



EUROPEAN
POLYGRAPH
Journal of Andrzej Frycz Modrzewski
Krakow University

European Polygraph is an international journal devoted to the publication of original investigations, observations, scholarly inquiries, and book reviews on the subject of polygraph examinations. These include jurisprudence, forensic sciences, psychology, forensic psychology, psychophysiology, psychopathology, and other aspects of polygraph examinations.

Editorial Board

Don Grubin (Newcastle, United Kingdom)
Charles R. Honts (Boise, United States)
Frank S. Horvath (East Lansing, United States)
Jerzy Konieczny (Krakow, Poland)
Jerzy Pobocho (Szczecin, Poland)
Udo Undeutsch (Cologne, Germany)
Jan Widacki (Krakow, Poland)
Daniel T. Wilcox (Birmingham, United Kingdom)
Gediminas Žukauskas (Vilnius, Lithuania)

Editor-in-Chief
Jan Widacki

Vice Editor
Jerzy Konieczny

Managing Editor
Margerita Krasnowolska

Office
ul. Herlinga-Grudzińskiego 1
30-705 Kraków
phone no. +48 12 25-24-666,
+48 12 25-24-658
mail: margerita.krasnowolska@kte.pl
www.polygraph.pl

Language Editor
Ben Koschalka

Statistics Editor
Paweł Napieracz

Cover design
Joanna Sroka



EUROPEAN
POLYGRAPH

PUBLISHED QUARTERLY

Volume 6

2012

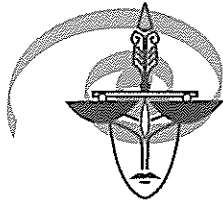
Number 1 (19)



Publisher Council
of the Andrzej Frycz Modrzewski
Krakow University
Klemens Budzowski
Maria Kapiszewska
Zbigniew Maciąg
Jacek M. Majchrowski

Copyright© by Andrzej Frycz Modrzewski
Krakow University
Krakow 2012
ksiegarnia@kte.pl

ISSN 1898-5238



EUROPEAN
POLYGRAPH

Volume 6 • 2012 • Number 1 (19)

James Allan Matte*
Matte Polygraph Service, Inc.
Williamsville, New York
USA

Critique of Meta-Analytic Survey of Criterion Accuracy of Validated Polygraph Techniques

Key Words: accuracy of validated polygraph techniques, validity and utility of polygraph examination, techniques of polygraph examination

A Meta-Analytic Survey of Criterion Accuracy of Validated Polygraph Techniques was conducted by an Ad-Hoc committee at the direction of the Board of Directors of the American Polygraph Association to review and analyze the status of the scientific literature on psychophysiological veracity examinations using the polygraph and evidence in the form of published research supporting the various polygraph techniques. The final 113-page report was published in *Polygraph*, Journal of the American Polygraph Association, Volume 40, Issue 4, 2011. This Meta-Analytic Survey was chaired by Michael Gougler with Raymond Nelson as Principal Investigator and Donald Krapohl, Mark Handler, Pam Shaw, and Leonard Bierman as committee members.

* jamesallanmatte@mattepolygraph.com

A critical review and analysis of the aforesaid Meta-Analytic Survey by this author revealed numerous errors and omissions that necessitated a critique be written and published to correct the record and inform recipients of the Meta-Analytic Survey of those inaccuracies.

This critique is divided in three parts. Part I describes noted errors and omissions. Part II describes noted inaccuracies in a PowerPoint presentation of the Meta-Analytic Survey of Criterion Accuracy of Validated Polygraph Techniques made by an Ad-Hoc Committee member at the Israeli Polygraph Examiner Association seminar on 26-28 January 2012. Part III contains a discussion and evaluation of the Committee's report pertaining to the Matte Quadri-Track Zone Comparison Technique (MQTZCT) and the Integrated Zone Comparison Technique (IZCT) identified by the Committee as *proprietary* event-specific diagnostic techniques.

The APA Committee's report listed seven polygraph techniques that met the Committee's requirement for acceptance as "Evidentiary" techniques on the basis of published and replicated research that showed these techniques had a minimum 90% criterion accuracy with an inconclusive rate not exceeding 20%. These polygraph techniques are listed below in order of their criterion accuracy and inconclusive rate.

Matte Quadri-Track Zone Comparison Technique (MQTZCT)

Correct Decisions = .994, Inconclusives = .029

Integrated Zone Comparison Technique (IZCT)

Correct Decisions = .994, Inconclusives = .033

Utah Zone Comparison Technique, Canadian Police College, RCMP (U-ZCT CPC)

Correct Decisions = .939, Inconclusives = .185

Utah Zone Comparison Technique – Probable Lie Test

Correct Decisions = .931, Inconclusives = .077

Event Specific Zone Comparison Technique (Empirical Scoring System)

Correct Decisions = .921, Inconclusives = .098

Federal You-Phase (Empirical Scoring System)

Correct Decisions = .904, Inconclusives = .192

Utah Zone Comparison Technique – Directed Lie Test

Correct Decisions = .902, Inconclusives = .073

The APA Committee declared that the Matte Quadri-Track ZCT and the Integrated ZCT were “Outliers” from the other validated techniques due to their exceptional accuracy but instead of recognizing the elements responsible for their accuracy; the Committee faulted the validity studies that supported them as evidenced in Part I of this critique with rectifying comments.

The Matte Quadri-Track Zone Comparison Technique was validated by three field research studies: Matte & Reuss 1989; Mangan, Armitage, Adams 2008; Shurany, Stein, Brand 2009.

The Integrated Zone Comparison Technique was validated by one laboratory and two field research studies: Gordon, Mohamed, Faro, Platek, Ahmad, Williams, 2005; Shurany & Chaves 2010; Shurany 2011, respectively.

Part I

The following inaccuracies were noted on the following pages of the final report on Meta-Analytic Survey of Criterion Accuracy of Validated Polygraph Techniques prepared for the American Polygraph Association by the Ad-Hoc Committee on Validated Techniques.

Page 240 of the Meta-Analytic Survey, third footnote states

A correlation coefficient of .990 is an extraordinary and remarkable finding in any field of research, and suggests an extremely low rate of disagreement between the numerical scores of blind evaluators using the MQTZCT. This statistic cannot be found in the Matte and Reuss (1989) dissertation paper for the now defunct Columbia Pacific University, but was published in the included Matte and Reuss (1989) reprint in *Polygraph*. Despite this extremely high correlation of numerical scores from different scorers, developers and researchers of the MQTZCT have expressed repeated cautions regarding the lack of generalizability of MQTZCT results without intensive proprietary training.

Comment

The second sentence commencing with “This statistic” referring to the correlation coefficient of .990 (blind evaluation of polygraph charts) was in fact

published in the Matte Reuss 1989 dissertation on page 3 in the Table of Contents and on pages 46-47 and Table 11 on pages 99-100. Furthermore, the score sheets from Mangan and Armitage (Mangan et al 2008a) in their blind scoring of 30 cases each that resulted in one error in 60 cases blind scored for a correlation coefficient of .983 was provided to the Committee, yet no mention of this is made in this report. (See Appendix E-12). In addition, the “intensive proprietary training” claimed by the Committee consists of only one day’s training to insure that polygraphists who administer the MQTZCT are thoroughly knowledgeable about the protocol of the technique. The American Polygraph Association (APA, 2009) requires all of its members, who must have completed a minimum of 200 polygraph examinations, attend and successfully complete a minimum of 40 hours of specialized classroom instruction and pass a written examination before they can administer a post-conviction sex offender test. Accordingly, a one day training session can hardly be regarded as “intensive.”

Pages 199, 200 of the Meta-Analytic Survey

The Committee report states that “Two PDD techniques produced accuracy rates that were *outliers*¹ from and inconsistent with the distribution of results from all other techniques. They were the Integrated Zone Comparison Technique (IZCT) and the Matte Quadri-Track Zone Comparison Technique (MQTZCT). While it is within the realm of possibility that these two techniques are superior to other techniques, studies supporting them proved to have more unresolved methodological issues than others included in this meta-analysis.”

Comment

The MQTZCT contains an Inside-Track composed of a Fear-of-Error Control Question and a Hope-of-Error Relevant Question for comparison and quantification whose scores are added to the scores acquired from the two previous tracks each containing a control versus a direct relevant question dealing with the same issue. The Inside-Track is *unique* to the MQTZCT and addresses the *Fear of Error* by the innocent, also coined by Dr. Paul Ekman as the Othello Error, an issue mentioned in the National Academies of Science 2003 report. (Matte 2011).

¹ Outliers are numbers in the data set that are extremely high or extremely low, compared to the rest of the data. **The mean may not be a fair representation of the data, because the average is easily influenced by outliers of very large or very small values in the data set that are not typical.**

In the Matte-Reuss1989 field study, the Inside-Track reduced the Inconclusives for the Truthful from 52% to 9% and prevented 5% false positives. The Inside-Track further reduced the Inconclusives for the Deceptive from 17% to 3% and prevented 2% false negatives. The Fear of Error increased the total scores for the Truthful from +341 to +762 thus increasing the score by +421 points. The Fear of Error Control Question generated an adjustment to the 58 Innocent case scores by increasing the score an average of +7.3 per case. The average total score per Innocent case without the fear of error adjustment was +5.89 and with the Fear of Error adjustment was +13.1. This shows that the *Fear of Error* factor is extremely significant and cannot be ignored in the scoring of Innocent cases. It also increased the average score per case for the Guilty from -19.7 to -25.1. Overall accuracy 100% with 6% Inconclusives.

In the Mangan et al 2008 field study, the Inside-Track reduced the Inconclusives for the Truthful from 32% to Zero, and the Deceptive from 12.3% to 2.2%. The Fear of Error increased the scores for the Truthful from a mean of +4.0 per chart to +7.1 and the Deceptive from a mean of -6.9 per chart to -10.0. Overall accuracy 100% with 2.2% Inconclusives.

In the Shurany et al 2009 field study, the Inside-Track reduced the Inconclusives for the Truthful from 31% to Zero and the Deceptive from 71% to Zero. The Fear of Error increased the total score for the Truthful from a mean +3.39 per chart to +5.39 per chart, and the Deceptive from -3.54 per chart to -6.08 per chart. Overall accuracy 96.5% with Zero Inconclusives.

It can be seen from the above data that the significant increase in the scores for both the Truthful and Deceptive is due to the effectiveness of the Inside-Track containing the Fear-of-Error Control Question and the Hope-of-Error Relevant Question. This should explain the reason for the significantly higher scores compared to the other techniques (excluding the IZCT), and thus labeled an "Outlier" by the Committee. An additional benefit of the Inside-Track is that it confirms the legitimacy of reactions to the direct relevant questions in the other two tracks that often raises the issue of false positives. Details regarding the role of the Inside-Track and its benefits can be found in "Psychological Aspects of the Quadri-Track Zone Comparison Technique and Attendant Benefits of its Inside Track" published in *European Polygraph*, 5(2(16), 2011 which was excluded from the Committee's Report. The IZCT Version 2 incorporated the Inside-Track's Fear and Hope of Error questions in its format.

Page 236, Footnote #3 states

Generalizability of this outlier result is limited by the fact that the developers and investigators have advised the necessity of intensive training available only from experienced practitioners of the technique, and have suggested that the complexity of the technique exceeds that which other professionals can learn from the published resources. The developer reported a near-perfect correlation coefficient of .99 for the numerical scores, suggesting an unprecedented high rate of inter-scorer agreement, which is unexpected given the purported complexity of the method. Additionally, the data initially provided to the committee for replication studies included only those cases for which the scorers arrived at the correct decision, excluding scores from those cases for which the scorers did not achieve the correct decision. Missing scores were later provided to the committee for both the Mangan et al (2008) and Shurani and Chavez (2009) studies. However, the resulting sampling means were different from those reported for both replication studies. Because of these discrepancies, the statistical analysis was not re-calculated with the missing scores, and the reported analysis reflects the sampling distribution means as reported. Sampling means for replication studies should be considered devoid of error or uncontrolled variance.

Comment

The underlined portion by this author reflects a gross inaccuracy inasmuch as the Matte-Reuss(1989) field study and the Mangan, Armitage, Adams (2008a) field study reported 100 percent accuracy, with no errors to report. The raw data for the two inconclusives (Mangan 2008a) which do not reflect correct or incorrect decisions of truth of deception and do not affect the data of conclusive results were subsequently provided to the APA committee upon request. It is expected that the sampling means of the two inconclusives would be different from the conclusive cases. Furthermore the Committee cited the wrong study in that Chavez was not one of the authors of the 2009 field study on the MQTZCT. The correct citation and spelling of the principal author is Shurany, Stein and Brand (2009). In addition, there were no inconclusives reported in the Shurany, Stein and Brand 2009 field study. The raw data for the two errors in the Shurany et 2009 study were included in the completed study data provided by Shurany to Chief Investigator Nelson. Nelson had previously acquired incomplete data of the study from Barry Cushman who released it without authorization from Shurany.

Moreover, this author (Matte) merely requires one day's training (unless an interpreter-translator is needed) to insure that the examiner understands the psychological aspects of the MQTZCT, the standardized pretest interview

unique to the MQTZCT and the technique's protocol and chart interpretation rules. This author has conducted numerous quality control reviews during the past 40 years as an active polygraphist and has noted a disturbing number of polygraph tests that failed to meet acceptable standards of practice. This short training assures that the MQTZCT will be administered in accordance with its protocol resulting in the high accuracy reflected by the field research that supports this robust technique when properly administered. To fault a technique because it requires additional training is ludicrous.

Page 249. Last paragraph states in part

Although one-way differences were not significant within the deceptive or truthful groups, the significant Interaction effect indicates that the scores of criterion deceptive and criterion truthful cases are expressed or interpreted in different ways within the sampling distributions of the three included studies on the MQTZCT. In other words, the data are not congruent even among the studies used to support the MQTZCT. This significant interaction suggests the possibility that the included studies are based on samples that are not representative of each other. It is unknown whether one or more of the studies is not representative of the population of all examinees, reducing our confidence in the potential for generalizability of the reported results.

Comment

The Shurany, Stein, Brand (2009) field study was conducted in Thailand consisting of 42 Thais, 4 Israelis, 4 Chinese, 2 Columbians, 1 American, 1 Vietnamese, 1 Burmese, 1 from the United Kingdom and 1 Australian. This information was provided in the published study.

Page 250, Second paragraph states in part

A final confound to the generalizability of the results of the included studies on the MQTZCT is that the data provided to the committee initially included numerical scores for only those cases for which the scorers achieved the correct result. Data available to the ad-hoc committee did not initially include numerical scores for those cases for which the scorers achieved erroneous or inconclusive results. Missing scores were later provided to the committee for both the Mangan, Armitage and Adams (2008) and Shurani, Stein and Brand (2009) studies.

Comment

The above statement is a repetition of the statement made on Page 236, also erroneously citing the Shurani and Chavez 2009 study which actually pertains to the Integrated Zone Comparison Technique.

Page 254, Last 3 lines of paragraph titled “Ancillary Analysis” which states “and two studies on the MQTZCT (Shurani, Stein & Brand, 2009; Shurani 2011).

Comment

Shurany is misspelled. Should read “Shurany.” Shurani 2011 pertains to the Integrated Zone Comparison Technique, not the MQTZCT.

Tuvia Shurany’s family name was misspelled (Shurani) forty-one (41) times in the committee’s report including the three research studies’ citations listed in the References section of the report. These three cited Shurany et al studies, which were used by the APA committee including its data to assess the validity of the ITZCT and the MQTZCT, correctly spelled Shurany’s name, yet the committee for unknown reasons continuously misspelled his family name.

Page 211, Second paragraph

This paragraph cites published research that supports the lack of significant differences in classification accuracy of field and laboratory polygraph research.

Comment

The APA report failed to cite a study published in *European Polygraph*, Volume 4, 2010, Number 4(14) by Matte entitled “Guiding Principles and Benchmarks for the Conduct of Validity Studies of Psychophysiological Veracity Examinations Using the Polygraph” that challenges the value of laboratory versus field studies in generalizing its results to real-life situations.

Page 210, Footnote #16 states in part

Confirmation based on confession alone would exclude inconclusive and error cases, and would tend to inflate accuracy calculations. Judicial outcomes as a criterion and are also not independent if polygraph evidence was considered during the judicial proceedings, and could lead to inflated accuracy estimates. One included study (Mangan, Armitage&Adams, 2008) did not meet this requirement, and was based only on sample cases that were confirmed by confession. Not surprisingly, the study resulted in a reported 100% accuracy rate. Verschuere, Meijer, &Merckelbach (2008) argued the results of this study as a methodological artifact and therefore unreliable.

Comment

The report failed to cite a “Rebuttal to Objections by Iacono and Verschuere et al” by Mangan, Armitage and Adams published in *Physiology & Behavior*, 95 (2008) 29-31 which persuasively refutes their objections. Further discussion regarding the value of confessions in establishing ground truth can be found in “Guiding Principles and Benchmarks for the Conduct of Validity Studies of Psychophysiological Veracity Examinations Using the Polygraph” *European Polygraph*, Vol. 4, 2010, Number 4(14). also available for review at www.mattepolygraph.com.

Page 253. Footnote #54 which states

A possible example of this phenomenon can be seen in Mangan et al., (2008) who reported the results of a survey of the confession-confirmed test results of one experienced examiner. The reported results were 100% accurate, a finding in accord with what would be expected to arise from a confession based selection bias.

Comment

A review of the field study by Mangan et al, on the MQTZCT published in *Physiology & Behavior* (2008a) failed to reflect the “survey” of confession-confirmed test results of 100% stated in Footnote #54 in the Committee report. However, Mangan et al’s Rebuttal to Objections by Iacono and Verschuere et al, also published in *Physiology & Behavior* (2008b) which reported the results of a research study by Gary D. Light and John R. Schwartz (1999) entitled “The Relative Utility of the Forensic Disciplines” revealed that the United States Army Criminal Investigations (CID) Command conducted a study in 1990 involving a total of 1069 forensic examinations consisting of firearms, illicit drugs, latent prints, questioned documents serology, trace evidence, photographic, and the polygraph. The study’s report stated that “Of the 1069 examinations reviewed, there were no instances in which the findings of one discipline contradicted the results of any other discipline.” The report further stated that “The findings of this comparison support other studies that utilized the confession as ground truth (Barland and Raskin, 1976; Patrick & Iacono, 1988).” “This assertion is further substantiated by a study conducted by Mason (1991) wherein PDD examinations were conducted in which ground truth was ascertained by urinalysis examinations. The validity of PDD (verified by these biomedical tests) was in excess of 95% and if utilizing confessions in conjunction with the urinalysis forensic discipline accuracy of that confession subset would be over 98%.”

Page 228, Footnote #40 states

This statistic was published in the Matte and Reuss (1989) reprint of the dissertation published in the journal *Polygraph*, but cannot be located in the original dissertations study for the no longer extant Columbia Pacific University.

Comment

University Microfilm International (UMI), Ann Arbor, Michigan statutorily copyrighted the dissertation with the Copyright Office of the Library of Congress. An official copyright notice reflecting UMI as the publisher was provided to the principal Investigator of the Ad-Hoc committee with the notice that both the official copyright document and the entire dissertation in PDF format was published and available at www.mattepolygraph for review and download and the original dissertation was on file at the Library of Congress. This information providing access to the dissertation was not reflected in the Committee's report. Furthermore, as indicated in this critique's Comment on Page 240, the "statistic" that the committee couldn't find in the dissertation is in fact in the Table of Contents on page 3, and on pages 46-47 and Table 11, pages 99-100 of the dissertation.

Page 284, Appendix E-12

The table fails to reflect reliability correlation for the Mangan, Armitage and Adams 2008 field study.

Comment

The 60 score sheets from the Mangan, Armitage and Adams field study (2008a) in the blind scoring of 30 field cases by Mangan and Adams which was classified by Mangan et al as a *reliability* rather than a validity study, resulted in one error in 60 cases blind scored for a correlation coefficient of .983 was provided to the Committee, yet no mention of this is made in their report (see Appendix E-12). The fact that 10 of those confirmed cases were randomly selected from 2007 cases because there were insufficient number of confirmed cases in 2006, should make no difference inasmuch as those cases were all confirmed and their results unknown to the blind reviewers. See also Comment on Page 240, Third Footnote.

Page 290, Appendix F

Reflects Matte SGK.

Comment

Should reflect SKG for *Suspicion-Knowledge-Guilt* Test. (Matte 1996).

Page 293, Appendix G

The paragraph which starts with Matte (1990), discusses the history of Matte's doctoral dissertation and publication by UMI subsequently known as Proquest Information & Learning.

Comment

However, it fails to direct the reader to a source from which the reader can gain access and review the 220-page dissertation, to wit: www.mattepolygraph.com under Research & Publications which can be reviewed and downloaded free of charge. The source could also have been inserted into the citation in the References section.

Pages 268 & 208

References section of report lists Tuvia Shurany's Polygraph Verification Test published in *European Polygraph*, Vol. 5, Nr. 2(16) 2011.

The report also states on Page 208 that "although hypotheses are abundant, scientific studies have been unable to show evidence of construct validity for the array of technical questions with the exception of one. The CQ is generally capable of producing larger reactions from truthful persons than RQ."

Comment

The Committee report failed to list this author's (Matte) study "Psychological Aspects of the Quadri-Track Zone Comparison Technique and Attendant Benefits of its Inside Track" published as the lead article in the same issue of *European Polygraph*, Vol. 5, Nr.2(16), 2011 that published the Shurany study. Yet the *Psychological Aspects* study fully explains the role of each component of the MQTZCT including its Inside Track and addresses issues raised in a presentation on The Evidence for Technical Questions in Polygraph Techniques by Barry Cushman and Donald Krapohl (the latter a member of the APA Committee) at the September 2010 annual polygraph seminar by the American Polygraph association at Myrtle Beach S.C., and in the APA Committee's report on page 208.

Pages 215, 225, 226

Reflects the MQTZCT (Matte) and the IZCT (Gordon) as "proprietary event-specific diagnostic techniques" yet describes the Backster ZCT as an event-specific diagnostic technique (not proprietary).

Comment

Gordon and Backster both developed their technique and teach it at their respective polygraph school. Hence there is an obvious inconsistency in the description of polygraph techniques.

Page 227, Figure 11

Reflects the mean truthful scores of MQTZCT at 3.099 for the Matte-Reuss 1989 Study.

Comment

The above figure is incorrect. The mean chart score for the Innocent Armitage cases was +5.7 and Matte cases was +6.1 for an overall mean truthful score for the MQTZCT of +5.9 which is reflected on Page 32 of the Matte 1989 Dissertation and also on Page 193 of the Matte-Reuss field study published in *Polygraph*, Vol. 18, Nr. 4, 1989. This brings the mean score for the Matte-Reuss study in line with the mean truthful scores of the Shurany et al and the Mangan et al studies reflecting +5.3 and +7.1 respectively.

Pages 196, 200, 255

The Committee's report is replete with comments about the "proprietary" nature of the MQTZCT and the IZCT labeling the published research that validates them as "advocacy" research stating that "both of these techniques are supported by studies authored by the developers and proprietors, and for which the developer/proprietor functioned as both principal investigator and study participant. From a scientific perspective, even well designed research generated by advocates of a method who have a vested interest in the outcome, and who act as participants and authors of the study report does not have the compelling power of research not so encumbered by these factors."

Comment

First of all, the MQTZCT developed by this author was originally validated in a doctoral dissertation for Columbia Pacific University (CPU) with Dr. Ronald M. Reuss, Professor of Biology at the State University College at Buffalo, New York (SUCBNY) and mentor-faculty advisor for CPU. Dr. Reuss had complete access to all of the raw data which had to be fed into his computer under his supervision because the IBM compatible statistical software provided by Dr. William C. Shefler, Professor of Biology at SUCBNY was not compatible with this author's Digital Rainbow CPM operating system. The late Dr. Reuss was a highly respected professor and author of several research studies

published in various peer-reviewed journals and an Anatomy and Physiology Lab Manual published in 1973 with a Second Edition in 1979. In 1985 he co-authored a Lab Manual and Study Guide in Anatomy and Physiology. He also conducted research on muscle physiology at Rensselaer Polytechnic Institute and the State University of New York Medical School, and radiation physics and radiation biology at the University of New Mexico, co-sponsored by the Atomic Energy Commission. Dr. Reuss was a Lifetime member of the National Science Teachers Association. He was known as a no-nonsense scientist whose honesty was beyond question.

The second field study of the MQTZCT was conducted by Daniel Mangan, Thomas Armitage, and Gregory Adams (2008a) and published in *Physiology & Behavior*, the official peer-reviewed journal of the International Behavioral Neuroscience Society. Mangan and Adams are graduates of the Backster School of Lie Detection and Armitage is a graduate of the New York School of Lie Detection which taught the Backster Zone Comparison Technique exclusively. Adams is the Chief Instructor at the Backster School of Lie Detection and uses the Backster ZCT exclusively, hence has no proprietary or financial interest in the MQTZCT. Mangan and Armitage have the choice of using the Backster ZCT or the MQTZCT without any restriction or opposition from their employers and clients, hence realize no financial gain or proprietary interest in the MQTZCT or in the outcome of the study.

The third field study of the MQTZCT was conducted by Tuvia Shurany, Einat Stein, and Eytan Brand, and published in 2009 in *European Polygraph*, the official peer-review journal of Andrzej Frycz Modrzewski Krakow University, Poland. Tuvia Shurany is the former Director of the Israeli Government Polygraph School and as such taught the Utah ZCT, the Peak-of-Tension (POT) and the Relevant-Irrelevant Technique. Since his retirement from the Israeli Government, Shurany has been using the Backster ZCT, the IZCT and the MQTZCT, hence has no financial or proprietary interest in any of those techniques which he uses as needed. Dr. Einat Stein, Professor of Psychology at Bar Llan University, Israel, is not a polygraphist but is a published researcher in the field of psychology. Dr. Stein was provided all of the data for statistical analysis, evaluation and reporting in the field study published in *European Polygraph*. Dr. Stein had no financial or proprietary interest in the outcome of the study. Eytan Brand of the Israeli Security Agency was also taught the Utah ZCT, POT and the R&I technique and has no proprietary or financial interest in the outcome of the study on the MQTZCT.

This author has never met or corresponded with Dr. Einat Stein, nor had this author ever met Eytan Brand until September 2011 at the APA seminar in Texas, two years after publication of their study published in *European Polygraph*.

It is most difficult to understand how the Committee came to the conclusion that the Mangan et al and the Shurany et al field studies were proprietary in nature and its researchers had a financial interest in the studies' outcome. Furthermore, the original study by this author (1989) under the direct supervision of Dr. Ronald M. Reuss assisted by Dr. William Shefler underwent rigorous scrutiny that assured the integrity of the research study. This author finds the Committee's statements that question the integrity of the the research studies validating the MQTZCT and the honesty of its researchers degrading and without merit, especially when we consider the same but unreported vulnerability of other research studies supporting validated polygraph techniques.

For instance, the research (Barland & Raskin 1976; Rovner 1986; Honts, Hodes, Raskin 1985; Honts, Raskin, Kircher 1987; Horowitz Kircher, Honts, Raskin 1997), mostly laboratory studies, validating the Utah Zone Comparison Technique, was developed by David Raskin, Chair of the Psychology Department at the University of Utah where all of the aforementioned researchers acquired their doctorates. It could be argued that each one of the aforementioned researchers had a vested interest in the outcome of their research with its developer as a co-author or dissertation reviewer. Furthermore, each of these researchers subsequently administered polygraph tests using the Utah ZCT and testified in court commanding high fees for their service, which could have been foreseen when they conducted their research.

Furthermore, the integrity of the research conducted by Raymond Nelson, Chief Investigator of the APA Committee could also be questioned due to the fact that Nelson is an employee of the Lafayette Instrument Company which competes with other manufacturers of polygraph instruments in the sale of their polygraph instruments to government agencies and in particular the National Center for Credibility Assessment (NCCA) which provides polygraph training to all of the Federal agencies that use the polygraph. In addition, Donald Krapohl, Special Assistant to the Director of NCCA and Editor-in-Chief of *Polygraph*, Journal of the APA is also a member of the APA Committee. In connecting the dots, it could be argued that research

conducted by Nelson to validate techniques such as the Air Force MGQT, the Federal You-Phase and the Federal ZCT were influenced by the financial interests of his employer who pays his salary.

However, this author would also contend that the aforesaid arguments that would label the research validating the Utah ZCT and aforementioned Government techniques as *advocacy research* are as *absurd* as the Committee's labeling of the MQTZCT and the IZCT research as *advocacy research*. There is absolutely no evidence to support the Committee's position or the arguments posited herein regarding the proprietary and financial interests of the research used to validate the polygraph techniques cited in the Committee's report.

It should be noted that Nathan Gordon, the developer of the Integrated Zone Comparison Technique (IZCT) validated by Gordon et al 2005; Shurany, Chaves 2010; Shurany et al 2011 is most capable in defending the published research that validated his highly accurate technique, hence the IZCT is not the focus of this critique which is already very extensive.

Page 196, Executive Summary states in Part

"Validation, which, as it applies to PDD exams, is stipulated by the APA Standards of Practice (Section 3.2.10) to refer to the combination of: 1) a test question format that conforms to valid principles for target selection, question construction, and in-test presentation of the test stimuli, and 2) a validated method for test data analysis as it applies to a specified test question format. Although many factors may affect the overall effectiveness of PDD examinations, these two parts are recognized as fundamental to the criterion accuracy of PDD examinations."

Comment

Yet the Committee accepted studies that used blind scoring of confirmed polygraph charts as validity studies rather than reliability studies presumably because they were chosen at random. Even Patrick Iacono(2008) a critic of the control question test recognized the difference in his review of the Mangan et al (2008a) study, stating "Mangan et al. also had blinded judges re-score a subset of 30 of the original examiners polygraph charts. This step appears to uncouple the connection between the confession criterion and the test outcome because the blind re-scorer did not obtain the confession. However, because polygraph chart scoring shows high inter-scorer reliability (reliabilities close to 90 are typical), it should be no surprise that the blindly

rescored charts will also match the criterion. Moreover, since the charts examined by the blind scorer are only ones where the original examiner was correct, the blind scorer is also denied access to charts that could involve errors. Hence, the analysis of blindly scored charts was correctly identified by Mangan et al, as an exercise to determine 'reliability of chart interpretation.' This blind re-scoring analysis contributes little to our understanding of polygraph validity."

Blind scoring of charts from confirmed examinations establishes repeatability of the results, hence reliability. However the blind scorers are not involved in the target selection, question formulation which includes effective comparison (control) questions and their introduction, and the pretest interview that prepares the subject psychologically for the collection of the physiological data. It fails to detect any procedural violations committed by the polygraphist during the pretest interview or during the collection of the physiological data that could have an adverse psychological impact affecting the physiological data that is used for a determination of truth or deception.

A scientifically accepted method of validating a polygraph technique is set forth in "Guiding Principles and Benchmarks for the Conduct of Validity Studies in Psychophysiological Veracity Examinations Using the Polygraph" published in *European Polygraph*, Volume 4, 2010, Number 4(14), also available for review in www.mattepolygraph.com.

The above mentioned "Guiding Principles..." study was not cited in the Committee's report, probably because its contents challenge the usefulness of laboratory studies in validating control question tests (but support its use in validating recognition (Concealed information) Tests and further challenges the results of a laboratory study by Pollina, D.A., Dollins, A. B., Senter, S. M., Krapohl, D. J., Ryan, A. H. (2004) which held laboratory studies as a viable alternative to field studies.

Pages 265, 266

The Monte Carlo method of calculating the criterion accuracy of polygraph techniques was used to validate the Federal You-Phase test, the Backster ZCT, the Air Force Modified General Question Test (MGQT), and the Directed-Lie Screening Test/Test for Espionage and Sabotage.

Comment

The Monte Carlo model is useful in research to provide answers to complex problems that are difficult to solve through other methods. However, the use

of the Monte Carlo method of calculating the criterion accuracy of polygraph techniques suffers from some of the same flaws or weaknesses inherent in the blind scoring of charts in that they both fail to meet all of the requirements set forth in the Guiding Principles and Benchmarks for the Conduct of Validity Studies in Psychophysiological Veracity Examinations (Matte 2010a).

Pages 267-268 – Selected References

- Shurani, T. (2011). Polygraph Verification Test. *European Polygraph*, 16.
- Abrams, S. (1977). A polygraph handbook for attorneys. Lexington, MA: Lexington Books.
- Abrams, S. (1989). A complete polygraph handbook. Lexington, MA: Lexington Books.
- Raskin, D. C. Honts, C.R. (2002). Handbook of polygraph testing. In M. Kleiner (Ed.), Handbook of Polygraph Testing. San Diego: Academic Press.
- Reid, J. E. & Inbau, F. E. (1977). *Truth and deception: The polygraph ("lie detector") technique* (2nd ed). Baltimore, MD: Williams & Wilkins.

Comment

In the above References, the APA report cited the above study by Shurani (correct spelling "Shurany") published in Volume 5, 2011, Number 2(16), *European Polygraph*, as the second study in that particular issue. The first study in that same EP issue by Matte titled "Psychological Aspects of the Quadri-Track Zone Comparison Technique and Attendant Benefits of its Inside Track" should also have been listed in the References because it addresses the issue of technical questions (P. 208).

The textbooks by Reid and Inbau (1977), Abrams (1977 & 1989), Raskin&Honts (2002), were listed in the References but the textbook by Matte titled "The Art and Science of the Polygraph Technique" published in 1980 by Charles C. Thomas, Publisher was omitted from the References.

Furthermore, the textbook by Matte (1996) titled "Forensic Psychophysiology Using The Polygraph: Scientific Truth Verification – Lie Detection" was originally written under contract with Charles C. Thomas, Publisher who would not permit the textbook to exceed 400 pages due to marketing considerations and subsequently released Matte at his request from their contract to pursue publication without page limitations. Matte published the 800-page textbook and after publication provided a copy to Thomas who stated in an email (Thomas, 2002) that he wished he had published the textbook which he would keep as a reference textbook and looked forward to further

associations with this author. Hence, this textbook may have been technically self-published but it was in fact started under contract with an established publisher who subsequently approved its content with high praise. This textbook was cited by the United States Supreme Court in *United States v. Edward G. Scheffer*, 523 U.S. 303 (1998), and received outstanding reviews: In *Polygraph*, Journal of the APA by Norman Ansley (1997), Editor, who stated that "This major work by Matte exceeds in scope and depth every previous work on the detection of deception. As a textbook it covers every topic in the curriculum of APA accredited school except ethics. As a textbook for polygraph courses the book is excellent. Attorneys will find it a necessity." In *The Champion*, National Association of Criminal Defense Lawyers, Law Professor Edward J. Imwinkelried (1998) stated that "the text belongs on the shelf of any defense attorney who contemplates waging a polygraph war." It is the most widely distributed textbook on polygraph in the world, yet was not listed in the Committee's References presumably because it was technically self-published.

Also, omitted from the Committee's References was a textbook by Tuvia Shurany and Israel Ravid (2004) entitled "Evaluation of Polygraph Charts: Formats, Criteria and Scoring" published by T.I Publications: Israel, which received outstanding reviews, most notably by Jerzy Konieczny (2011) of the Editorial Board of *European Polygraph*, Journal of Andrzej Frycz Modrzewski Krakow University who stated that "The Authors filled in the gap that is present in virtually all polygraph manuals that devote relatively little space to the evaluation of polygraph charts."

It is recognized that only those publications used in the text are normally cited in the References. However, those textbooks listed above which were omitted from the References most certainly contained at least as much information related to the subject of the Committee's review than other textbooks that were listed. Hence the question arises as to the reason they were omitted from the References, and in particular the Matte (1980) textbook published by Charles C. Thomas which was the first textbook describing the Quadri-Track ZCT then known as the Quadri-Zone ZCT.

Part II

A PowerPoint presentation of the Meta-Analytic Survey of Criterion Accuracy of Validated Polygraph Techniques by a member of the APA Ad-Hoc

Committee, was made at the Israeli Polygraph Examiner Association seminar in Israel during period 26-28 January 2012. The following errors were noted:

Slide Number 50, states

Complete numerical scores were not provided for two of the three included studies: Scores were not provided for those cases that were not scored correctly.

Comment

The above statement is inaccurate inasmuch as the Matte-Reuss (1989) field study and the Mangan, Armitage, Adams (2008a) field study reported a 100 percent accuracy, with no errors to report. The raw data for the two inconclusives (Mangan 2008a) which do not reflect correct or incorrect decisions of truth of deception and do not affect the data of conclusive results were provided to the APA committee upon request. This leaves only the Shurany 2009 field study and its primary author provided the Committee with the complete data upon request. An incomplete draft of the study had been previously provided by Shurany to Barry Cushman with the understanding that it was an incomplete draft, which was subsequently given to Committee member Nelson without Shurany's knowledge.

Slide Number 62, states

MQTZCT

Mangan, Armitage & Adams (2008)

N = 136

Comment

Should read N=140.

See Page 21, *Physiology & Behavior*, Volume 95 (2008) 17-23.

Slide Number 63, reflects

The mean truthful scores of MQTZCT at +3.099 for the Matte-Reuss 1989 Study.

Comment

The above figure is incorrect. The mean chart score for the Innocent Armitage cases was +5.7 and Matte cases was +6.1 for an overall mean truthful score for the MQTZCT of +5.9 which is reflected on Page 32 of the Matte 1989

Dissertation and also on Page 193 of the Matte-Reuss field study published in *Polygraph*, Vol. 18, Nr. 4, 1989. This brings the mean truthful score for the Matte-Reuss study in line with the mean truthful scores of the Shurany et al and the Mangan et al studies reflecting +5.3 and +7.1 respectively. This same diagram reflecting the erroneous mean truthful score for the MQTZCT is on page 227 as Figure 11 in the Meta-Analytic Survey of Criterion Accuracy of Validated Polygraph Techniques.

Part III

Discussion

The failure of the APA Committee to find the blind study showing a correlation coefficient of .990 in Matte's 1989 doctoral dissertation though published as a reprint in *Polygraph*, Journal of the APA, is difficult to comprehend in view of its listing in the dissertation's Table of Contents on page 3 and full discussion on pages 46-47 and in Table 11 on pages 99-100.

The Committee's report highlights missing data from the Mangan et al and Shurany et al field studies when in fact the only missing data from the former study were the scores from the two inconclusives which were submitted upon request. The score sheets of the 30 cases blind scored (reliability study) by Mangan and Adams were provided unsolicited to the Committee. Reference the Shurany et al study, the missing data consisted of the scores for the two errors which were submitted upon request. However, the Committee's report made no mention nor did it highlight the fact that the U.S. Government refused to provide the data of its studies on the Directed Lie Screening Test and the Air Force MGQT to the APA Committee. Nevertheless, the Committee included those studies in their report. Furthermore, two studies on the Utah ZCT conducted by Honts, Raskin and Kircher (1987), and Honts and Raskin (1988) "reported mean scores but were not required by editorial and publication standards to report standard deviations for the sampling distributions of deceptive and truthful and deceptive scores at the time of publication. Because data were no longer available to calculate these missing statistics, a blunt estimate of the pooled standard deviation was calculated from the reported F-ratio for the level of significance of the difference between truthful and deceptive scores." (Footnotes 43 & 44 of Committee Report).

The fact that the U.S. Government refused to provide the data for the DLST and AFMGQT studies, and the fact that the Honts, et al 1987 and

the Honts&Raskin 1988 studies were included in the report in spite of the aforesaid missing data (Nelson 2011, Feb 11) was not mentioned in the PowerPoint presentation of the Meta-Analytic Survey. Nevertheless slide #62 of the PowerPoint presentation pertaining to the Matte Quadri-Track ZCT reflected that "Data for 2008 and 2009 studies did not include numerical scores for cases not scored correctly." The above statement is incorrect and suggests a most selective reporting of information.

The Committee's report tends to make sweeping statements that are not supported by the facts and data as indicated in Part I of this critique. The report goes to great lengths in emphasizing the *proprietary* nature of the Matte Quadri-Track Zone Comparison Technique (MQTZCT) and the Integrated Zone Comparison Technique (IZCT) but fails to provide evidence to support that assertion. The report also places great emphasis on the "intensive proprietary training" required for the administration of the MQTZCT which is a gross exaggeration inasmuch as only one day of training is required to insure that the polygraphist is knowledgeable about the psychological structure, format and protocol of the MQTZCT which is not an excessive requirement considering the importance of its ensuing results and serious effect on the lives of examinees. Not mentioned is the APA requirement for its members who are graduates of APA accredited polygraph schools, many with extensive experience, to attend a minimum 40-hours of specialized classroom instruction and successful completion of a written examination before they can administer post-conviction sex offender tests. (APA 2009).

The Committee's report omits the blind scoring of 30 cases in the Mangan et al field study showing the reliability of the MQTZCT but provides no adequate and satisfactory explanation. Furthermore, the exclusion of several studies that support various essential components of the MQTZCT and its validity-reliability and/or contradict studies listed in the Committee's report raises serious questions about the Committee's objectivity. The omission of Mangan et al's "Rebuttal to Objections by Iacono and Verschuere et al" published in *Physiology & Behavior* (2008), and this author's "Guiding Principles and Benchmarks for the Conduct of Validity Studies in Psychophysiological Veracity Examinations Using the Polygraph" published in *European Polygraph* (2010) regarding the use of confessions as ground truth are particularly significant omissions that begs an adequate explanation. The latter omitted study further presents significant challenges to the use of laboratory studies to validate polygraph techniques, and sets forth guidelines for the conduct of validity studies using field cases.

The omission of this author's study "Psychological Aspects of the Quadri-Track Zone Comparison Technique and Attendant Benefits of its Inside Track" published as the lead article in *European Polygraph*, Vol 5, Nr. 2(16), 2011, which addresses and explains the various 'technical questions' discredited by B. Cushman and D. Krapohl in their presentation at the APA annual seminar in 2010 is of particular concern inasmuch as the validity of technical questions was discussed in the Committee's report. Yet, the APA Committee cited in its References Tuvia Shurany's study, "Polygraph Verification Test" in that same issue of *European Polygraph*, which indicates the Committee's awareness of this author's study.

It is with great hesitation that this author brought forth this most unpleasant task of exposing the cited errors, omissions and apparent bias against research conducted in the private sector which has historically produced most of the original and creative work that generated the polygraph techniques in current use throughout the world.

There appears to be a lack of interest by NCCA² in polygraph techniques developed in the private sector such as the MQTZCT and the IZCT which is unfortunate because most inventions are created in the private sector by individuals who are not hamstrung by government regulations and academic rules that restrain and limit the freedom of thought so essential to the creation of new ideas in technology that undoubtedly threaten the status quo. Hopefully, researchers in Europe, Asia as well as North and South America will develop an interest in conducting field validity studies on the MQTZCT and the IZCT using the Guiding Principles and Benchmarks for the Conduct of Validity Studies published in *European Polygraph*. (Matte 2010a).

References

Abrams, S. (1977). *A Polygraph Handbook for Attorneys*. Lexington, MA: Lexington Books.

Abrams, S. (1989). *The Complete Polygraph Handbook*. Lexington, MA: Lexington Books.

American Polygraph Association (2009, March 31. By-Laws, Division III, *APA Standards of Practice*, Section 3.11.2, 3.11.3, 3.11.4.

² NCCA provides polygraph training to all Federal agencies that use the polygraph.

- Ansley, N. (1997). Book Review: Forensic Psychophysiology Using the Polygraph: Scientific Truth Verification – Lie Detection. *Polygraph*, 27(2), 65–68.
- Backster, C. (2009, September 15). Statement to J. A. Matte by electronic mail.
- Backster, C. (2011, October 15). Sworn Declaration executed in San Diego, CA.
- Barland, G. H., Raskin, D.C. (1976). Validity and Reliability of Polygraph Examinations of Criminal Suspects. (Report No. 76 – Contract No. 75-NI-99-0001. Washington, DC: National Institute of Justice.
- Cushman, B. (2009, August 19). Cushman reply to D. Mangan by electronic mail.
- Cushman B., Krapohl, D. (2010, September). The Evidence for Technical Questions in Polygraph Techniques. A Presentation to the American Polygraph Association, Myrtle Beach. S.C.
- 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, J. 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.
- Gougler, M., Nelson, R., Handler, M., Krapohl, D., Shaw, P., Bierman, L. (2011). Meta-Analytic Survey of Criterion Accuracy of Validated Polygraph Techniques. *Polygraph*, 40(4), 194–305.
- 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. *Psychophysiology*, 1(3), 241–247.
- 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.

Iacono, W.G. (2008). Accuracy of Polygraph Techniques: Problems Using-Confessions to Determine Ground truth. *Physiology & Behavior*, 95(1-2), 24-26.

Imwinkelried, E. J., (1998, April). Book Review: Forensic Psychophysiology Using the Polygraph. *The Champion*, National Association of Criminal Defense Lawyers. Vol. XXII, No. 3, 44-46.

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.

Konieczny, J. (2011). Book Review: T. Shurany, I. Ravid. Evaluation of Polygraph Charts: Formats, Criteria and Scoring. T.I. Pulications 2004, 150 pp.

Krapohl, D. (2008, October 2). Review of Matte-Reuss manuscript by D. Polina for APA Journal, Electronic mail attachment.

Krapohl, D. ((2009, March 3), Review of Matte-Reuss manuscript by D. Polina for APA Journal, Electronic Mail attachment.

Light, G. D., Schwartz, J.R. (1999). The Relative Utility of the Forensic Disciplines. *Polygraph*, 28(3), 240-258.

Mangan, D. J., Armitage, T. E., Adams, G.C. (2008a). A Field Study on the Validity of the Quadri-Track Zone Comparison Technique. *Physiology & Behavior*, 95 (1-2), 17-23.

Mangan, D. J., Armitage, T. E., Adams, G. C. (2008b). Rebuttal to Objections by Iacono and Verschuere et al. *Physiology & Behavior*, 95 (1-2), 29-31.

Mason, P. (1991). *Association Between Positive Urinalysis Drug Tests and Exculpatory Examinations*. Unpublished doctoral dissertation. United States Army Criminal Investigation Command, Baltimore, MD.

Matte, J. A. (1996). *Forensic Psychophysiology Using The Polygraph: Scientific Truth Verification – Lie Detection*. Williamsville, New York: J.A.M. Publications.

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*. Springfield, Illinois: Charles C. Thomas, Publisher.

Matte, J. A., Reuss, R. M. (1989). A Field Validation Study of the Quadri-Zone Comparison Technique. *Polygraph*, 18(4), 187–202.

Matte, J. A. (1989). *Validation Study on the Quadri-Zone Comparison Technique*. Research Abstract LD 01452, Vol. 1902, Ann Arbor, Michigan: University Microfilm International.

Matte, J. A. (2010a). Guiding Principles and Benchmarks for the Conduct of Validity Studies of Psychophysiological Veracity Examinations Using the Polygraph. *European Polygraph*, 4–4(14), 173–198.

Matte, J. A. (2010b). A field study of the Backster Zone Comparison Technique's Either Or Rule and scoring system versus two other scoring systems when relevant question elicits strong response. *European Polygraph*, 4, 2(12), 53–69.

Matte, J. A. (2011). Psychological Aspects of the Quadri-Track Zone Comparison Technique and Attendant Benefits of its Inside-Track. *European Polygraph*, 5–3(17)

Mohamed, F. B., Faro, S. H., Gordon, J. JH., 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*. Washington, DC: Committee to Review the Scientific Evidence on the Polygraph. Division of Behavioral and Social Sciences and Education, National Academies Press.

Nelson, R. (2011, Nov 8). Meta-Analytic Survey Report. Referencing UMI Dissertation. Electronic mail to J. A. Matte.

Nelson, R. (2011, Feb 10). Meta-Analytic Survey Report. Reference recalculation of scores from studies validating polygraph techniques. Electronic mail to J. A. Matte.

Nelson, R. (2011, Feb 11). Meta-Analytic Survey Report. Reference methods of data analysis. Electronic mail to J. A. Matte.

Office of Technology Assessment. (1983, November). *Scientific Validity of Polygraph Testing – A Research Review and Evaluation*, Washington, D.C.

Pollina, D. A., Dollins, A. B., Senter, S. M., Krapohl, D. J., Ryan, A. H. (2004). Comparison of Polygraph Data Obtained from Individuals Involved in Mock Crimes and Actual Criminal Investigations. *Journal of Applied Psychology*, 89(6), 1099–1105.

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., Honts, C. R. (2002). *Handbook of Polygraph Testing*. In M. Kleiner (Ed.), *Handbook of Polygraph Testing*. San Diego, CA: Academic Press.

Reid, J. E. & Inbau, F. E. (1977). *Truth and Deception: The Polygraph (Lie Detector) Technique (2nd ed)*. Baltimore, MD: Williams & Wilkins.

Rovner, L. I. (1986). The accuracy of Physiological Detection of Deception for subjects with prior knowledge. *Polygraph*, 15(1), 1–39.

Shurany, T. (2011). Polygraph Verification Test. *European Polygraph*, 5–2(16), 61–70.

Shurany, T., Ravid, I. (2004). Evaluation of Polygraph Charts: Formats, Criteria and Scoring. T.I. Publications:Israel. ti_publications@intermail.co.il

Shurany, T., Stein, E., Brand, E. (2009). A Field Study on the Validity of the Quadri-Track Zone Comparison Technique. *European Polygraph*, 1–1(7), 5–23.

Shurany, T., Chaves, F. (2010). Integrated Zone Comparison Technique and ASIT PolySuite algorithm: A Field Validity Study. *European Polygraph*, 4(2), 71–80.

Thomas, M. (2002, January 30). Reference textbook: Forensic Psychophysiology Using The Polygraph. Electronic mail to J. A. Matte.

Verschuere, B., Meijer, R., Merckelbach, H. (2008). The Quadri-Track Zone Comparison Technique: It's just not science. A Critique to Mangan, Armitage, and Adams (2008). *Physiology & Behavior*, 1–2, 27–28.