Psychiatry and Psychology, 16, 357-369.
- Grubin, D., Madsen, L., Parsons, S., Sosnowski, D. & Warberg, B. (2004). A prospective study of the impact of polygraphy on high risk behaviors in adult sex offenders. *Sexual Abuse: A Journal of Research and Treatment*, 16(3), 209 222.
- House of Commons Select Employment Committee. (1984). The Implications for Industrial Relations and Employment of the Introduction of the Polygraph. http://www.bopcris.ac.uk/imgall/ref20386_1_1.html
- Madsen, L. & Grubin, D. (Submitted 2006). The accuracy of the polygraphy. Sexual Abuse: A Journal of Research and Treatment
- Madsen, L., Parsons, S. & Grubin, D. (2006). A comparison of DSM-IV Personality disorders and the Five Factor Model in a sample of child molesters. *Journal of Personality and Individual Differences*.
- Madsen, L., Parsons, S. & Grubin, D. (2004). A preliminary study of the contribution of periodic polygraph testing to the treatment and supervision of sex offenders. *British Journal of Forensic Psychiatry and Psychology*, 15(4), 682 695.

Personal communication, Dr Keith Ashcroft, 2005

Personal communication, Professor Gisli Gudjonsson, 2005

Personal communication, Mr Guy Heseldine, 2005.

Personal communication SAP services Co., 2005.

- Wilcox, D. (2000). Application of the clinical polygraph examination to the assessment, treatment and monitoring of sex offenders. *Journal of Sexual Aggression, 5,* 134-152.
- Wilcox, D., Sosnowski, D & Middleton, D. (2000). Polygraphy and sex offenders. *Forensic Update*, 61, 20–25.

The Use and Benefits of the Photoelectric Plethysmograph in Polygraph Testing

Mark Handler and Donald J. Krapohl

Abstract

Improvements in polygraph decision accuracy can be obtained by adding new physiological data channels to the existing polygraph. One well researched source of useful and independent physiological data is the vasomotor response, a form of vascular activity that is sensitive to activation of the sympathetic nervous system. The vasomotor response can be detected using an off-the-shelf sensor called the photoplethysmograph, and when scored with the other channels, adds diagnostic information to the polygraph decision process (Rovner 1986, Podlesny & Raskin 1978, Raskin & Hare 1978). The present paper sets out to provide a brief summary of the physiology, history, and research associated with the vasomotor response, and includes how-to recommendations for using the photoplethysmograph during polygraph examinations.

Introduction

"Great excitement is accompanied by sympathetic innervations which contract the small blood vessels, accelerate the heart rate and thus increase arterial pressure." So wrote Dr. Walter Cannon in 1915 to describe effects seen in humans during extreme pleasure, anger or fright (Cannon, 1915). Cannon and colleagues had learned that during arousal of the sympathetic branch of the autonomic nervous system, a redistribution of blood was occurring to prepare the body for the danger. This "flight or fight" reaction, as it has been called, has since been used to describe the physiological manifestations that occur in response to a threatening stimulus.

The Vasomotor Response

Using the plethysmograph to measure relative differences in autonomic arousal has a number of aspects that make it an attractive additional channel in polygraphy. The vasomotor response appears to be resistant to habituation and passage of time. Vasomotor responses have been shown to outlast electrodermal and heart rate changes (Brown, 1967). Also, the neural system that underlies the vasomotor response is largely independent from those that drive the other response systems recorded with the polygraph. This provides a non-redundant source of diagnostic information on which to base scoring decisions. Finally, like electrodermal activity, the vasomotor response is driven almost

purely by the sympathetic branch of the autonomic nervous system. That is, there is no competing parasympathetic contribution to attenuate or conflict the reaction.

In the human body, arteries and smaller arterioles carry oxygenated blood away from the heart to serve the body tissues. The arteries are large vessels that have a small amount of smooth muscle and a larger amount of collagen and elastin fibers. Because they are so constructed, arteries can stretch and have a somewhat elastic quality as compared to the smaller diameter arterioles. The elastic nature of the arteries helps propel blood through the distribution system as they recoil following systolic contraction of the heart. The further from the heart, the smaller the diameter of the vessel carrying blood away becomes. There are additional differences in the construction of the vessels in the periphery. Those smaller diameter vessels in the periphery have a higher concentration of smooth muscle than the larger diameter vessels closer to the heart. These small arteries are called arterioles and they play an important part in managing systemic blood pressure.

The arterioles maintain their diameter based on the amount of sympathetic innervation they are receiving at any given time. They receive a constant sympathetic innervation that is sometimes referred to as vasomotor tone. Because of this, vasodilatation is achieved by a reduction in innervation. Vasoconstriction results from sympathetic nervous system activation of the smooth muscles in the arterioles. Vasomotor tone can also be influenced by hormonal mechanisms.

As stated earlier, the vasomotor system is primarily innervated by the sympathetic branch of the autonomic nervous system. An increase in sympathetic activation can result in either vasoconstriction or vasodilatation. The net effect depends upon whether the receptors of that particular vascular bed are sensitive to alpha or beta adrenergic binding.

There are two major classes of adrenergic receptors: alpha and beta. Body organs that are sensitive to norepinephrine or epinephrine display one or both receptors. For the most part, when norepinephrine or epinephrine binds to alpha receptors, it stimulates that receptor. When norepinephrine or epinephrine binds to a beta receptor, it is inhibitory.

There are exceptions to this as there are several sub-types of each receptor (Marieb, 1999).

The blood vessels in the periphery with (skin) where we monitor the plethysmograph are alpha receptors. This means they are stimulated by norepinephrine or epinephrine. This results in a constriction of the vessel and an overall rise in systemic blood pressure. This constriction also results in a reduction of the amount of blood that passes through the arterioles with each beat of the heart.

Measurements

The term "plethysmograph" is derived from the Greek term "plethymos" which means "an enlargement" or "fullness." The plethysmograph can be used to measure relative changes in the total blood volume in a body segment. The plethysmograph can also be used to measure the rapidly occurring relative changes in pulse blood volume. In psychophysiology, the use of plethysmograph has a history as long as the monitoring of the electrical properties associated with the skin (Brown 1967). Early investigators (Fere, 1888; Sticker, 1897; Vigoroux, 1879) associated changes in the electrical properties of the skin with changes in blood flow. It was Darrow (1929) who conducted an experiment that produced evidence to suggest otherwise. Darrow found that while a common stimulus would cause a change in electrical properties and blood volume, the two were independently aroused. Hertzman (1938) was one of the first scientists to experiment with the photoplethysmograph in the United States.

While there are a variety of methods for measuring relative changes in blood volume and pulse volume, the three most commonly used are (a) changes recorded using a strain gauge, (b) impedance changes and (c) photoelectric changes. It is the third technique (photoelectric) that we use in modern polygraphy to measure the relative changes in pulse volume associated with the vasomotor response, usually at the distal phalange of one of the examinee's fingers (Figure 1).



Figure 1. Photograph of the Lafayette Instrument Company photoplethysmograph. Reprinted with the permission of the Lafayette Instrument Company.

The photoelectric plethysmograph (usually shortened to "photoplethysmograph") uses a photo-sensitive cell to measure light reflected or passed through the tissue segment where the monitor is placed. The light produced by the source is in the infrared range (7000 to 9000 Angstroms). The light in this frequency range is scattered by red blood cells so the amount of light reaching the photo sensor is related to the amount of blood through which it passed before reaching the

sensor. The sensor can be placed on the same side of the monitoring site as the light, in which case the amount of light reflected back is measured. Alternatively, the sensor may be placed on the opposite side of the monitoring site as the light source in which case light transmitted through the site is measured by the sensor. The former is less limited in site locations than is the latter. When a system is used in which light is transmitted through the tissue, the sites are generally limited to places such as the earlobe or finger. Stern (1974) demonstrated that there is very little change in the pulse volume in the earlobe as a function of psychological stimuli. During presentations of nude slides, accident views, loud noises and mental gymnastics very little observable decreases in pulse amplitude were observed in Stern's experiment.

Most photoplethysmographs produced by modern manufacturers of polygraph equipment measure the pulse wave under the monitoring site. The rising front of the pulse waveform depicts systole and the falling portion is diastole. The pulse amplitude is the measurement of the height of the tracing from the trough to the highest peak. The plethysmograph graphically displays the continuous pulse amplitude along with any changes that occur in the pulse volume at the monitoring site. While it is possible to monitor the slower relative change in total blood volume, this is not done as often.

The majority of photoplethysmographs available with standard polygraphs are made for durability, ease of use, and stability of placement. A clamp-like device houses both the light source and the sensor, and the assembly is placed on the finger or the thumb (see Figure 2). The sensor is designed to be comfortable. Examiners should begin each examination with an acquaintance test to ensure that the pulse wave is recorded at the proper amplitude (about 3/4 inch) and that the tracing is not erratic. Some experimentation and adjustment may be required to find the optimal recording site on The sensor is sensitive to the hand. movement, so examinees must keep their hands still during testing. After use, the sensor may be cleaned with a dry cotton cloth by gently wiping the inside area. The photoplethysmograph component requires no special handling beyond what is normal for standard computerized polygraph equipment.



Figure 2. Diagram of a photoplethysmograph with a reflective photo sensor on the same side of the monitoring site as the LED light source. Reprinted with the permission of Lafayette Instrument Company.

Implementation and Measurement Considerations

There are several external factors that can affect photoplethysmograph recordings. The most likely is ambient temperature. One of the primary purposes of blood flow to the skin is thermoregulation. If a person is cold, there will likely be increased vasoconstriction in the subject's tonic or baseline measurements. This may impede or limit the subject's ability to mount a sympathetic response to a threatening stimulus.

Conversely, if the ambient temperature is too high, the subject will experience some degree of vasodilatation as the body attempts to increase blood flow to the skin and lower the body temperature. Extreme heat will system's constrain the vasodilatation The heat factor is one of the potential. reasons it is important to manufacture the photoplethysmograph with a light source that does not produce a significant amount of heat. Heat produced by the light source could confound the photoplethysmograph readings by causing vasodilation under the light.

A second factor that could interfere with obtaining optimal recordings is the postural location of the monitoring site. If the monitoring site is substantially below heart level, the venous pressure will be raised and may result in decreased pulse amplitude. Conversely, if the monitoring site is raised, the distention of the vein may result in an increase in the pulse amplitude. It is recommended the polygraph examination be conducted in a chair designed for polygraph comfortable testing and at а room temperature.

For the peripheral vasomotor activity, the relative strength of the reactions is assessed by comparing the reduction in pulse amplitude. Numerical scores are based on the duration and degree of amplitude reduction. Scores may be assigned when there is no difference in amplitude decrease but a discernable difference in duration of the reactions. scores from Anv the photoplethysmograph are included in the total score for that spot. The inclusion of the photoplethysmograph in the polygraph testing does not change the cutting scores.



Figure 3. Example of the photoplethysmograph and electrodermal channels displayed simultaneously.





Figure 4. Second example of the photoplethysmograph and electrodermal channels displayed simultaneously.

Research

photoplethysmograph The was incorporated into the Utah probable-lie test (PLT) by at least the 1970s, and has been studied extensively in subsequent research (Honts, Raskin, & Kircher, 1985; Horowitz, Kircher, Honts & Raskin, 1999; Kircher & Raskin, 1988; Podlesny, Raskin & Barland, 1976; Raskin & Hare, 1978; Rovner, 1986). The Utah Scoring System is based on physiological phenomena that have been proven to be valid and reliable indicators of sympathetic arousal. Scorers using the Utah Scoring system exceed 0.90 for interrater reliability (Bell, Raskin, Honts & Kircher, The accuracy of the Utah Scoring 1999). system from several analog studies averaged 90% (Bell, Raskin, Honts & Kircher, 1999). The results of field studies using the Utah Scoring system are consistent with analog study results (Bell, Raskin, Honts & Kircher, 1999). These were all done with the photoplethysmograph incorporated as an integral part of the testing.

The relative contribution of the photoplethysmograph to polygraph decision accuracy has been the subject of previous investigation. As with the other polygraph channels, most score assignments were 0 or +/-1. Bell et al. noted in scoring finger pulse amplitude (recorded with the photoplethysmograph) scores of 0 were assigned about 70% of the time and scores of +/-1 about 30%, (Bell, Raskin, Honts & Kircher, 1999). The current authors obtained the score sheets from 100 laboratory-based examinations in which five charts were conducted per exam (Kircher & Raskin, 1988). Half of the subjects had been programmed truthful and the other half deceptive. Α reanalysis of those data was conducted and we measured the frequency with which a score was assigned to the plethysmograph tracing. This provided a sample size of 1500 numerical scores (3 relevant questions X 5 charts X 100 subjects). This survey revealed that approximately 61% of the plethysmograph numerical scores were 0, and 31% of the time non-zero score was assigned. The а proportions of positive scores and negative scores were not significantly different from one another (z = 0.35, ns). Of the 229 positive scores, 224 were +1 and 5 were scored +2. Of the 236 negative scores, 231 were -1 and 5 were -2.

The contribution of each polygraph data channel toward the total score from this data set is shown in Figure 5. On average the electrodermal response was the strongest contributor, with 63% of the score totals coming single from this channel. Cardiovascular and the plethysmograph each added another 15%, with the pneumograph taking up the remaining 7%. In view of the strong showing for the photoplethysmograph, it is evident that polygraph decision accuracy could benefit from the addition of the plethysmograph data.

meta-analysis In а of validated polygraph techniques, the Utah PLT has been shown to have one of the highest overall accuracy rates (91% excluding inconclusive tests) and the one of the lowest rates of inconclusive outcomes (12%) (Krapohl, 2006). There are many aspects of the Utah PLT that undoubtedly contribute to the high validity and reliability the test enjoys, and among them is the incorporation of the photoplethysmograph.



Figure 5. Average total scores for four polygraph data channels across five charts.

The photoplethysmograph provides an additional index of sympathetic arousal that is independent from the other polygraph channels. The underlying physiological principles of the photoplethysmograph are scientifically based and have been demonstrated to be reliable in laboratory research (Kircher & Raskin, 1988).

Summary

One of the most straightforward methods to increase polygraph decision accuracy, and reduce inconclusive results, is to add independent physiological data channels to the current polygraph. Of the possible physiological phenomena available, the best researched is the vasomotor response, which can be recorded using the non-intrusive photoplethysmograph. When scoring the photoplethysmograph channel, the diagnostic features are the degree of pulse amplitude reduction, followed by the duration of the reduction (Bell et al., 1999; Handler 2006). The scores from the photoplethysmograph channel are treated in a similar fashion to the scores from the traditional data channels. Polygraph decision rules are not altered by the inclusion of photoplethysmograph scores. It is important to note that, though the data from the photoplethysmograph may at times have a similar appearance to the cardiovascular channel, the two channels are differently innervated, and cannot replace one another in the polygraph.

Acknowledgments

The authors are grateful to Chris Fausett and Dr. Tim Weber for their thoughtful reviews and comments to an earlier draft of this paper. The views expressed in this article are solely those of the authors, and do not necessarily represent those of the Montgomery County Texas Sheriff's Office, the DoD or the US government. The authors and the APA grant unlimited use and duplication rights to any polygraph school accredited by the American Polygraph Association or the American Association of Police Polygraphists for initial and continuing education of polygraph examiners. Questions and comments welcome are at polygraphmark@sbcglobal.net

References

- Bell, B.G., Raskin, D.C., Honts, C.R., & Kircher, J.C. (1999). The Utah numerical scoring system. *Polygraph*, 28(1), 1-9.
- Brown, C.C. (1967). *Methods in Psychophysiology*. Baltimore, MD: The Williams & Wilkins Company.
- Cannon, W.B. (1915). Bodily Changes in Pain, Hunger, Fear and Rage. New York, NY: D. Appleton & Company.
- Darrow, C.W. (1929). The galvanic skin reflex and finger volume changes. American Journal of Physiology, 88, 219-229.
- Fere, C. (1888). Note on changes in electrical resistance under the effect of sensory stimulation and emotion. *Comptes Rendus des Seances de la Societe de Biologie* (Series 9), 5, 217-219.
- Handler, M.D. (2006). Utah Probable Lie Comparison Test. Polygraph, 35(3), 139-148.
- Honts, C.R., Raskin, D.C., & Kircher, J.C. (1985). Effects of socialization on the physiological detection of deception. *Journal of Research in Personality*, 19(4), 373-385.
- Horowitz, S.W., Kircher, J.C., Honts, C.R., & Raskin, D.C. (1997). The role of comparison questions in physiological detection of deception. *Psychophysiology*, *34*(1), 108-115.

- Hertzman, A.B. (1938). The blood supply of various skin areas as estimated by the photoelectric plethysmograph. *American Journal of Physiology*, 124:328.
- Kircher, J.C., & Raskin, D.C. (1988). Human versus computerized evaluations of polygraph data in a laboratory setting, *Journal of Applied Psychology*, 73(2), 291-302.
- Krapohl. D.J. (2006). Validated polygraph techniques. Polygraph 35, 149-155.
- Marieb, E.N. (1999). Human Anatomy & Physiology. 5th Edition, Benjamin Cummings Publisher
- Podlesny J.A., & Raskin, D.C. (1978). Effectiveness of techniques and physiological measures in the detection of deception. *Psychophysiology*, *15*, 344-359.
- Podlesny, J.A., Raskin, D.C., & Barland, G.H. (1976). Effectiveness of techniques and physiological measures in the detection of deception. Report No. 76-5. National Institute of Law Enforcement and Justice, Law Enforcement Assistance Administration, U.S. Department of Justice (Contract No. 75-NI-99-0001) University of Utah.
- Rovner, L.I. (1986). The accuracy of physiological detection of deception for subjects with prior knowledge. *Polygraph*, 15(1), 1-39.
- Raskin, D.C., & Hare, R.D. (1978). Psychopathy and the detection of deception in a prison population. *Psychophysiology*, 15, 126-136.
- Stern, R.M. (1974). Earlobe photoplethysmography. Psychophysiology, 11, 73-75.
- Sticker, H. (1897). Wiener klin. Rundschau, xi, 497.
- Vigoroux, R. (1879). Sur le role de la resistance electrique des tissues dans l'electro-diagnostic. *Comptes Rendes Societe de Biologie, 31,* 336-339.

History of the Backster Zone Comparison Technique

Cleve Backster

The recent article published in the 2006 volume 35, no. 3 issue of the journal, Polygraph, titled Validated Polygraph Techniques, authored by Donald Krapohl, concluded that the Utah Zone Comparison Technique and the Federal Zone Comparison Technique indicate the highest accuracy (without inconclusives) of the various techniques evaluated. Conspicuous by its absence was any mention (not even a reference or footnote) of The Backster Zone Comparison Technique. This oversight has prompted me to outline an accurate history of my technique, which, minus the Backster name, constitutes the major components of the two techniques rated highest in the Krapohl article.

Regarding the Utah Zone Comparison Technique, it should be noted that one of the involved examiners, David Raskin, received his basic polygraph examiner resident training from a Backster School of Lie Detection course conducted from September 10th to October 20th, 1973. David Raskin was awarded his final certificate of overall course completion in November 1974. The other involved polygraph examiner, Charles Honts, received his basic polygraph examiner resident training from a Backster School of Lie Detection course conducted from September 13th to October 23rd, 1976. Charles Honts was issued his final certificate of overall course completion in January 1978. Although the Backster name has been eliminated, the more important aspects of the original Backster Zone Comparison Technique continue to remain intact.

The following historical facts may be of interest regarding the Backster Zone Comparison Technique. It should be noted that I have been continuously active in the polygraph profession for the past 58 years. I initiated the Central Intelligence Agency Polygraph Program in 1948. During the period of 1958 to 1965, I was reappointed Chairman of the Research and Instrumentation Committee of the Academy for Scientific Interrogation, which was then the largest professional polygraph organization. This was prior to a 1966 consolidation with smaller groups, establishing the American Polygraph Association.

During 1960 and 1961, I completed the consolidation, refinement and expansion of the then existing polygraph techniques and created the term zone comparison. I titled the technique The Backster Zone Comparison Technique. A series of standardized polygraph examiner notepacks were published. These were designed to guide the polygraph examiner in the use of the technique. The first two notepacks were spirit duplication editions. The first widely distributed four-color notepack edition was commercially printed in 1963. A revised four-color edition was printed in 1969. As a historical note, this notepack was reproduced in color in a 1970 textbook entitled "Investigation and Preparation of Criminal Cases—Federal and State", authored by F. Lee Bailey and Henry Rothblatt. Sample case entries, based on an actual case, were made on the notepack by the late Robert Henson. Black and white editions of this notepack have been in active use during the past 27 years.

Regarding the history of the Federal Zone Comparison technique, the article entitled Fort Gordon Lie Detector Course Updated; Originally appeared in The Military Police Journal early in 1963 and was reprinted in December 1963 in The Academy for Scientific Interrogation Polygraph and Interrogation section of Law and Order magazine¹.

¹The full text of the 1963 article entitled "Fort Gordon Lie Detector Course Updated" and additional information relating to other referenced sources, are posted on the Backster School of Lie Detection website (www.backster.net).

Military Police School, established the Lie Detection Transition Course (19-N-F-15). The purpose of this course is to provide examiners with post graduate training in methods such as the BZC, developed since their graduation A quote directly from this article states the following: "Recognizing that this advanced technique (Backster Zone Comparison Technique) greatly reduces inconclusive test results and increases examiner proficiency, the commandant, U.S. Army from the Lie Detection Course."

The publication entitled *The Accuracy and Utility of Polygraph Testing*, was published by the Department of Defense in 1984. On page 31 the origin of what was later called the Federal Zone Comparison Technique is clearly established. When the U.S. Army Military Police Polygraph School was elevated to Department of Defense status in 1986, the Backster name was deleted from the technique designation.

Page one of a 1990 DoDPI ten page lesson plan summary sheet titled FSC 501 Control Question Techniques - Zone Comparison Test - clearly identifies the source of the DoDPI Zone Comparison Test, stating it "has changed little from the original Backster testing technique of 1961".

My use of field reports concerning the success of the Backster Zone Comparison Technique, rather than laboratory studies, is illustrated by an article authored by the then Superintendent of the Virginia State Police. This was published in the American Polygraph Association July-August 1998 Newsletter.

In 2006 the American Polygraph Association Board of Directors established the Cleve Backster Award, which is to be presented annually honoring an individual, or group, that advances the polygraph profession through tireless dedication to standardization of polygraph principles and practices. The 2006 recipient of this award was the American Association of Police Polygraphists.

In addition to Donald Krapohl's omission of the Backster Zone Comparison Test as a validated polygraph technique, a more recent item of concern has surfaced in the form of a 67 page document, titled Test Data Analysis: DoDPI Numerical Evaluation Scoring System (dated August 2006). The entire document includes numerous aspects primarily associated with the Backster Zone Comparison Technique, yet the Backster name has been systematically omitted throughout, even in the document glossary and reference sections.

As Director of an APA accredited school, having just completed it's 171st basic polygraph examiner course, the Krapohl article would seem to indicate that I have been teaching a technique for more than forty- five years that lacks validation. It is hopeful that my article's more realistic assessment of the history of the Zone Comparison Technique will provide some needed clarification.

A Personal View of Donald Krapohl's "Validated Polygraph Techniques"

Nathan J. Gordon¹

This article appearing in our journal appears to indicate the only validated techniques used in our profession are those used by DoDPI or DoDPI personnel (Federal ZCT, TES, RI, Reid, CIT and MGQT) and the Ph.D.'s (Raskin, et al).

I find it ironic that the MGQT which I believe by DoDPI's own research had such a high false-positive rate it defies the definition of validation, and the R/I technique which is from primitive times and certainly has little or no place in specific issue examinations makes the grade, yet the Backster ZCT does not.

The Backster ZCT is the foundation of several zones, including Federal, Utah, Air Force MGQT, Matte and the Academy's IZCT.

Interestingly, from my personal perspective the weakest of these techniques is the Federal Zone. It is taught and used mainly with a third relevant question of a secondary nature (resulting in a mixed or multi issue question test rather than the better focused single issue test) and has a misplaced symptomatic question (Q8) which breaks the flow of reaction and relief that has already been established in the preceding sequence of comparison and relevant questions.

I also find it scary that the article implies that all of the other zone techniques are not validated procedures, even though our APA accredited schools have been teaching them for years, and even though there are published articles on their validation! The IZCT for example has both a field and laboratory study showing extremely high rates of accuracy (A field validity study of the IZCT, Polygraph, 29 (3); IZCT accuracy with scoring algorithms, Physiology and Behavior, 87; and Brain mapping of deception and truth telling ecologically about an valid situation: MR imaging and Functional polygraph investigation experience, Radiology, 238 (2).

I think a good analogy is if you take a Mercury Marquis off the showroom floor and subject it to full ASTM standard testing, and determine it to be reliable, valid, economical and well engineered, you would be remiss not to mention that it was a Ford engine, a Ford transmission, a Ford electrical system and was engineered by Ford!

When you validate that Mercury Marquis, by proxy, you are validating the Ford vehicle. You can choose to ignore that the Mercury is the product of Ford's engineering genius and intellectual property and argue the researchers were never even in a Ford, or you can give it its due recognition! What do you think the right thing is to do?

Our profession should be moving toward inclusion, rather than exclusion of the best techniques. Without question the "best practices" standard in our profession is the Zone Comparison Technique given to us by Mr. Backster! That is the foundation and all other zone variations are built upon it!

¹Director, Academy for Scientific Investigative Training

Critical Analysis of Krapohl's Validated Polygraph Techniques

James Allan Matte

The omission of the Backster Zone Comparison Technique from Krapohl's list of validated polygraph techniques (Krapohl, 2006) was both а surprise and а disappointment, inasmuch as the Backster ZCT served as the foundation for all zone comparison techniques, some of which have been either validated and replicated or validated but not replicated by published research. Krapohl's list includes only those techniques that have been purportedly validated and replicated by research not necessarily replicated by a separate entity, i.e. Test for Espionage and Sabotage, citing DoDPI Research Division Staff (1995a & 1995b). Other techniques such as the Federal Zone Comparison Technique (aka Army ZCT) and the Reid Technique were cited as validated with the use of reliability studies rather than validation studies (Blackwell, 1998; Horvath, 1977; Horvath, 1988; Jayne, 1990; Krapohl, 2005; Yankee, Powell, & Newland, 1985).

It should be noted that the blind scoring of polygraph charts, determines the reliability of the scoring method and chart interpretation skill of the polygraphist(s), rather than the validity of the polygraph technique. The intense interrogation of a polvgraph examinee during the pretest interview and stimulation of the relevant questions between chart collection would surely produce a false positive result that would make the test invalid, but the blind scoring of those charts by a dozen examiners would undoubtedly result in a unanimous verdict of deception that would establish the reliability of the chart interpretation and scoring method, but not its validity. An index of validity shows the degree to which a test measures what it purports to measure, when compared with accepted criteria, hence the validity of a polygraph examination depends on whether it can accurately determine truth and deception.

It is therefore surprising that the Army Modified General Question Technique (MGQT) was listed as a validated technique when it was only 25 percent accurate in the identification of the truthful examinee and the overall accuracy of the MGQT was only 61 percent. Hence the MGQT is not a valid technique for identifying the truthful examinee and its overall accuracy fails to meet the minimum degree of accuracy (90%) required by ASTM standards.

This brings us to the method of validating a polygraph technique which has been divided into two types of studies; the field study which uses real-life cases, and the laboratory (analog) study which uses a mockcrime paradigm that usually employs a number of college students or military recruits. The problem with laboratory studies is that the subject sample is not representative of the diverse population found in real-life. More importantly, laboratory subjects lack the most essential emotions present in real-life examinations such as the guilty subject's fear of detection, the innocent subject's fear of error, also known as the Othello Error, and the innocent subject's anger, all of which can cause an autonomic response (Bongard, Pfeiffer, Al'Absi, Hodapp & Linnenkemper, 1997; Ekman, 1985; Matte, 1978; Matte & Reuss, 1989; National Research Council, 2003). Furthermore, mock paradigms do not contain the vital case intensity present in field cases, nor do its subjects experience the psychological stress of real-life polygraph subjects that can produce false positive results and the strong motivation for the guilty to employ countermeasures that require mental effort which research has demonstrated can autonomic response cause an undistinguishable from the deception syndrome (Boiten, 1993; Bongard et al., 1997; Fokkema, 1999; Ring, Carrol, Willemsen, Cooke, Ferraro & Drayson, 1999; Winzer, Ring, Carroll, Willemsen, Drayson & Kendall, Therefore, the validation process 1999). should employ field research studies that do not suffer the serious inadequacies of the laboratory studies. In that regard, Krapohl cites six *laboratory* studies to validate the Utah Zone Comparison Technique, not one field study (Honts, Hodes & Raskin, 1985; Honts, Raskin & Kircher, 1987; Honts, Raskin, & Kircher, 1994; Kircher & Raskin, 1988; Raskin & Hare, 1978).

Finally, Krapohl cited Horvath's 1977 study of the reliability of polygraphists reading sets of charts when they are blind to the case facts and the original polygraphist's decisions which were based on tests conducted with the Arther Technique to validate the Reid The aforesaid study states "All Technique. polygraph records were taken from examinations conducted bv field-trained examiners according to a standard controlquestion technique (Reid & Inbau, 1966) into which the variations advocated by Arther, (1969b) had been incorporated." Therefore, using that rationale, the Backster Zone Comparison Technique can thus be validated by published validity studies of derivative zone comparison techniques (Bersh, 19691; Gordon, Fleisher, Morsie, Habib & Salah, 2000; Gordon, Mohamed, Faro, Platek, Ahmad, & Williams, 2005; Matte, et al., 1989; Raskin, et al., 1978). Furthermore, Norman Ansley, former Chief of the polygraph unit at the National Security Agency and Editor of Polugraph for more than a quarter of a "The Validity century. published and Reliability of Polygraph Decisions in Real Cases" wherein he listed four field studies that validated the Backster Zone Comparison Technique (Arellano, 1990; Elaad & Shahar, 1985; Putnam, 1983; Widacki, 1982) with an average accuracy of 97 percent.

This raises the issue of acceptable methods of establishing ground truth in field cases. Some researchers hold that confessions can be used as ground truth but or lawyer panels convictions are not acceptable, which is contradicted by published research (Huff, Rattner & Sagarin, 1986), which reflected the rate of wrongful

convictions (irrespective of polygraph evidence) in the United States at one-half percent (0.5%), which is an acceptable error rate in the scientific community. False confessions are a distinct reality in the real world and there is no evidence to indicate that its error rate is less than half of one percent. Convictions are judgments rendered by a judge or jury who has less information upon which to base their decision to convict than that provided a panel of several lawyers who had access to entire case files containing information, some of which would not be legally admissible but nevertheless useful. Thus, the establishment of ground truth by a panel of lawyers having access to the complete file would be at least of equal value and accuracy as the decision of a judge or jury.³

However, we should not forget the value and importance of empirical data. In 1961, the United States Army Military Police School, which trained all federal agencies in the use of the polygraph technique, adopted the Backster Zone Comparison Technique. This technique was included in its polygraph training program for several decades². In fact, a study by Robert Brisentine (1974) consisted of statistics collected on U.S. Army C.I.D. polygraph examinations during the calendar The quantity of polygraph vear 1972. examinations in 1972 was more than three times the number conducted during 1966. In all the examinations conducted by the U.S Army C.I.D. worldwide, there were no examinations in which the polygraphist reached a finding of truthful and the subject was later determined to be guilty of the crime. Furthermore, there was no instance in which a subject was found not guilty by a court after the polygraphist reached a finding of deception. The U.S. Army's standardization

¹The Bersh study was subsequently corrected by Robert A. Brisentine, Jr., who carried out the data collection, to accurately reflect that all Zone Comparison tests were numerically scored and the decisions as to truth or deception were based solely on the test scores. See Pages 112-113, Matte (1996).

²See Bersh study (1969) for rationale in the use of lawyer panel.

³DoDPI 2005 lesson plan includes this statement "Cleve Backster designed the Zone Comparison Test (ZCT), and variations of Backster's technique were subsequently adopted by USAMPS in 1961. As taught by DoDPI, the ZCT and You Phase ZCT Psychophysiological Detection of Deception (PDD) formats have changed little from the original Backster techniques."

of polygraph examination procedures and quantification of physiological data in chart analysis (Backster ZCT), permitting one polygraphist to read another polygraphist's charts, resulted in a quality control that reduced the Army's yearly final inconclusive rate (after retest of initial inconclusives) from 5 percent to 1.8 percent. The U. S. Army's Quality Control unit made the ultimate and final decision regarding truth or deception. This type of empirical data simply cannot be ignored and surely surpasses laboratory studies involving a few dozen students in a mock paradigm.

Interestingly, in 1996, Charles R. Honts who later joined the Raskin, Kircher team, stated to this author that they never promoted any particular questions sequence. Their "collective view was that a control question test was a control question test." Dr. Honts saw no scientific reason to prefer one order of control, relevant, and neutral question over another, hence saw no reason to promote any one formulation. However the most common format in their published research was a three-relevant question test with three Backster type (exclusive) control questions. This view supports the contention of this author that all published validity studies and empirical data that support zone comparison techniques can be used to validate its source, the Backster Zone Comparison Technique and all of its published derivatives, i.e., Federal ZCT, Utah ZCT, Quadri-Track ZCT, and Integrated ZCT. At the present time, there are two field validation studies in progress that will be completed in 2007; that will further validate the Backster ZCT and the Quadri-Track ZCT.

Lastly and most important is the fact that Krapohl sent a letter dated 3 May 2002, subject: Validated Techniques, to the Board of Directors, American Polygraph Association, wherein he listed and included the Backster Single-Issue Zone Comparison Technique amongst the same polygraph techniques listed in his recent 2006 APA article, "that have had a body of replicated and peer-reviewed research that uses the name of the technique." The Backster ZCT has not changed since 2002 and indeed not since 1983 when an adjustment in the distribution of numerical cut-offs was published, which begs the question as to Krapohl's reason and motive for excluding the Backster ZCT from his 2006 APA article on validated polygraph techniques.

Unfortunately, Krapohl's article has already caused Backster and his school unwarranted harm when one accredited polygraph school recently told students that the Backster Zone Comparison technique was a non-validated polygraph technique (personal communication, Adams, 2006). Furthermore, the contents of the article presented by its author at the 2006 APA Annual Seminar in Las Vegas, Nevada, was also used as the source of a statement made by a speaker at the Latin-American Polygraph Association (ALP) seminar in San Andres, Columbia, which included representatives of several Latin-American countries, that the Backster Zone Comparison technique had not been validated, which caused much consternation amongst the seminar attendees (personal communication, O'Malley, 2006). Had Krapohl's article been a work of fiction, a befitting title would be "The Assassination of a Legend." The American Polygraph Association has recently instituted the Cleve Backster Award in recognition of Backster's lifetime achievement and contribution to the polygraph profession through polygraph technique standardization that has withstood the test of time, usage and study that forms the basis for all zone comparison techniques.

References

- Adams, G. C. (2006, December 5). Personal conversation with J. A. Matte regarding statement pertaining to the validity of the Backster ZCT made by an accredited polygraph school to its students.
- Arellano, L. R. (1990). The polygraph examination of "Spanish speaking subjects. *Polygraph*, 19(2), 155-156. (abstract).

Arther, R. O. (1969). Irrelevant questions. Journal of Polygraph Studies, 3(6), 3-4. (b).

- Bersh, P. J. (1969). A validation study of polygraph examiner judgments. *Journal of Applied Psychology*, 53(5), 399-403.
- Blackwell, N. J. (1998). PolyScore 3.3 and psychophysiological detection of deception examiner rates of accuracy when scoring examination from actual criminal investigations. Polygraph, 28(2), 149-175.
- Boiten, F. (1993). Component analysis of task-related respiratory patterns. International Journal of Psychophysiology, 15, 91-104.
- Bongard, S., Pfeiffer, J. S., Al'Absi, M., Hodapp, V., & Linnenkemper, G. (1997). Cardiovascular responses during effortful active coping and acute experience of anger in women. *Psychophysiology*, 34, 429-466.
- Brisentine, R. A. (1974). Polygraph Research in the U.S. Army. Polygraph, 3(1), 66-80.
- Ekman, P. (1985). Telling Lies A How-To-Guide for all Those Who Want to Detect Lies. Berkley Books, New York: N.Y.
- Elaad, E., & Shahar, E. (1985). Polygraph field validity. Polygraph, 14(3), 217-223.
- Fokkema, D. S. (1999). The psychobiology of strained breathing and its cardiovascular implications. A functional system review. *Psychophysiology*, *36*(2), 164-175.
- Gordon, N. J., Fleisher, W. L., Morsie, H., Habib, W., & Salah, K. (2000). A field validity study of the Integrated Zone Comparison Technique. *Polygraph*, *29*(3), 220-225.
- Gordon, N. J., Mohamed, F. B., Faro, S. H., Platek, S. M., Ahmad, H., & Williams, J. M. (2005). Integrated zone comparison polygraph technique accuracy with scoring algorithms. *Physiology and Behavior*, 87(2), 251-254.
- Honts, C.R. (1996, February 9). Letter of reply to letter of inquiry from J.A. Matte dated 13 January 1996.
- Honts, C. R., Hodes, R. I., & Raskin, D. C. (1985). Effects of physical countermeasures on the physiological detection of deception. *Journal of Applied Psychology*, 70(1), 177-187.
- Honts, C. R., Raskin, D. C., & Kircher, J. C. (1987). Effects of physical countermeasures and their electromyographic detection during polygraph tests for deception. *Journal of Psychophysiology*, 1(3), 241-247.
- Honts, C. R., Raskin, D. C., & Kircher, J. C. (1994). Mental and physical countermeasures reduce the accuracy of polygraph tests. *Journal of Applied Psychology*, 79(2), 252-259.
- Horvath, F. S. (1977). The effect of selected variables on interpretation of polygraph records. *Journal* of Applied Psychology, 62(2), 127-136.
- Horvath, F. S. (1988). The utility of control questions and the effects of two control question types in field polygraph techniques. *Journal of Police Science and Administration*, *16*(3), 198-209.
- Huff, C. R., Rattner, A., & Sagarin, E. (1986). Guilty Until Proven Innocent: Wrongful Conviction and Public Policy. *Crime & Delinquency*, 52(4), 518-544.

- Jayne, B.C. (1990). Contributions of physiological recordings in the polygraph technique. *Polygraph*, 19(2), 105-117.
- Kircher, J. C., & Raskin, D. C. (1988). Human versus computerized evaluations of polygraph data in a laboratory setting. *Journal of Applied Psychology*, 73(2), 291-302.
- Krapohl, D. J. (2002, May 3). *Subject: Validated techniques*. Report to: Board of Directors, American Polygraph Association.
- Krapohl, D. J. (2005a). Polygraph decision rules for evidentiary and paired-testing (Marin Protocol) applications. *Polygraph*, *34*(3), 184-192.
- Krapohl, D. J. (2006). Validated Polygraph Techniques. Polygraph, 35(3), 149-155.
- Matte, J. A. (1978). Polygraph Quadri-Zone Comparison Technique. Polygraph, 7(4) 266-280.
- Matte, J. A. (1996). Forensic Psychophysiology Using The Polygraph: Scientific Truth Verification Lie Detection. J.A.M. Publications: Williamsville, New York
- Matte, J. A., & Reuss, R. M. (1989). A field validation study of the Quadri-Zone Comparison Technique. *Polygraph*, 18(4), 187-202.
- National Research Council. (2003). *The Polygraph and Lie detection*. Committee to Review the Scientific Evidence on the Polygraph. Division of Behavioral and Social Sciences and Education, Washington, DC: The National Academies Press.
- O'Malley, T. V. (2006, Dec 6). Telephone conversation with J. A. Matte regarding statement by speaker at the Latin American Polygraph Association seminar in October 2006 at San Andres, Columbia.
- Putnam, R. L. (1983). *Field accuracy of polygraph in the law enforcement environment*. Unpublished manuscript. American Polygraph Association archives.
- Raskin, D. C., & Hare, R. D. (1978). Psychopathy and detection of deception in prison in a prison population. *Psychophysiology*, *15*, 126-136.
- Reid, J. E., & Inbau, F. E. (1966). *Truth and deception: The polygraph ("lie-detector") technique.* Williams & Wilkins: Baltimore, MD.
- Research Division Staff. (1995a). A comparison of psychophysiological detection of deception accuracy rates obtained using the counterintelligence scope polygraph and the test for espionage and sabotage question formats. *Polygraph*, *26*(2), 79-106.
- Research Division Staff. (1995b). Pschophysiological detection of deception accuracy rates obtained using the test for espionage and sabotage. *Polygraph*, *27*(1), 68-73.
- Ring, C., Carrol, D., Willemsen, G., Cooke, J., Ferraro, A., & Drayson, M. (1999). Secretory Immunoglobulin A and Cardiovascular Activity During Mental Arithmetic and Paced Breathing. *Psychophysiology*, 36(5), 602-609.
- Widacki, J. (1982). Analiza przestanek diagnozowoania w. badanich poligraficznych (The analysis of diagnostic premises in polygraph examinations) Uniwersytetu Slaskeigo, Katowice. [text in polish].

- Winzer, A., Ring, C., Carroll, D., Willemsen, G., Drayson, M., & Kendall, M. (1999). Secretory immunoglobulin A and cardiovascular reactions to mental arithmetic, and cold pressor, and exercise. Effects of Beta-Adrenergic blockade. *Psychophysiology*, 36(5), 591-601.
- Yankee, W.J., Powell, J.M., III, & Newland, R. (1985). An investigation of the accuracy and consistency of polygraph chart interpretation by inexperienced and experienced examiners. *Polygraph*, 14(2), 108-117.

Rejoinder to Criticisms by Messrs Backster, Gordon and Matte: A closer look at the evidence¹

Donald J. Krapohl

Introduction

The confidence that can be placed in scientific inquiries depends in large part whether it can withstand peer criticisms. Messrs Backster, Gordon and Matte have each offered different criticism to my article titled Validated Polygraph Techniques (2006), to which I offer answers in this article. The goal is to clarify those areas that might be mistaken, and to compare the criticisms and my article against the published research.

Backster's Critique

Mr. Backster's critique focused almost entirely upon the history of his illustrious career. It is widely known, even without his reminder article, that he has had an abiding impact on the profession. To this there can be no debate. Backster's contribution assures his place of prominence in the history of Backster's article mentions polygraphy. testimonials and the APA award named for him. The article does not mention any new published data, re-analyses, flaws in my methodology, or a list of published articles that should have been included in the Validated Polygraph Techniques paper, those issues which I would be prepared to rebut. Because Backster's paper regarding his achievements is accurate, and he did not find fault with my methodology or data, there is nothing of consequence I would dispute. I acknowledge his critique and let it stand unchallenged.

Gordon's Critique

Gordon characterizes his own article as a personal view, and is more of a commentary than the typical critique. He correctly points out that the Backster Zone Comparison Technique (ZCT) is a predecessor of all subsequent ZCTs. Gordon follows with his personal objections to the Federal ZCT. Gordon expresses concern that APA schools have been teaching techniques for many years that might be called unvalidated. He cites research supporting his own technique, the Integrated ZCT, and finally offers an "automobile analogy" that by inference validates the Backster ZCT.

Gordon relates that the Validated Polygraph Techniques article makes it appear that only those techniques used by DoDPI personnel or Raskin adherents are validated. This is untrue, but even if it were true it would not change the status of the published research. The Validated Polygraph Techniques article was a straightforward summary of the techniques for which there had been more than one published research report. If the research meeting the criteria were available, the technique was listed. If there were not the sufficient quality or quantity of research on a technique, it was not included. The final list had nothing to do with who used the techniques.

Gordon finds irony in the listing of the Army MGQT and the RI Screening Test in the Validated Polygraph Techniques paper, though the Backster ZCT was not included also. It is true that the overall accuracy of the Army MGQT was not high, though greater than chance. Nevertheless, it had been the subject of repeated published validation research, and completeness dictated that it be included in the article regardless of its modest performance. The RI Screening test also received Gordon's attention, noting that it is not suited for specific-issue examinations. I would submit that there is general agreement on his point.

¹For educational and accuracy purposes, the author will arrange to make copies of the research reports cited in this article available to APA members upon request. Comments and reprint requests should be sent to dkrapohl@aol.com. The views expressed in this article are solely those of the author, and do not necessarily represent those of the Department of Defense, the US Government or the APA.

To Gordon's observations on the Federal ZCT, I concede that he may be entirely correct. The use of a third relevant question that covers secondary involvement may degrade the accuracy of the technique. The placement of a symptomatic question in position 8 may break the flow of reaction and There are no data to support these relief. positions, however. Based on the same lack of evidence any number of claims can be made. One could easily argue the opposite of Gordon's claims with equal vigor. It would be pointless, however, until the necessary research has provided a glimpse of the real truth. Because the research is currently silent on this issue, there is good reason for authors to reserve judgment.

To Gordon's concern that the APA schools may have been teaching unvalidated techniques for years, we are in agreement. There has never been a requirement for APA schools to teach validated methodologies, and the current proliferation of techniques is a direct consequence. While is it not fair to hold polygraph schools accountable for doing research to validate methods that they teach, I would contend that there is an obligation to read the APA's publications to find out what has been validated. To his credit, Gordon has taken the initiative to gather data on his Integrated ZCT. His article in *Polygraph* (Gordon, Fleisher, Morsie, Habib, & Khaled, 2000) compared polygraph decisions with confessions and judicial decisions. While confessions could arguably be considered truth under certain conditions. ground agreement with judicial decisions is an assessment of reliability between judges and polygraph examiners, and not considered a reliable criterion for ground truth. Unfortunately, in his data analysis Gordon did not disentangle the two types of confirmations to reveal the portion that was exclusively validity. It was not possible to determine how much of his analysis was validity and how much was reliability, and therefore the study was not included for consideration the Validated Polygraph Techniques article.

The second citation offered by Gordon is an unambiguous validity study, conducted in a laboratory under realistic conditions and good scientific controls (Gordon, Mohamed, Faro, Platek, Ahmad, & Williams, 2005). The

accuracy reported for the Integrated ZCT was 100%, without inconclusives, for the following analytical systems: ASIT Polygraph Suite, the Objective Scoring System (OSS)and PolyScore5.5. There was one inconclusive for ASIT Polygraph Suite, two for OSS (misreported as three), and three for PolyScore 5.5. These results are impressive, and provide the partial foundation for estimates of validity for the IZT. The only shortcoming of consequence was the sample size, with a total of only 11 subjects in the entire study. Samples of this size are usually considered pilot data rather than being entire polygraph studies in themselves. Such a small sample does not permit any type of meaningful statistical analyses and has virtually no power to generalize. The error in the Validated Polygraph Techniques article was that it did not establish a minimum sample size for study selection. Based on that oversight a study with even a single subject could have met the selection criteria. In updates of the Validated Polygraph Techniques article it is my intention to set a minimum of 10 subjects in each condition (i.e., deception and truthfulness), understanding that it could be argued with justification that even this number may be inadequate.

A third study was reported by Gordon, published in Radiology (Mohamed, Faro, Gordon, Platek, Ahmad, & Williams, 2006). That paper shows identical dates, number of subjects, and coauthors to the article reported previously. Both papers involved testing with a functional MRI (fMRI) device in addition to the polygraph. Because fMRI studies are expensive to conduct, it seemed more probable that both papers were reporting on the same data rather than there having been two fMRI studies conducted. It was for this reason it was not considered a separate study. Mr. Gordon (personal communication) subsequently advised that the two reports were of the same study.

Regarding Gordon's "automobile analogy," it poses a novel perspective on the field of polygraphy. To encapsulate Gordon's argument, if one brand of automobile has parts in common with another brand of automobile, validating one is validating them both. By implication, if some form of ZCT has been validated, all forms of ZCT have been validated.

Gordon's argument fits in well with a proposal the Validated Polygraph in Techniques paper, that the emphasis on Validated Polygraph Techniques may be misplaced. There is value in validating the principles (car parts in the "automobile analogy") rather than the techniques (the whole car). If we know, for example, that comparison questions should be placed immediately before relevant questions as has been shown empirically, then this should be the principle used by all techniques. Doing that one thing does not make the test valid, but ignoring this rule would be expected to set a lower cap on its potential accuracy. Scientifically speaking, it can be said that the condition is necessary, but not sufficient. Similarly, using unproven and disproven principles in the polygraph technique (unnecessary or counterproductive car parts) such as unvalidated scoring procedures, unproven technical questions, too few charts, and arbitrary decision rules, can compromise the validity of the technique. Therefore, they should be avoided. Many of the scientifically supported principles are found in the Validated Polygraph Techniques article. From these, and others to be discovered in future research, it is possible to devise techniques that will stand up to validation research. Techniques that ignore these principles are destined for lower accuracy. While some may wish it otherwise, the adaptive response to new research discoveries is to adjust one's technique.

Disagreements between schools of thought in polygraphy are common knowledge, and the contestants have not always based their positions on solid evidence. I direct the reader's attention to the longstanding debates among the Keeler-Backster-Arther-Reid (and others) schools. where each claimed superiority over competing methods. Data were scarce, but writers who did offer evidence typically cited research conducted by himself, research that invariably showed that his technique produced perfect or near-perfect accuracy. Some of this same research is cited even today. This provides a convenient segue to discuss one of the most protracted problems in polygraph research: advocacy research.

Advocacy research is known to many fields (think tobacco industry scientists). As might be supposed, this type of research often tends to produce highly favorable results for the interests of the advocate. These studies are conducted less for the furthering of science than for the implicit purpose of advancing the interest of the party conducting the research. Perhaps not surprisingly, the conclusions of advocacy research are rarely confirmed by independent research.

We are not immune to advocacy research in polygraphy. Consider the following examples of the validity of techniques reported by individuals who created the technique:

Technique: Arther Technique Creator: Richard O. Arther Creator's research findings: 99% accurate without inconclusives Reference: Arther & Arther (1999) Independent research findings: None

Technique: Guilty Knowledge Test (Concealed Information Test) Creator: David Lykken Creator's research: 96% - 100% accuracy Reference: Lykken (1959, 1960) Independent research findings: Average 80% accuracy (MacLaren, 2001)

Technique: Integrated Zone Comparison Technique Creator: Nathan Gordon Creator's research findings: 99.5% - 100% accuracy without inconclusives References: Gordon, Fleisher, Morsie. Habib, & Salah (2000); Gordon, Mohamed, Faro, Platek, Ahmad, & Williams (2005) Independent research findings: None

Technique: Quadri-Track Creator: James Matte Creator's research findings: 100% accuracy without inconclusives Reference: Matte & Reuss (1989) Independent research findings: None

In polygraphy a persistent problem is that there are few avenues for validity research. Those individuals with techniques requiring assessment are almost always left to their own resources. As seen in the previous list, validity figures from creator-conducted studies tend to be quite spectacular, and because there is no independent confirmation, claims of exceptional accuracy are usually tendered as the final answer. I was unsuccessful in locating a single published study conducted by anyone with his own comparison question technique that had an accuracy less than 99%. Given that the techniques listed above depart from one another in significant, even dramatic ways, it is nothing less than wondrous that they should converge on accuracies within 1% of each other and of perfection.

These results are in sharp contrast to the meta-analysis conducted by the NRC the (2003)which estimated accuracy for percentage comparison question techniques in the field in the high 80s. One source of variance between the NRC and the studies cited above is the relationship between the researcher and the technique: the highest accuracies are reserved for those techniques researched by their creators.

Is there a lesson here? Consider one of the possible implications. Taken to its logicalbut-absurd conclusion, such a positive relationship should encourage every polygraph examiner to create and research his own technique, thereby assuring that the entire field of polygraphy will have at least a 99% accuracy. This tongue-in-cheek suggestion is offered simply to make a point. There should be a measure of caution exercised when interpreting the meaning of advocacy research when independent confirmation is lacking, and especially when the advocacy research reports exceptional accuracies that promote the interests of the advocate. As Aristotle observed: To give a satisfactory decision as to the truth it is necessary to be rather an arbitrator than a party to the dispute.

Matte's Critique

The criticisms offered by Matte cite research suggesting flaws in the selection of cases in the Validated Polygraph Techniques article. As will be made clear later in this rejoinder, a careful reading of the original article would show that many of Matte's criticisms are already answered. For the benefit of addressing Matte's criticisms, I have taken the liberty of copying the selection criteria from the original Validated Polygraph Techniques article for the convenience of reference for the present purposes. The selection criteria were:

- 1. The research had to be published in full.
- 2. The research had to be replicated.
- 3. The published polygraph technique had to be identified by name or reported in sufficient detail so that the correct name for the technique could be determined.
- 4. When multiple techniques were reported, accuracy figures had to be available for each technique.
- 5. The accuracy figures had to be broken out separately for truthful and deceptive cases.
- 6. Ground truth criteria must have been independent of the polygraph results.
- 7. The testing and scoring technique must have been representative of field practices.
- 8. Field cases must have been randomly selected, or with laboratory studies, subjects must have been randomly assigned to either deception or non-deception conditions.
- 9. The formulation of decisions of deception or truthfulness on individual cases could not consider the results of other examinations on the same crime.
- 10. For laboratory data, programmed countermeasure cases were excluded.

Matte offers four field studies that purportedly validate the Backster ZCT: Arellano, 1990; Elaad and Schahar, 1985; Putnam, 1983; Widacki, 1982. Obviously, if these papers met the criteria in the Validated Polygraph Techniques article, they would support the validation of the Backster ZCT. Below is a discussion of the articles, and how they fared against the 10 selection criteria.

The Arellano paper (1990) is a field study, and was never published in full (criterion 1). There were 40 employees tested regarding thefts from their employers. Eighteen were called truthful. Confirmation of the truthful cases was claimed by the author, and confirmed only by the author stating that they were verified in his considered opinion. There is no other explanation given. Due to the circumstances under which this, or other field studies are conducted confirmation of all or even most NDI cases is doubtful. Because the confirmation of the truthful cases was highly suspect, it was my view that criterion 6 had not been met. In addition to these substantive shortcomings, then-APA Editor Norman Ansley may have chosen not to publish the article due to Arellano's unconventional statistical treatment of his The Discussion section of his paper data. describes the novel mathematical approach as follows:

> I am not going to talk about numbers here as I believe that talking about percentages is for fools. This is a matter of personal opinion and as such I do realize I am open for criticism. So be it. I will not debate my critics on whether they are fools or not.

Because the Arellano paper failed to meet criteria 1 and 6, it was not considered for the Validated Polygraph Techniques article. The suggestion that it should have been included is incompatible with the facts.

In the Elaad and Schahar (1985) research they reviewed all polygraph cases having confirmation for the years 1973 and 1974 for the Scientific Interrogation Unit of the Israeli Police. Confirmation criteria included judicial opinions, a problem previously discussed. However, even if the confirmations were indisputable the article clearly states that the cases were conducted using both the Reid and Backster techniques (p 218). A more careful reading of the Elaad and Schahar article will reveal that results were not broken out for each technique (criterion 4). Finally, the authors acknowledged that the polygraph results could have influenced the confessions and convictions, and that the sample was not random (an intractable problem of all field research). Individually or in toto, these reasons would make it a mistake to consider the Elaad and Schahar paper a validation of the Backster ZCT.

A third article offered by Matte is research by Putnam (1983). In Putnam's paper he confirmed 285 examinations he had conducted over nearly four years using confessions as the sole criterion of ground truth. As with the Arellano paper, Putnam's article was never published (criterion 1). It also mixed Backster ZCT and the Modified General Question Test (MGQT) data together so that the accuracy of each technique alone is unknown (criterion 4). Because the Putnam article failed to meet these two selection criteria, his paper was not included in the Validated Polygraph Techniques article.

The fourth and last article cited by Matte to validate the Backster ZCT is by Widacki (1982). Dr. Widacki, a well respected polygraph expert in Poland, blind scored 38 confirmed field cases. Though the text is in Polish, portions have been translated into English including the abstract. Those portions do refer to the use of the Backster numerical analysis, but that the polygraph cases had been conducted using the Reid technique, not the Backster ZCT. Because of the combination of Reid testing and Backster scoring, it did not fit the definition of being representative of field practices (criterion 7). Even overlooking this inadequacy, the testing technique was not Backster's, and consequently of no value in validating the Backster ZCT.

Matte cites a report I'd made to the APA Board of Directors a year after leaving the editorship in which I had listed the Backster Technique as one of the validated methods. My mistaken conclusion was based on an error that Matte has repeated in his effort to bolster his own position: the Ansley (1990) literature summary. Both Matte and I (2002) failed to assess the value of the original For the Validated Polygraph research. Techniques paper I did not rely on that summary, but went to the original research reports which revealed the flaws in the four studies. It would therefore be an error from this point forward to use those studies to support the Backster Technique.

Matte also argues that some of the studies identified in the Validated Polygraph Techniques article were reliability studies, and not suited for estimates of validity. The studies in question used field cases in which blind examiners scored the charts. Confirmation criteria included confession. inculpatory evidence, exculpatory evidence, or it was found that items thought stolen were merely misplaced. The selection of the cases in the studies did not depend on whether the original examiner was correct, but what subsequent evidence showed regarding the truthfulness of the examinee. In some of the cases the original examiner was incorrect. Because the blind scoring decisions were compared to ground truth rather than original decisions, I would submit that they meet the definition of a validation study. Moreover. because the blind scorers did not have access to information other than the charts, factors such as case facts and examinee behavior could have no influence on the chart scoring. Therefore, for techniques that base decisions exclusively upon the polygraph tracings, the blind scoring of the test charts provides a purer index of the technique's power to produce accurate decisions than decisions made by the original examiner.

Matte's critique includes other sweeping statements about laboratory research that are incomplete or inaccurate. First, it implies that most laboratory research in the Validated Polygraph Techniques article was done with college students or military recruits. A careful reading of the original five Utah research will show that they recruited examinees through newspaper advertisements, and tested examinees from a very broad range of demographics. The TES research used an employment agency to find subjects from the surrounding area, and Podlesny and Truslow (1993) recruited from the community. There was only one study in the Validated Polygraph Techniques article that used college students (Correa & Adams, 1981) and none using military recruits. Matte's generalization fits poorly with the research included in the Validated Polygraph Techniques paper.

Matte rightly points out some of the shortcomings of laboratory research, a type of methodology used in studies included in the Validated Polygraph Techniques paper. The problems of generalization of laboratory research are well known. Matte fails to point out the many problems with field research, a method he prefers. Indeed, the National Research Council (NRC, 2003), which Matte cites to shore up his claim of the problems with lab research also noted that field methods are not without significant problems, too. Having selectively cited the NRC findings would leave readers with a mistaken impression that the NRC preferred field data, and an evenhanded treatment would have shown that neither lab nor field studies are considered better than the other by the NRC scientists.

Because both laboratory and field research have inherent weaknesses, it becomes important for this discussion whether one produces poorer accuracy than the other. Fortunately, we need not rely only on speculation as we have data to which we can turn. There have been two studies published in peer-reviewed journals that speak directly to the question of differences between laboratory and field polygraph data (Kircher, Raskin, & Honts, 1994; Pollina, Dollins, Senter, Krapohl, & Ryan, 2004). In both studies there were differences in the profile of responses. That is, the response intensities among physiological channels differed to some degree between the field and laboratory conditions. However, classification accuracy deceivers and truthtellers was of not significantly different from one another. In other words, the decision accuracy between lab and field data was equivalent. Therefore, it would appear that laboratory studies can provide an estimate of polygraph decision accuracy that maps well onto those from field studies. Claims to the contrary run afoul with the published research, and the time has come to retire this old chestnut. Competently conducted laboratory research is as valuable and produces equivalent accuracy competently conducted field research.

The usefulness of laboratory analogs should come as good news for the polygraph field. Consider the situation otherwise: our profession would find itself in the awkward position of claiming that the polygraph is highly accurate except when scientists attempt to study it under carefully controlled conditions. This is a claim often heard from those who profess the validity of phenomena as varied as clairvoyance, water witching, and voice stress analysis. Fortunately, with the converging research findings we can lay to rest the flawed supposition regarding the unsuitability of a well-conducted laboratory paradigm to validate the polygraph.

Matte's critique makes much that DoDPI's instruction manual refers to the Backster technique as the foundation of the Federal ZCT, and that there is little that has changed. If Matte's position is correct, that DoDPI's ZCT is very similar to the Backster ZCT, it would make sense that the research on the federal ZCT would generalize to the Backster ZCT. There is a major obstacle to that conclusion, however. Backster has harshly criticized the Federal ZCT for decades for perceived problems that his ZCT does not To reconcile that the two ZCT share. highly similar approaches are while simultaneously continuing the longstanding argument that the federal system has unique flaws would require impressive mental legerdemain. I would side with Mr. Backster in his assertion that there are consequential differences between the two ZCTs. As to which technique is the better, this is unknowable until the Backster research is undertaken and reported. Returning to Mr. Gordon's automobile analogy, so far not all of the cars have been in the race, so it's too soon to say whether the one on the sidelines is the fastest. It may be Backster's, Matte's, Gordon's, DoDPI's, Utah's or an as-yet unpublished approach. One thing for certain is that some things of consequence have changed between the Backster ZCT and its descendent. Those differences include the scoring system, decision rules, number of charts, use of a "knowledge" question in position 10, and question rotation. The belief that these changes have no effect on validity relies on exceptional faith.

Finally, Matte cites personal communications that recounts third party statements that are purportedly traced to my presentations and publications as cause for harm to Mr. Backster and his school. This information thread may be difficult to follow, but by implication it indicates that my research summary led to a loss for Mr. Backster's business. If true, it is an unfortunate and unintended consequence of reporting the existing state of the published literature. It would be fair to state that I concur with the principle of setting aside economic interests when reporting research, and have always advocated following where the data led. At times my articles have supported the techniques developed by writers of the three critiques, and at other times they have not. At times my articles support the practices of the government, while at other times they have not. To consider personal interests when deciding what to report in scientific papers would fall under the discussion of advocacy research found earlier in this rejoinder.

Erratum

Perhaps this is the point for a fair disclosure. While most authors expend great effort to ensure accuracy in their manuscripts, errors inevitably are brought to their attention. Criticism, regardless of how one might feel about it, is essential to the scientific process. It is this critical review process that ensures science is self-correcting. I submitted the Validated Polygraph Techniques manuscript to the APA Editor in December 2005 where it underwent the editorial review process. After its publication it was brought to my attention (not by the three who provided critiques) that there were two studies that met all of the selection criteria but were not included in the article: Horowitz (1997) and Rovner (1986). These articles had failed to come up during my keyword search, but the responsibility for thoroughness lies with the author. For the purpose of thoroughness, the accuracy information for the Utah Probable-Lie Technique had to be recalculated. Below are the adjusted values, along with the complete list of citations. I regret any inconvenience this oversight might have caused.

Utah Probable-Lie Technique

Unweighted mean accuracy

Deceptive cases (N = 143): 91% correct without inconclusives. 13% inconclusive.

Truthful cases (N = 128): 89% correct without inconclusives. 10% inconclusive. Overall: 90% correct without inconclusives. 12% inconclusive.

Citations

- ¹ Honts, Hodes, & Raskin (1985).
- ¹ Honts, Raskin, & Kircher (1987).
- ¹ Honts, Raskin, & Kircher, J.C. (1994).
- ¹ Horowitz, Kircher, Honts, & Raskin (1997)
- ² Kircher, & Raskin, (1988).
- Raskin, & Hare, (1978).
- ¹ Rovner (1986).

¹ Programmed countermeasure cases excluded.

² Human scoring condition only.

Because of rounding some values may have changed as much as one percentage point from the previous values (Krapohl, 2006). Such a trivial adjustment supports the robustness of the Utah Probable-Lie Technique. These additional validation studies for the Utah Probable-Lie Technique bring the total to seven, more than twice the number of any other comparison-question technique. The new data did not change its first-place ranking among the assessed techniques.

Summary

critiques offered by Messrs The Backster, Gordon and Matte did not provide any justification for changing either the methodology nor the conclusions found in the Validated Polygraph Techniques article. Many of the concerns expressed in the critiques were answered in the original paper. It should be clear that the techniques examined and reported in the article were neither the APAapproved techniques nor а list of recommended techniques, but rather a review of the available literature that met specific criteria. Anyone using these criteria would have produced similar conclusions. The

exclusion of some techniques does not signify that they are invalid, only unvalidated. They will remain unvalidated until carefully conducted research is completed, ideally by parties with no personal interest in the outcome of the research. Examiners who prefer to use techniques that have a more sound scientific foundation may find the Validated Polygraph Techniques article useful. Examiners with other priorities may choose to ignore the article, or alternatively, search for evidence to support conclusions they already hold.

The two stated goals of the Validated Polygraph Techniques article were: "to inform polygraph examiners of the existing state of the field, and to encourage more research that could advance it." They are worthwhile goals, and I commend them to the profession.

Post Script

All three critiques agreed that Backster should be given credit for his contribution to the field. Mr. Backster has, indeed, given many things to modern polygraph practice. Because my article was a literature survey with specified criteria rather than an essay on the history and systems of polygraphy, many individuals who made enduring contributions to the field were not listed. I take a moment here to identify and honor those persons who in my view have made a lasting mark on the field irrespective of whether their techniques ultimately underwent scientific investigation. They are:

Richard O. Arther Cleve Backster Leonarde Keeler Lynn Marcy John Reid Dr. David Raskin Rev. Walter Summers

References

- Ansley, N. (1990). The validity and reliability of polygraph decisions in real cases. *Polygraph*, 19(3), 169-181
- Arellano, L. R. (1984). The polygraph examination of Spanish speaking subjects. Unpublished manuscript.

- Arther, D. O., & Arther, K. A. (1999). How the polygraph greatly assists attorneys. *The Journal of Polygraph Science*, 33(5).
- Correa, E. J., & Adams, H. E. (1981). The validity of the pre-employment polygraph examination and the effects of motivation. *Polygraph*, 10(3), 143-155.
- Elaad, E., & Shahar, E. (1985). Polygraph field validity. Polygraph, 14(3), 217-223.
- Gordon, N. J., Fleisher, W. L., Morsie, H., Habib, W., & Salah, K. (2000). A field validity study of the Integrated Zone Comparison Technique. *Polygraph*, *29*(3), 220-225.
- Gordon, N. J., Mohamed, F. B., Faro, S. H., Platek, S. M., Ahmad, H., & Williams, J. M. (2005). Integrated zone comparison polygraph technique accuracy with scoring algorithms. *Physiology* & *Behavior*, 87(2), 251-254.
- Honts, C. R., Hodes, R. L, & Raskin, D. C. (1985). Effects of physical countermeasures on the physiological detection of deception. *Journal of Applied Psychology*, 70(1), 177-187.
- Honts, C. R., Raskin, D. C., & Kircher, J. C. (1987). Effects of physical countermeasures and their electromyographic detection during polygraph tests for deception. *Journal of Psychophysiology*, 1(3), 241-247.
- Honts, C. R., Raskin, D. C., & Kircher, J. C. (1994). Mental and physical countermeasures reduce the accuracy of polygraph tests. *Journal of Applied Psychology*, 79(2), 252-259.
- Horowitz, S. W., Kircher, J. C., Honts, C. R., & Raskin, D. C. (1997). The role of comparison questions in physiological detection of deception. *Psychophysiology*, 34(1), 108-115.
- Kircher, J. C., & Raskin, D. C. (1988). Human versus computerized evaluations of polygraph data in a laboratory setting. *Journal of Applied Psychology*, 73(2), 291-302.
- Kircher, J. C., Raskin, D. C., & Honts, C. R. (1994). Generalizability of statistical classifiers for the detection of deception. *Psychophysiology*, *31*(S11).
- Krapohl, D. J. (2006). Validated polygraph techniques. Polygraph, 35(3), 149-155.
- Lykken, D. T. (1959). The GSR in the detection of guilt. *Journal of Applied Psychology*, 43(6), 385-388.
- Lykken, D. T. (1960). The validity of the guilty knowledge technique: The effects of faking. *Journal of Applied Psychology*, 44(4), 258-262.
- Matte, J. A., & Reuss, R. M. (1989). A field validation study of the quadri-zone comparison technique. *Polygraph*, 18(4), 187-202.
- Mohamed, F. B., Faro, S. H., Gordon, N. J., Platek, S. M., Ahmad, H., & Williams, J. M. (2006). Brain mapping of deception and truth telling about an ecologically valid situation: Functional MR imaging and polygraph investigation—Initial experience. *Radiology*, 238, 679-688
- National Research Council (2003). *The Polygraph and Lie Detection*. Committee to Review the Scientific Evidence on the Polygraph, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

- Podlesny, J. A., & Truslow, C. M. (1993). Validity of an expanded-issue (modified general question) polygraph technique in a simulated distributed-crime-roles context. *Journal of Applied Psychology*, 78(5), 788-797.
- Pollina, D. A., Dollins, A. B., Senter, S. M., Krapohl, D. J., & Ryan, A. H. (2004). A comparison of polygraph data obtained from individuals involved in mock crimes and actual criminal investigations. *Journal of Applied Psychology*, 89(6), 1099-1105.
- Putnam, R. L. (1983). Field accuracy of polygraph in the law enforcement environment. Unpublished manuscript.
- Raskin, D. C., & Hare, R. D. (1978). Psychopathy and detection of deception in prison in a prison population. *Psychophysiology*, 15, 126-136.
- Rovner, L. I. (1986). The accuracy of physiological detection of deception for subjects with prior knowledge. *Polygraph*, 15(1), 1-39
- Widacki, J. (1982). Analiza przestanek diagnozowania w badaniach poligraficznych (The analysis of diagnosis premises in polygraph examinations). Katowice, University of Slask. (Text in Polish, Abstract in English).

A Reply to Krapohl's Rejoinder to Criticism of his Article on Validated Polygraph Techniques

James Allan Matte

In his lengthy rejoinder, Mr. Krapohl attempts to address all of the comments and criticisms of his article on validated polygraph techniques (Krapohl 2006), but upon close examination of the facts, it can readily been seen that he missed several important points that address the issue of validity versus reliability and supportive research.

Krapohl lists ten requirements that must be met for a research study to qualify for validation. Requirements number six and eight are of particular interest to this discussion and are thus set forth below:

> 6. Ground truth criteria must have been independent of the polygraph results.

8. Field cases must have been randomly selected, or with laboratory studies, subjects must have been randomly assigned to either deception or non-deception conditions.

Let us first examine requirement number six. Under that criterion, confessions and judicial convictions, both of which are independent of polygraph results meet the standard for ground truth. Yet Krapohl omitted Nathan Gordon's Integrated Zone Comparison Technique (IZCT) from his list of validated polygraph techniques, stating that his field research study on the IZCT with the Egyptian government (Gordon, Fleisher, Morsie, Habib, & Salah, 2000) "compared polygraph decisions with confessions and judicial decisions." Krapohl further stated that "in his data analysis Gordon did not disentangle the two types of confirmations to reveal the portion that was exclusively validity."

First of all, there is a significant difference between judicial *decisions* and judicial *convictions*. Judicial decisions include both Guilty and Not Guilty verdicts. Guilty verdicts are in the category of convictions which require evidence of guilt beyond a reasonable doubt, whereas Not Guilty verdicts are often rendered due to a lack of sufficient evidence, lack of witnesses, legal technicalities such as violation of defendant's rights and other factors that the judicial system has in place to protect the innocent from wrongful convictions and in the process allows a significant percentage of guilty defendants to be found Not Guilty. On the other hand, Guilty verdicts have a very small percentage of wrongful convictions (0.5%) as indicated by research conducted by Huff, Rattner, and Therefore there is an Sagarin (1986). important distinction between judicial decisions and judicial convictions which Krapohl evidently failed to recognize.

Gordon's field study (2000) states "Among the 309 verified cases, 288 were confirmed by confession and 21 by judicial conviction. It should be noted that in the examinations confirmed by conviction, polygraph results played no part in the judicial decision." Furthermore, judicial convictions represented only 7.29% of the total confirmed cases, which is not a justifiable reason for disqualifying the study. But I would argue that even if half or more of the confirmed data base had been from judicial convictions, it would satisfy Krapohl's sixth standard regarding ground truth, and it would most certainly match the validity of confessions inasmuch as it has never been demonstrated that confessions enjoyed a lesser percentage of false confessions than the half of one percent (0.5%) wrongful convictions (Huff, et al 1986). This I had explained in my critical analysis of Krapohl's article. In his rejoinder he failed to acknowledge and discuss the cited research.

Krapohl's requirement number eight only requires that "Field cases must have been randomly selected." The mere random selection of cases does not satisfy the requirement for validation of a polygraph technique. All cases for a particular period of time, i.e. 2005 thru 2006, must be selected and from all of those cases, all confirmed cases are retrieved including false positives, false negatives and inconclusives. Also figures for both confirmed and unconfirmed cases must be provided in the study. In addition, it would be wise to report the average score per chart for each examinee in both confirmed and unconfirmed cases to refute adversaries' claim that the reactivity of examinees in the confirmed cases was substantially greater than those from the unconfirmed cases where the errors could allegedly be hidden. Hence, the mere selection of confirmed cases even when randomly selected does not accurately determine the accuracy and error rate of the original examiner against ground truth since the random selection from a pool of cases could miss several confirmed false positives, false negatives and also inconclusives.

Blind studies by examiners who score confirmed polygraph charts of examinations conducted by the original examiner, even when randomly selected, are reliability studies, not validity studies. Krapohl stated "Because the blind scoring decisions were compared to ground truth rather than original decisions. I would submit that they meet the definition of a validation study. Moreover. because the blind scorers did not have access to information other than the charts, factors such as case facts and examinee behavior could have no influence on the chart scoring." I would submit that it is expected that the blind scoring of charts would be from confirmed cases and the only thing it proves is that an independent examiner can reliably come to the same conclusion as the original examiner based solely on the analysis of the physiological data recorded on the confirmed polygraph charts. Algorithms were developed to provide reliability in the analysis of the physiological data collected from the examinee, but its consistent results do not provide evidence of the validity of the technique.

In his rejoinder, Krapohl never addresses the issue I raised regarding his use of Frank Horvath's 1977 study of the *reliability* of polygraphists reading sets of charts when they were blind to the case facts and the original polygraphist's decisions. These were based on tests conducted with the *Arther Technique* to validate the *Reid Technique*. As I stated in my critical analysis of his article on validated polygraph techniques, "using that rationale, the Backster Zone Comparison Technique can thus be validated by published validity studies of derivative zone comparison techniques (Bersh, 1969; Gordon, et al, 2000; Matte & Reuss, 1989; Raskin, Barland, & Podlesny, 1978; Raskin & Hare, 1978). But Krapohl was mute on that subject.

In the second part in item eight of Krapohl's standards. he states "with laboratory studies, subjects must have been randomly assigned to either deception or non deception conditions." In his rejoinder, Krapohl faults me for including only college students or military recruits in laboratory studies, and excluding examinees recruited through newspaper advertisements, employment agencies and the community, as if these other examinees, unlike those I mentioned, possessed those most essential emotions present in real-life examinations, such as the guilty subject's fear of detection, the innocent subject's fear of error, also known as the Othello Error, and the innocent subject's anger, all of which can cause an autonomic response. (Bongard, Pfeiffer, Al'Absi, Hodapp, & Linnenkemper, 1997; Ekman 1985; Matte, 1978; Matte & Reuss, 1989; National Research Council, 2003).

Krapohl cites two research studies (Kircher, Raskin, & Honts, 1994; and Pollina, Dollins, Senter, Krapohl & Ryan, 2004) which he states "speak directly to the question of differences between laboratory and field polygraph data." Krapohl admits that "the response intensities among physiological channels differed to some degree between the field and laboratory conditions. However classification accuracy of deceivers and truthtellers was not significantly different from one another." To the layman, this would appear to be a convincing argument for the However, the use of laboratory studies. reactivity of examinees in laboratory studies only goes to indicate that the examinee had demonstrated some fear of detection to his/her lie to the relevant or comparison questions. But in field cases involving real-life examinees suspected of having committed a real crime with punitive consequences, some innocent examinees will show significant reactions to the relevant questions due to their fear of error or anger, both of which are emotions that are most absent in laboratory studies. Those types of errors are classified as false positives and the percentage of false positive errors is significantly greater than false negatives. A good example of the effects of false positives was demonstrated in Krapohl's own article wherein he listed under validated polygraph techniques the Army Modified General Question Technique (MGQT) which was found have been 97% correct without to inconclusives in Deceptive cases, but only 25% correct without inconclusives in Truthful cases. Krapohl lumped the data from the DI and NDI cases together for an overall accuracy of 61% which enabled him to state "It is true that the overall accuracy of the Army MGQT was not high, though greater than chance."

I firmly believe that the accuracy for both the Deceptive and Truthful cases should attain a degree of accuracy well beyond chance and in the ninetieth percentile, thus should be reported separately. Since the literature on polygraph research acknowledges that false positives dominate the error rate in real-life polygraph examinations, it behooves researchers to conduct studies that address that issue which can only be resolved in field studies. The importance of having a polygraph technique that correctly identifies the innocent with at least a 90% rate of accuracy is consistent with our judicial system which requires proof beyond a reasonable doubt to convict a defendant. One famous jurist, Sir William Blackstone¹ went so far as to state "Better that nine guilty men go free than one innocent man be convicted." The polygraph profession should adopt the same doctrine as the medical profession that requires that they "do no harm."

Krapohl makes no mention of the value and importance of empirical data that I submitted in my critical analysis, namely Robert Brisentine's 1974 study and collection of statistics on U.S. Army C.I.D. polygraph examination during the calendar year 1972.

Furthermore, he fails to acknowledge that the U.S. Army C.I.D. and its successor DoDPI have been using Backster's You-Phase ZCT, a true single-issue test that DoDPI labeled the Bi-Zone Comparison Technique because it contained only two relevant questions as found in the original and current Backster ZCT. DoDPI's use of the Bi-Zone Test was limited in favor of their 3-Relevant Question ZCT which includes an evidentiary question that Backster has been objecting to for many years. Hence, Backster's criticism was directed at the Federal 3RQ ZCT, not its You-Phase (Bi-Zone) ZCT which Backster reminded them was a misnomer because this You-Phase had in fact three zones (Red. Green and Black). Therefore it does make sense that the long period of usage of the You-Phase ZCT by the Army and DoDPI plus their research on that technique should apply equally to the Backster ZCT.

There is no mention in Krapohl's rejoinder of the research by Bersh (1969) or Raskin, et al. (1978), which validates the Backster ZCT, nor is there any mention of the research study by Huff et al. (1986) which supports the use of judicial convictions in establishing ground truth. It appears that Krapohl simply ignores those research studies that contradict or do not support his position.

Finally, as I had indicated in my critical analysis of Krapohl's article on validated polygraph techniques, replication studies of initial research should be conducted by an independent and separate entity, preferably with the use of field studies. Interestingly, Krapohl listed seven laboratory studies that validated the Utah Probable Lie Technique (including Rovner, 1986 and Horowitz, Kircher, Honts, & Raskin, 1997), all of which were conducted at the University of Utah. There were no independent field studies validating the Utah PLT. Furthermore, there was no independent field replication of the validity study conducted on the Test for Espionage and Sabotage (Research Division

¹Sir William Blackstone fashioned his belief after this text from The Holy Bible in which Abraham questions whether God intends to kill the innocent along with the wicked when he destroys Sodom and Gomorrah; Genesis 18:26, And the LORD said, If I find in Sodom fifty righteous within the city, then I will spare all the place for their sakes. And he said, Oh let not the Lord be angry, and I will speak yet but this once: Peradventure ten shall be found there. And he said, I will not destroy it for ten's sake. Genesis 18:23-32 1.

Staff (1995a and 1995b), nor was there any independent field replication of the validity study on the Federal Zone Comparison Technique (Blackwell 1998; Krapohl, 2005; Yankee, Powell, & Newland 1985), all research having been conducted at DoDPI. In my opinion, the research standard for validating a polygraph technique should require the use of a field study that is replicated by another field study from an independent entity.

References

- Ben-Shakhar, G., & Elaad, E. (2003). The validity of psychophysiological detection of information with the Guilty Knowledge Test: A meta-analytic interview. *Journal of Applied Psychology*, 88, 131-151.
- Bersh, P. J. (1969). A validation study of polygraph examiner judgments. *Journal of Applied Psychology*, 53(5), 399-403.
- Blackwell, N. J. (1998). PolyScore 3.3 and psychophysiological detection of deception examiner rates of accuracy when scoring examination from actual criminal investigations. Polygraph, 28(2), 149-175.
- Bongard, S., Pfeiffer, J. S., Al'Absi, M., Hodapp, V., & Linnenkemper, G. (1997). Cardiovascular responses during effortful active coping and acute experience of anger in women. *Psychophysiology*, *34*, 429-466.
- Brisentine, R. A. (1974). Polygraph Research in the U.S. Army. Polygraph, 3(1), 66-80.
- Cook, E.W., III, & Turpin. G. (1997). Differentiating orienting, startle and defense responses: The role of affect and its implications for psychopathology. In P. J. Lang, R. F. Simons, & M. T. Balaban (eds.). Attention and orienting: Sensory and motivational processes (pp. 137-164). Hillsdale, NJ: Erlbaum.
- Ekman, P. (1985). Telling Lies A How-To-Guide for all Those Who Want to Detect Lies. Berkley Books, New York: N.Y.
- Gordon, N. J., Fleisher, W. L., Morsie, H., Habib, W., & Salah, K. (2000). A field validity study of the Integrated Zone Comparison Technique. *Polygraph*, *29*(3), 220-225.
- Guyton, A. C., & Hall, J. E. (2000). *Textbook of Medical Physiology*. Tenth Edition. W. B. Saunders Company: Philadelphia, PA.
- Horowitz, S. W., Kircher, J. C., Honts, C. R., & Raskin, D. C. (1997). The role of comparison questions in physiological detection of deception. *Psychophysiology*, 34(1), 108-115.
- Horvath, F. S. (1977). The effect of selected variables on interpretation of polygraph records. *Journal* of Applied Psychology, 62(2), 127-136.
- Huff, C. R., Rattner, A., & Sagarin, E. (1986). Guilty Until Proven Innocent: Wrongful Conviction and Public Policy. *Crime & Delinquency*, 52(4), 518-544.
- Kircher, J. C., Raskin, D. C., & Honts, C. R. (1994). Generalizability of statistical classifiers for the detection of deception. *Psychophysiology*, *31*(S11).
- Krapohl, D. J. (2005). Polygraph decision rules for evidentiary and paired-testing (Marin Protocol) applications. *Polygraph*, *34*(3), 184-192.

Krapohl, D. J. (2006). Validated Polygraph Techniques. Polygraph, 35(3), 149-155.

- Matte, J. A. (1978). Polygraph Quadri-Zone Comparison Technique. Polygraph, 7(4) 266-280.
- Matte, J. A. (1980). *The Art and Science of the Polygraph Technique*. Charles C. Thomas, Publisher: Springfield, Illinois.
- Matte, J. A., & Reuss, R. M. (1989). A field validation study of the Quadri-Zone Comparison Technique. *Polygraph*, 18(4), 187-202.
- National Research Council. (2003). *The Polygraph and Lie detection*. Committee to Review the Scientific Evidence on the Polygraph. Division of Behavioral and Social Sciences and Education, Washington, DC: The National Academies Press.
- Pollina, D. A., Dollins, A. B., Senter, S. M., Krapohl, D. J., & Ryan, A. H. (2004). A comparison of polygraph data obtained from individuals involved in mock crimes and actual criminal investigations. *Journal of Applied Psychology*, 89(6), 1099-1105.
- Research Division Staff. (1995a). A comparison of psychophysiological detection of deception accuracy rates obtained using the counterintelligence scope polygraph and the test for espionage and sabotage question formats. *Polygraph*, 26(2), 79-106.
- Research Division Staff. (1995b). Pschophysiological detection of deception accuracy rates obtained using the test for espionage and sabotage. *Polygraph*, 27(1), 68-73.
- Raskin, D. C., & Hare, R. D. (1978). Psychopathy and detection of deception in prison in a prison population. *Psychophysiology*, *15*, 126-136.
- Raskin, D. C., Barland, G. H., & Podlesny, J. A. (1978). Validity and Reliability of Detection of Deception. National Institute of Law Enforcement and Criminal Justice, Law Enforcement Assistance Administration, U. S. Department of Justice.
- Rovner, L. I. (1986). The accuracy of physiological detection of deception for subjects with prior knowledge. *Polygraph*, 15(1), 1-47.
- Verschuere, B., Crombez, G., De Clercq, A., & Koster, E. H. W. (May 2004). Autonomic and behavioral responding in concealed information: Differentiating orienting and defensive responses. *Psychophysiology*, 41(3), 461-466.
- Yankee, W.J., Powell, J.M., III, & Newland, R. (1985). An investigation of the accuracy and consistency of polygraph chart interpretation by inexperienced and experienced examiners. *Polygraph*, 14(2), 108-117.

Rejoinder to Criticisms by Matte: Closing Comments¹

Donald J. Krapohl

In his most recent rejoinder Mr. Matte has repeated some of his earlier criticisms. He has posited new reasons to extend the findings of research listed in the article Validated Polygraph Techniques (Krapohl, 2006) to the Backster Zone Comparison Technique (ZCT) while also offering new reasons why the research studies listed in the Validated Polygraph Techniques article are deficient. In this final comment I will make the case that some of Mr. Matte's criticisms may be correct, others not relevant, and that some cannot be reconciled with the current published science.

Matte has taken issue with my failure to acknowledge or discuss his cited research regarding false convictions. To recap Mr. Matte's point, in the Validated Polygraph Techniques article I had excluded one study by Gordon, Fleisher, Morsie, Habib, and Salah (2000) because a portion of their field sample consisted of cases where the ground truth was only agreement with judicial decisions, in this case, criminal convictions. The problem, according to Matte, is that there is published research showing clearly that false convictions are exceedingly rare, perhaps 0.5% (Huff, Rattner, & Sagarin, 1986). If the rate of false convictions is very low, the polygraph decisions that agree or disagree with those judicial convictions should be adequate to use for estimating polygraph validity. Matte suggests that not only would I be ignoring this important source of data, but that I may simply be reluctant to acknowledge evidence that challenges my perspective. To quote Matte:

> "...nor is there any mention of the research study by Huff

which supports the use of judicial convictions in establishing ground truth. It appears that Krapohl simply ignores those research studies that contradict or do not support his position."

There are two serious challenges to Matte's argument. First, the use of criminal convictions to validate the polygraph affords an incomplete picture that can lead to faulty conclusions regarding polygraph accuracy. For illustration, it may be helpful to conceptualize this problem in the form of a 2X2 matrix, with polygraph decisions across the top (DI and NDI) and judicial decisions in the left margin (guilty and not guilty). This produces four boxes, where the agreement between polygraph decisions and court decisions intersect (see Figure 1). There are two boxes that can be filled in with Matte's proposal: where DI decisions match criminal convictions, and where DI decisions disagree with criminal convictions. The other two boxes are unknown. Contrast the empty cells in this figure with those that result from traditional validity research, where the ground truth (both inculpatory and exculpatory) are compared with polygraph decisions (DI and NDI). This standard approach allows all cells to be filled, and thereby giving the complete answer, something that cannot be accomplished with only judicial convictions. The exclusive reliance on the Huff et al. (1986) criterion is inadequate. From this perspective alone it is seems reasonable to ignore Matte's position on judicial convictions. However, there is a more powerful reason relevant to the present discussion.

¹For educational and accuracy purposes, the author will arrange to make copies of the research reports cited in this article available to APA members upon request. Comments and reprint requests should be sent to dkrapohl@aol.com. The views expressed in this article are solely those of the author, and do not necessarily represent those of the Department of Defense, the US Government or the APA.

Polygraph Decisions

		DI	NDI	
Judicial	Guilty	99.50%	0.5%	
Decisions	Not Guilty	<u> </u>	<u>;</u> ;;	

Figure 1. Standard matrix used for calculating polygraph decision accuracy showing the problem with reliance on judicial convictions as a criterion.

The second shortcoming of Matte's assertion is more blatant. Consider again the argument offered by Matte: Gordon et al. (2000) supplemented their validity data with decisions that were compared to judicial convictions. Huff et al. (1986) had found judicial convictions to have a false positive rate of about 0.5%. Therefore, Gordon's use of judicial convictions was appropriately included as validity evidence.

The error: Matte's citation of Huff et al. (1986) relates to false convictions in US courts. The Gordon et al. (2000) article related to judicial convictions in *Equptian courts*. Unlike American courts, the foundation of the Egyptian legal system includes a combination of the Napoleonic Code and Islamic (Shariah) law. Because of dissimilar historical and cultural roots, the Egyptian legal system is markedly different from the US system, (i.e., prosecution for religious crimes.) After an exhaustive search of the EBSCO's comprehensive sociology research database, I was unsuccessful in locating any evidence that the false conviction rate in Egypt was similar to those of US courts. Indeed, I found no English language research on false convictions in Egypt at all. A thorough reading of Matte's oft-cited Huff et al paper certainly did not any samples of Egyptian data. reveal Therefore, the sole study Matte used to bolster his assertion had no relevance to the Gordon et al data at all. The error of the present author was not stating this fact in my previous rejoinder.

Matte's critique indicates that he disagrees with one of the criteria I used to select cases for the Validated Polygraph Techniques article. I had required random selection of field cases, whereas Matte argues that an exhaustive sample was better. In this case I would agree with Matte. Exhaustive samples can give better resolution on a number of factors that sampling may miss. I would only point out that this issue may only be an example between what is good and what is better. Exhaustive sampling will be better in most instances, but can be costly in time Random sampling may be and effort. adequate alternative so long as standard scientific practices are put into place. Ι cannot disagree with Matte's preference for exhaustive samples, and would recommend them whenever possible. I would not dismiss validity research that used defensible sampling procedures, however.

In his critique Matte appears to have missed an important point that I considered adequately explained regarding blind scoring data being used for validity studies. His last rejoinder states:

> I would submit that it is expected that the blind scoring of (field) charts would be from confirmed cases and the only thing it proves is that an independent examiner can reliably come to the same conclusion as the original examiner based solely on the analysis of the physiological data recorded on the confirmed polygraph charts.

In my previous rejoinder I had answered this way:

The studies in question used field cases in which examiners blind scored the charts. Confirmation criteria included confession, inculpatory evidence, exculpatory evidence, or it was found that items thought stolen were merely misplaced. The selection of the cases in the studies did not depend on whether the original examiner was correct, but what subsequent evidence showed regarding the truthfulness of the examinee. In some of the cases the original examiner was incorrect. (emphasis added).

I hoped that I had made clear that Matte's conjecture did not apply to the present As an alternative approach to case. communicate my point, I will provide another example. Instead of the blind scoring of field cases, let us take a laboratory study in which volunteers enacted an engaging mock crime, and that there were meaningful incentives to try to pass the polygraph examinations. After the examinations the charts were sent to polygraph examiners who had not participated in the study, and the examiners were asked to blind score the data. This is a standard practice in laboratory validity research. The accuracy of the blind scorers would be reported as validity, not reliability, though reliability could also be assessed when there is more than one blind scorer. Now, replace the laboratory charts with field charts, and have the same blind scoring take place by the same polygraph examiners. I would argue that the nature of the study was still validity, though the source of data was different. For this reason, and the explanation provided in the earlier rejoinder, I would contend that the listing of the selected field research in the Validated Polygraph Techniques article was appropriate.

In his rejoinder Matte argues that one of the studies, Horvath (1977) was a reliability study, and should not have been used to estimate polygraph decision accuracy. А careful reading of Horvath's work will show that it could meet the definition of both validity and reliability. For example, Horvath's abstract and text includes calculations for decision accuracy based on ground truth criteria, something that it not necessary if the project were only a reliability study. The study is often cited in court as one of those used to calculate polygraph decision accuracy. Matte is correct in asserting that Horvath's research was a reliability study, but characterizing it as only a reliability study is to ignore half of the report.

Matte further proposed that inclusion of the Horvath (1977) research in the Validated Polygraph Techniques paper could provide a rationale for affording the Backster ZCT validity. Again referring to the Horvath paper, Matte says:

> These were based on tests conducted with the Arther Technique to validate the Reid Technique. As I stated in my critical analysis of his article on validated polygraph techniques, "using that rationale, the Backster Zone Comparison Technique can thus be validated by published validity studies of derivative zone comparison techniques ... "

For accuracy, here is what the Horvath's (1977) report actually states:

All polygraph records were taken from examinations conducted by field trained according examiners to а standard control-question technique (Reid & Inbau, 1966) into which variations advocated by Arther (1969b) had been incorporated.

The Arther (1969b) citation in the above quotation referred to an article titled Irrelevant Questions. As the title might suggest, the content of the Arther article was on the construction of irrelevant questions. In other words, in the Horvath (1977) research the Reid Technique had been followed but it included Arther's recommendations on irrelevant questions. It is difficult to understand how the use of Arther-like irrelevant questions could be interpreted to mean "(t)hese were based on tests conducted with the Arther Technique to validate the Reid Technique" as Matte states. However, from this inaccurate representation came the assertion that the Backster ZCT could assume validation from the research conducted on other ZCTs. With the Horvath citation shown to have been incorrectly represented, and as the only source offered to justify this generalization, it should be apparent that this

assertion is no longer tenable and can be safely put to rest.

On the continuing disagreement regarding the value of laboratory and field studies, Matte maintains that only field data answer questions about polygraph can validity. He accurately captures the essence of the problem, that field conditions affect both liars and truthtellers in ways that are very difficult to replicate in laboratory research. Indeed, only field research can answer certain This does not mean that field questions. research is better, or the preferred method for validating polygraph techniques. As it is generally known field research is plagued by an intractable problem of its own, the difficulty in obtaining ground truth in all cases. As was pointed out by the National Research Council (2003), field research tends to inflate estimates of polygraph accuracy because confirmation is more likely to come when the polygraph decision was correct. Unless confirmation is secured for 100% of an exhaustive sample of field cases, those data will always be suspect. For example, if 500 cases were conducted, but only 200 had confirmation, and the polygraph led to the confirmations (typically confessions), those 200 cases may be different in some qualitative way from the rest of the 500-case sample. This is why laboratory research also plays an essential role in calculating accuracy, and why the research findings regarding differences in laboratory and field data are important. If it were discovered that decision accuracy is different between field and laboratory data, this would be problematic for the profession. Not knowing which validity estimate is right, and recognizing that both research approaches have flaws, there might be no defensible way to calculate polygraph The actual finding that decision accuracy. decision accuracies between the two research approaches lead to similar conclusions is good news. Matte and I are in accord that field research is important for the very reasons that he articulates, but I would contend that by itself field research is capable of only telling half of the story.

Matte offers a value judgment regarding the polygraph decision accuracy for both truthful and deceptive cases, establishing a 90% minimum for the detection of truthfulness. This appears in itself to be reasonable, and is certainly supportable for cases offered as evidence in a court of law. It not so reasonable for multiple-issue is examinations, or even for all investigative The quotation by Sir William settings. Blackstone regarding the letting of nine guilty men go free before convicting one innocent man is appropriate only to evidentiary applications. Any police polygraph examiner who misses nine deceptive suspects out of fear of misclassifying a single innocent citizen will soon find himself channeled to a new career Similarly, PCSOT examiners who path. conduct multiple-issue testing do not serve the public interest if they permit their concerns for false positives overwhelm their good judgment. Because no multiple-issue format is likely to be able to achieve 90% accuracy for truthful examinees without missing a significant percentage of liars, examiners may find that they must accept a higher false positive rate in some settings. How those false positives can be remedied is discussed in a classic paper by Meehl and Rosen (1955), with its specific application to polygraphy outlined by Krapohl and Stern (2003). I do not contend with Matte's threshold for accuracy, but merely indicate that the limits of polygraphy restrict this requirement to a narrow range of settings.

I am criticized for not addressing Matte's citation of Robert Brisentine's 1974 study, which allegedly has some unspecified relationship with the Backster technique. I would propose that there is a valid reason for not addressing the Brinsentine (1974) study. A thorough review of the document does not find Backster's technique mentioned by name, nor was there an adequate explanation in the text to reveal the exact form of Zone that was used. The samples had been collected across agencies, which Brisentine complained had no standardization for test construction. Accuracy was not broken out separately for the Zone that was used, but individual blind scorers were between 75% and 95% accurate (mislabeled as "reliable" in the Brisentine document). Inasmuch as the Brisentine report (1974) does not allude to the Backster method, the accuracy for the technique is not clearly identified, and that the aggregate accuracy is modest, I remain perplexed as to the reason why the Brisentine report is offered as a critical component in Matte's argument that it

validates the Backster ZCT. The document itself makes no such case.

A similar complaint is raised for my failure to consider "research by Bersh (1969) and Raskin and Hare (1978), which validates the Backster ZCT." Dealing first with Bersh. there is absolutely no mention of Backster's technique in the research report, simply a misnamed "Zone of Comparison." However, it does indicate that the polygraph cases had been drawn from military files between 1963 and 1966. In those earlier years one could speculate that the military had not yet adopted practices that were different from what Backster taught (though even those teachings have not remained static since that era). Based on this reasonable but unproven assumption, the samples may have been sufficiently similar to the Backster technique to permit generalization.

The fatal problem with the Bersh (1969) methodology, and one that has led to its virtual abandonment in subsequent studies, is that Bersh compared the original examiners' polygraph decisions to those of an independent panel who review the case file without any polygraph references included. As many writers have since observed, the panel was looking at the same case file as the original examiner did when he was preparing for the polygraph session. Finding agreement among individuals reviewing the same case file is not unlikely. Most of Bersh's independent panel agreed on most of the cases, so finding that the polygraph examiner agreed with them also did not provide any evidence of the validity of the polygraph. The polygraph examiner is likely to have agreed with the panel based on the file review without even having conducted the examination. Bersh himself commented "...no attempt was made to disentangle the influence of the polygraph examination and record from that of the extrapolygraph sources of information to the examiner." Consequently, the study was hopelessly confounded. The study might have been salvaged to a degree if blind scoring of the field cases had been used, though Matte has repeatedly disagreed with the blind scoring of field cases to validate a technique. Nevertheless, the Bersh study is not taken seriously today by those familiar with the literature because of its grave methodological

flaw (Raskin & Honts, 2002), and for this reason Bersh's methodology has not reappeared in the scientific literature in over 30 years.

Regarding the Raskin and Hare (1978) study, again a thorough review of that article found no mention of the Backster technique. Raskin and Hare stated that "(t)he polygraph test was a control question test similar to that employed by Barland and Raskin (1975)" (p 128). Going next to the Barland and Raskin "federal (1975), they reported that the government modification of the zone comparison polygraph was then test conducted" (p 324. emphasis added). Therefore, in contrast to Matte's assertion that the Raskin and Hare (1978) research supported the Backster technique, the published articles clearly show otherwise. To make the point more plain, both published articles prominently printed the 10-question ZCT they used, which included the federal use of an evidence-connecting question in position 10. There can be no confusion to even the casual reader that the Backster technique was not used. Why it continues to be described as such in Matte's rejoinders is unknown.

Regarding research conducted on the Utah Probable-Lie Technique (PLT), the Test for Espionage and Sabotage (TES), and the Federal ZCT, Matte notices that these techniques have been researched at only one of two places: the University of Utah and by the US government. This does not meet his definition of being replicated by independent entities, a standard not found in the Validated Polygraph Techniques article, but not out of the bounds of reason, either. His point warrants consideration, as replication at different sites gives additional confidence that the effects were not attributable to a single researcher. In the case with the University of Utah research, it is clear that the Utah PLT works with different researchers in over 20 years of research, though it has not been proven that it works outside of Utah. Whether that is an important factor, I leave to others. In the case of the TES, this method is used exclusively by the US government. For practical reasons, it is unlikely that it will be researched elsewhere. For the Federal ZCT, that research has also been performed at the Defense Academy for Credibility Assessment

(DACA, formerly DoDPI). Like the Utah research, it has been conducted by different researchers who produced converging findings, but there is no published research from outside organizations. Matte offers a legitimate criticism, though I would argue not an insurmountable one. Both DACA and the University of Utah researchers have their publications peer reviewed by those not connected with their organizations. If there were methodological problems with the studies, they would not be published until the matter had been resolved.

Summary

A recurring theme in Matte's rejoinders is that the Backster technique can be considered validated. A review of Matte's supporting citations shows that, in a number of instances, they have been incorrectly described or irrelevant to the discussion. He provided no research not already considered and found lacking. They did not provide any new evidence that would change the entries in the list published in Validated Polygraph Techniques.

I have taken the position that no technique that is devoid of supporting research should be considered validated, though not all may agree. The criteria for considering a method validated may vary, and I have offered by own view based on models used in other fields. The polygraph community is, of course, free to call any method valid if it so chose, but the label would command no respect outside of that community, and could feed into the interests of those who already do not hold polygraphy in high regard. For these reasons I would advocate for the minimum standards listed in the Validated Polygraph Techniques article.

The present debate has been challenging for all participants, but it was not without benefit. The validity research regarding the polygraph has now been thoroughly discussed from at least two sides, and in some cases the research was summarized. Those who read the original Validated Polygraph Techniques, along with the series of rejoinders, will receive in a very condensed manner the sum of the prevailing issues and the meaning of much of the research. And though not in the same vein as the scientific discussion of the other rejoinders, Mr. Backster's article covering his illustrious history makes for fascinating and worthwhile reading.

An additional benefit of this exchange is that it required close scrutiny of many of the others' assumptions. This led to the discovery of oversights on all sides. For my part, the exchange with Mr. Gordon pointed out the need to add one additional criterion to the selection of research: sample sizes in updates of the article would require 10 or more subjects in each condition (deception or truthfulness). Also, two research articles supporting the Utah Probable-Lie Technique needed to be added to the accuracy calculation for that technique. The net effect has been a more defensible list of validated techniques. The updated list, rank ordered by accuracy, is found in Table 1.

Table 1.Validated polygraph techniquesranked by without-inconclusives accuracy.

<u>Technique</u>	Accuracy without <u>Inconclusives</u>	Inconclusive <u>Rate</u>
Utah ZCT	90%	12%
Federal ZCT	89%	16%
TES	88%	2%
RI	83%	0%
Reid	83%	6%
CIT	80%	0%
MGQT	61%	21%

Though this article is the last in the current series, it is not the end of the story on polygraph validation. Matte has promised research on both the Backster and Matte methods, and other research is taking place in other venues. If they meet the now-11 selection criteria, and avoid the pitfalls of advocacy research, those techniques will be added to the list published in future updates of Validated Polygraph Techniques. There is much more to come.

References

Arther, R. O. (1969b). Irrelevant questions. Journal of Polygraph Studies, 3(6), 3-4.

- Barland, G. H., & Raskin, D.C. (1975). An evaluation of field techniques in detection of deception. *Psychophysiology*, 12(3), 321-330.
- Bersh, P. J. (1969). A validation study of polygraph examiner judgments. *Journal of Applied Psychology*, 53(5), 399-403.
- Brisentine, R. (1974). Polygraph research in the Army. Polygraph, 3(1), 66-80.
- Gordon, N. J., Fleisher, W. L., Morsie, H., Habib, W., & Salah, K. (2000). A field validity study of the Integrated Zone Comparison Technique. *Polygraph*, *29*(3), 220-225.
- Horvath, F. S. (1977). The effect of selected variables on interpretation of polygraph records. *Journal of Applied Psychology*, 62(2), 127-136.
- Huff, C. R., Rattner, A., & Sagarin, E. (1986). Guilty until proved innocent: Wrongful conviction and public policy. *Crime & Delinquency*, 32(4), 518-544.
- Krapohl, D. J. (2006). Validated polygraph techniques. Polygraph, 35(3), 149-155.
- Krapohl, D. J., & Stern, B. A. (2003). Principles of multiple-issue polygraph screening: A model for applicant, post-conviction offender, and counterintelligence testing. *Polygraph*, 32(4), 201-210.
- Meehl, P. E., & Rosen, A. (1955). Antecedent probability and the efficiency of psychometric signs, patterns, and cutting scores. *Psychological Bulletin*, 52(3), 194-216.
- National Research Council (2003). *The Polygraph and Lie Detection*. Committee to Review the Scientific Evidence on the Polygraph, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.
- Raskin, D. C., & Hare, R. (1978). Psychopathy and detection of deception in a prison population. *Psychophysiology*, 15, 126-136.
- Raskin, D. C., & Honts, C. R. (2002). The Comparison Question Test. In (Ed. Kleiner) Handbook of Polygraph Testing. New York: Academic Press.
- Reid, J. E., & Inbau, F. E. (1966). *Truth and deception: The polygraph ("lie detector) technique.* Baltimore: Williams & Wilkins.