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Deadlines
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Submission of Articles
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In Memoriam

William Claiborn Soper

The APA is saddened to announce that William Claiborn “Bill” Soper passed away on January 20, 2015. Bill joined the APA in January 1991 and became a Full Member in 1996.
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Announcement Regarding the 2015 APA Election Schedule

APA will hold its annual election for Board offices in July. If you are interested in running for office, please take note of the positions being voted this year:

- President Elect (1 year)
- Vice President Government (1 year)
- Vice President Law Enforcement (1 year)
- Vice President Private (1 year)
- Director 1 (2 years)
- Director 3 (2 years)
- Director 5 (2 years)
Applicants must specify which of the seven offices he or she is a candidate. Candidates may run for only one office per year.

Below are important dates to remember

- **May 1 – May 31**: Period to submit nominations and self-nominations in writing to the National Office. Nominations must include a cover letter specifying for which office the candidate is vying.

- **June 1**: Last day to submit a candidate statement up to 500 words for the APA Magazine and the APA website (editor@polygraph.org)

- **June 1 – 7**: Validation of candidates’ eligibility to hold APA office.

- **June 7**: Candidacy letters published on the APA website and in the APA Magazine.

- **July 4**: Email notification of elections (Ensure your email address is current on the APA website)

- **July 5 – 11**: Electronic elections.

- **July 13**: Posting of results on the APA website.

- **August 2 – 8**: Runoff elections, if necessary.

- **August 10**: Notification to winners. Posting of final election results.

- **September 3**: Officers sworn in at the APA Annual Banquet.

For additional information, contact Don Krapohl at APAkrapohl@gmail.com or (803) 463-1096.
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Polygraph Examiner Training Schedule

Academy for Scientific Investigative Training

Basic Examiner Course
September 21 - November 27, 2015
October 5 - December 11, 2015 (Pretoria)

Advanced Examiner Course
July 27 - 28, 2015
October 3 - 4, 2015 (Pretoria)
October 10-11, 2015 (Cape Town)

Basic PCSOT
May 11 - May 15, 2015
November 30 - December 4, 2015

Advanced PCSOT
July 29 - 30, 2015

Forensic Assessment Interview and Interrogation Seminar
September 28 - October 2, 2015
October 5 - 9, 2015 (Pretoria)

Academy of Polygraph Science

Basic Examiner Course (Fort Myers)
April 27 - July 3, 2015
August 31, November 6, 2015

PCSOT Course (Fort Myers)
November 9 - 13, 2015

American International Institute of Polygraph

Basic Examiner Course
April 13 - June 19, 2015 (South Africa)
May 4 - July 10, 2015 (Asia)
May 18 - July 23, 2015 (Atlanta, GA)
August 10 - October 31, 2015 (Atlanta, GA)
September 14 - November 20 (South Africa)

Marston Polygraph Academy
(all listed courses taught in San Bernardino, CA)

Basic Polygraph Instruction (400 hours)
April 6 to June 12, 2015
July 6 to September 11, 2015

PCSOT Basic Course (40 hours)
June 15 to June 19, 2015
September 14 to September 18, 2015

Attention School Directors

If you would like to see your school’s course dates listed here, simply send your upcoming course schedule to editor@polygraph.org.
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5:30-8:30 PM  
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GUEST NAME ON BADGE: __________________________

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___$350 - MEMBER/APPLICANT
___$500 - NON-MEMBER
___$125 - PER GUEST (Cannot Attend classroom presentations)
(Guest fee includes: Sunday Reception, Guest Brunch Monday and Banquet Thursday)

**PAYMENT RECEIVED AFTER AUGUST 13, 2015**
___$400 - MEMBER/APPLICANT
___$550 - NON-MEMBER
___$175 PER GUEST (Cannot Attend classroom presentations)
(Guest fee includes: Sunday Reception, Guest Brunch Monday and Banquet Thursday)

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President’s Message

Raymond Nelson

Spring is here. What that means for some is that mud season is here. For others it means that fishing poles are longer. For myself and the other members of the APA Board of Directors it means that we are about six months away from the next APA Annual Conference. This one is sure to be a great time for all in the great city of Chicago – a terrific place to celebrate the 50th anniversary of the APA.

Today the APA is the largest and most important professional associations for polygraph examiners in the U.S. Additionally, our worldwide influence and membership continue to expand. In practical terms this means that it is now more important than ever for the APA Board of Directors to remain informed of the issues and concerns of its members as individuals – in addition to the important policy and professional practice issues that present to communities across the U.S and across the world. Because the APA is not a regulatory agency, this means that the APA has the role of leading through information and through influence more than through direct regulation.

Recent emphasis on the use of validated techniques and evidence based practices is among the most important things we have done to ensure that our future is met with opportunities to continue to be of valuable service to our communities, agencies and countries. Nowhere is this more important that for those examiners whose daily work involves collecting and verifying information related to community safety, professional integrity, and operational security. So before I forget to say it again, let me take the time to thank everyone who serves their community and country in any way. It can be said that aside from public service all work is a professional and
industrial luxury – no matter how difficult and how tedious.

I hope that I can remain humbly aware that my role is simply to be of temporary service that will hopefully make things a little better for everyone in the future. I can assure all APA members that the APA Board of Directors continues to work diligently with our future in mind. And with that, I hope to see as many of you in Chicago as possible. It is never to soon to plan ahead.

Board of Directors’ Reports

J Patrick O’ Burke
VP Private

All polygraph schools are not equal. There I said it out loud, now I am going to duck! Emotionally, everyone is now saying “yes, and my school was the best”. Cognitively, everyone is now saying “did he just insult me”? Everyone has fond memories and entrenched belief systems from their polygraph school experience. With what is now 32 years ago, I can clearly remember
the student next to me referring to Cleve Backster as “Clyde Backster”. The drawn out “who….” and the incredulous look from School Director Shirley Sturm is burned into my mind. I also remember the framed cartoon on the back wall of the classroom. The cartoon depicted two Native American Indians on a bluff overlooking another group who were seen crouching down below examining something on the ground. One of the men on the bluff said to the other, “when you get too old to hunt, you teach a course in how to read buffalo dung”. I occasionally ponder which group I am in since I teach in school more than I actually conduct polygraph. Often our first and most lasting impression on a subject is what we are taught early. It can be difficult for us to depart from those entry level beliefs. I have a book with the original Keeler School curriculum on polygraph instruction. I also have my original notebook and hand written notes from my polygraph school. Some of what I teach today remains the same, however, some has changed and needed to change. Many in our profession cling dearly to that which was first taught, but we need to think about whether it needs to evolve. My notes and memories are still clear from one of Shirley’s lecture that one day we would express the accuracy from each polygraph exam result as estimate. I did not believe it then, thinking “why, they are either lying or they are not”. And then the “p-value” train ran over me a few years ago. I also remember learning, and later teaching, 23 different criteria for response. Now, I rely on ESS with six criteria and my students are sure much happier. I am not even going to mention psychological set or salience for those of you old enough to cringe. Clearly, we know more about the science behind polygraph than we did thirty years ago, or even ten years ago. Polygraph training therefore has to evolve. Which brings me to the point of this article. What do we want taught in polygraph schools? Better yet, should the APA care what is taught? If so, does the APA have authority to say what is taught, or how training evolves? In a perfect world, every polygraph school director would decide on their curriculum, or would they? We all recognize the multi-disciplinary topics of learning that must be grasped in polygraph. Very few master them all, and what about that person who is just too old to hunt, and now wants to have his own school? Most everyone will acknowledge the importance of that first exposure in school for the new examiner. The APA
has historically demonstrated a desire, and possibly the need, to establish certain minimum standards for polygraph schools. Publishing a minimum standard and then determining if a school has the potential to meet this standard would be more appropriately called “recognition”. Simply stated, “recognition” is a determination that the raw materials exist for instruction. Accreditation is a higher benchmark. It is an evaluation process to determine if the school is actually delivering to the standards that have been established. Accreditation is a lot more work and potentially a cause for significant dispute. Some will say that we may not have the means or the will to do accreditation. Normally, accreditation is accomplished by some outside organization to avoid conflicts of interest. Accreditation can be done internally, but it is a much more difficult process and the potential for accusations of bias are even greater. As an example, accreditation can involve actually testing students after graduation to see if they are capable and minimally competent. This standard test would be used to determine how well, or even if, the school achieved its’ educational goals. For the polygraph field, who writes that standard and validated test? This test would have to be for any graduate from any polygraph school. I am currently involved with a State agency in validating a licensing exam. It is not a simple process. The process is so complex that I suspect the majority of polygraph schools do not have a validated test for their own individual school graduation. If the APA did possess this validated test, what would be the standard for passing or failing, or identifying a need for improvement with respect to the school? The State agency I am supporting wanted 50 field examinations in order to determine if their current state examination was “good or bad”. For some schools that could be from five to ten polygraph schools administered over three or more years for potential evaluation. Do we want to wait that long, and how does the APA act if there think they see a problem in the short term? So, does the APA have the desire, or the authority, to accredit a polygraph school? My opinion is a qualified yes. The upside potential for pursuing my opinion position is that more qualified students would be turned out by polygraph schools. The downside for pursuing this accreditation path is more complex. Accreditation would be all of the following; time consuming, expensive, and leading to unhappy schools and their directors,
increasing the number of dissatisfied students, and cause emotional disagreement from APA members. The normal result of dissatisfaction today is often settled in court and there are very few winners from the legal process, except for the lawyers. Clearly, the one pillar we must cling to is that we should only listen and consider input from those who love this profession. This does not mean those who love their favorite format or style to the exclusion of others. Love means sacrifice, and doing what is best for the profession. Therefore we must be willing to work to achieve shared longevity, coupled with respect from the scientific community. Regardless of your opinion, there will be consequences in choosing. Saying no to school accreditation could mean lowered student quality, and less standardization and acceptance from the scientific community. I am not happy to accept those. Saying yes to accreditation means that it would be very complicated with many “devils in the details”. Personally, I am willing to accept the potential for litigation over a loss of professional competencies. Even so, we must work diligently to avoid court battles, and not foolishly invite litigation, or loss of membership. Another possible step would be to work cohesively to adopt consensus standards for polygraph training. Consensus standards are usually adopted by an industry, similar to ASTM, and not a particular body, like the APA. We have a number of professional polygraph associations in the United States and across the world. There has been and continues to be, a lack of broad based shared input into minimum standards for polygraph training. This can be corrected and would go a long way towards mitigating the potential for court battles. Another possibility is for the APA to permit or allow an outside body to inspect schools for compliance with standards. This has the potential to be both expensive and complicated. The outside entity would need to have fluency in multiple languages and understand the process from a global perspective. There are agencies that already perform these functions, but it would be very costly. Students and agencies will ultimately bear that uptick in cost, probably shrinking our field. My belief is that we have solutions that we can adopt that will mitigate the issues that come with accreditation. They will have to be developed and matured into a sensible process that will help ensure quality and consistency in polygraph training. This offers us
the benefit of having a standardized minimum platform for the “birth” of every new polygraph examiner. However, this accreditation is not our only option. We could look at professional development from the optics of how and what the APA categorizes and does for membership. The APA could redefine and restructure membership. We could tier members into all entry level examiners that would be Associates. One could only become a Full member by testing and continued examination. We could create Accredited members that are only allowed based on training hours, continued examinations and field inspections of work. This membership process could be much like C.A.L.E.A. does for police agencies. I would really like to discuss these potentials further. However, the esteemed editor only allows me so much space. Please stay tuned for my next Journal article. I am hoping that the majority are concerned about this issue and are still in the “hunt”. We will be discussing this issue at the next Board meeting in March. Please let me your Board members know how you feel. I plan to talk with you in Chicago at the 50th Anniversary conference in 2015. I am planning teaching a course in reading buffalo sign. Good hunting!

Daryl Starks
VP Government

My Fellow APA Members,

I hope this communication finds you and your families doing well, particularly following what has been for most of us, a very harsh winter. Come on Spring & Summer! Recently, the Board of Directors met in Baltimore, Maryland at the site of the 2016 APA Annual Seminar & Workshop. Among the many items of business on the agenda was the continued planning of our upcoming APA Annual Seminar & Workshop in the beautiful city of Chicago, Illinois. As a Chicago native, I promise you will experience a city rich in culture, tradition and summer festivities. Hats off to Seminar Committee Chairman Mike Gougler and his entire team for putting together what promises to be a 50th Anniversary seminar to remember! Following our Seminar in Seattle, I was appointed Chairman of an Ad Hoc Committee on APA compliance with polygraph industry standards set for by the American Society for Testing and Materials (ASTM International). As you may know, in 1998 ASTM Committee E-52 (The Committee on Forensic Psychophysiology), was
Chairman Mike Gougler has outdone himself on this one, choosing great programs, wonderful special activities and brilliant speakers to present those programs. I urge everyone to make plans to attend this historic event being conducted not only in one of the most historic locations, Chicago, Illinois, but probably in the most famous hotel in the world, the Palmer House.

In regard to its history, most everyone knows that Chicago is located in the center of the United States on the shores of Lake Michigan. Chicago has become a vibrant, world class city that is rich in history. According to reports from explorers the Illinois Indians were the first people to claim the land they named “Chicugou.” It meant powerful, strong or great and was used by many tribal chiefs to signify that they were “great” chiefs. The first settlers came to the area in 1780 and traded furs with the Indians.

Though Chicago suffered a series of setbacks, including the Fort Dearborn Massacre by a tribe of hostile Indians and the 1812 War Between the United States and Great Britain, it was able to maintain its territorial possessions and expand its boundaries. With the development of the railroad as the
leader in cattle, lumber and wheat industries, by the mid 1850’s as many as 100,000 immigrants came to the city annually seeking land and jobs.

Interestingly, in 1860, Chicago hosted the Republican National Convention which nominated Illinois’ own Abraham Lincoln as the presidential candidate. Other significant events include the Great Chicago Fire in 1871 that destroyed most of the city’s central area. Legend has it that Mrs. O’Leary’s cow allegedly knocked over a kerosene lamp that started the fire. More than 17,000 buildings were destroyed and claimed at least 250 lives. Chicago quickly recovered and within a few years, it hosted the 1893 World Columbian Exposition that claimed 32.5 million visitors.

Today, Chicago is a dynamic and culturally diverse city. It is an international center for both business and leisure travel, due in part to the city’s transportation accessibility, a thriving business community, and world class hotels, restaurants, sports teams, entertainment, shopping, museums, art and other attractions.

Getting on to my job as the APA, Membership Services Committee Director, let me say, we have been busy. Membership continues to build and it is one of the most robust committees of the APA as it deals with a number of areas within our association. One of the aspects of the committee deals with verifying qualifications of new members and related areas. Over the past 4 years that I have been this committee’s director, a significant happening has been occurring, which is the remarkable growth of polygraph examiners from foreign countries submitting applications to become members of the American Polygraph Association. It’s not unusual to see numbers of applicants from Colombia, South Africa, Mexico, Peru, Singapore, United Kingdom, Poland, and Israel just to name a few countries. Speaking of applicants from foreign countries, I came across a bit of humor that I received from a foreign applicant. We had a discussion about how difficult it was to learn the English language and he gave me the following listing that I just had to share with everyone. The list is entitled:

“Reasons Why the English Language Is Hard to Learn”
“The bandage was wound around the wound.”
“The farm was used to produce produce.”
“The dump was so full that it had to refuse more refuse.”
“We must polish the Polish furniture.”
“The solider decided to desert his dessert in the desert.”
“Since there is no time like the present, he thought it was time to present the present.”
“A bass was painted on the head of the bass drum.”
“When shot at, the dove dove into the bushes.”
“I did not object to the object.”
“The insurance was invalid for the invalid.”
“There was a row among the oarsmen about how to row.”
“They were too close to the door to close it.”
“The buck does funny things when the does are present.”
“A seamstress and a sewer fell down into a sewer line.”
“To help with planting, the famer taught his sow to sow.”
“The wind was too strong to wind the sail.”
“After a number of injections my jaw got number.”

“Upon seeing the tear in the painting I shed a tear.”
“I had to subject the subject to a series of tests.”

Let’s face it – English is an illogical language at times. There is no egg in eggplant nor ham in hamburger. We don’t have either apples or pine in a pineapple. English muffins weren’t really invented in England or French Fries in France. There’s so many things that are strange, like boxing rings are really square. Also, there’s those other controversies we hear about in grade schools, like “If the plural of tooth is teeth, why isn’t the plural moose, meece? There are other questions like we ship by truck and send cargo by ship. We have noses that run, and feet that smell? How can a slim chance and a fat chance be the same, while a wise man and a wise guy are opposites? How can overlook and oversee be opposites?
Anti-Trust Statement

It is the clear intent of the American Polygraph Association (hereinafter APA), its Officers and Members to be in complete compliance with all federal and state anti-trust rules, regulations and amendments thereof and to uphold the highest standards of ethical and legal behavior as professionals involved in the detection of deception.

Numerous state and federal laws absolutely prohibit the exchange of information among competitors regarding price, refusals to deal, or agreements to proceed in certain anti-competitive respects, and that no such exchange of this information is either sanctioned by APA or will be permitted during meetings, conferences, educational seminars or any other professional or social gatherings. This is a very serious matter and your cooperation and adherence to these standards is expected.

The APA shall not, nor shall any of its Officers or Members, in any fashion whatsoever attempt to lessen competition or fix prices arbitrarily or to create a combination or pool in violation of the laws of any state.

These policies and procedures apply to all Officers, Boards, Member, Committees and meetings sponsored by or in which the APA participates and all activities by the membership within their scope as members of the APA. All meetings of the APA, regardless of the subject matter or the level of
participation of the membership of the APA shall be conducted as though they were open to the public.

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An old friend sent me this 1980 article published by the Texas Association of Polygraph Examiners. The article was written by one of our associate editors, David Raskin. While reading it I was struck by the author’s advice, warnings and predictions. Though written over 35 years ago, much of it either came to be - or is still true. The underlying message was for the profession to come together, embrace science and self-regulate, lest we be relegated to pseudoscience.

The author’s concerns for screening are still applicable today and they now extend to the realm of the ever-expanding use of polygraph in Post-Convicted Sex Offender Testing. Fortunately the APA recognized a need for a model policy in PCSOT to guide examiners and created one. Raskin’s concerns about pre-employment screening are as real today as they were in the 1980s. Again, the APA has published model policy to address this for those examiners seeking guidance.

I believe the gap between scientist and practitioners has narrowed since the original publication of this piece. The 2011 APA meta-analytic review of polygraph validity answered the author’s call for improved accuracy and error estimates. A recently published edited text by the author and his colleagues, Credibility Assessment, provides work from some of the world’s leading experts on the subject. More examiners are coming to understand the polygraph as a science-based test, rather than as an interrogation-based art. Finally, many examiners are learning to appreciate polygraph test results as probabilistic – and not deterministic.

I hope you appreciate the article reprinted here with gracious permission of the author and the Texas Association of Polygraph Examiners.
Science and the Polygraph Profession

David C. Raskin
University of Utah

In the last few years there has been substantial growth in public interest and awareness concerning the application of polygraph techniques in law enforcement, the criminal justice system, employment screening, and the resolution of political issues. Disclosures of polygraph results frequently make headlines and national new stories, not all of which are flattering to the polygraph profession or designed to inspire confidence among law enforcement officials, the courts, and legislative bodies. As a result of increasing applications and public awareness, the ultimate fate of polygraph techniques is rapidly approaching the moment of truth — will they survive, and if so, in which forms and for which purposes?

There are traditional supporters and opponents of the use of polygraph techniques. In general, the strongest reservoir of support has been found among civil libertarians, the academic-scientific community, and the unions. The legal community and the judiciary have been moving slowly and cautiously in the direction of increased acceptance, but it is a sometimes painful and erratic process. We might ask ourselves why there is such reluctance to move decisively toward judicial acceptance of polygraph evidence and such escalating clamor in public and legislative arenas for the abolition of employment screening. I believe that the answers can be found in the relationship between science and the polygraph profession.
Although there is a long history of interest and mutual interaction between the scientific endeavors of some psychologists, psychophysiologists, and criminologists and consumers of such information, especially in law enforcement, until recently there had been little scientific research of direct relevance to the application of polygraph techniques in the field situation. The paucity of such data has combined with a growing distrust and tension between the academic-scientific community and the polygraph profession. That situation has been substantially exacerbated by the publicly stated positions of some scientist (including me on some occasions), but more so by the failure of the polygraph profession to incorporate systematically and objectively the growing scientific literature on the merits and limitations of polygraph techniques and the specific findings reported. That is where the problem must faced if polygraph techniques are to attain their proper position in our social structure.

The problem which confronts the polygraph profession, is twofold: which applications of the polygraph can be clearly supported by scientific research and which cannot? And, which specific techniques should be used and how accurate are they? The failure to address those issues in an objective and forthright manner has engendered disdain among the academic-scientific community and provided ammunition for efforts to eliminate polygraph techniques entirely from the scene. Were it not for their long established utility in law enforcement, there might not be any polygraph profession today. Fortunately, it has survived in spite of such recent disasters as the public disagreement in the Senator Talmadge hearings, reports of major Watergate conspirators “passing” polygraph tests, the reappearance of the wife of an alleged wife-murderer who “failed” his polygraph test, the mayor and soon to be mayor of Chicago both “passing” their polygraphs in a direct dispute, the sordid story of the “polygraph examination” in the national best-seller and TV drama “A Death in Canaan”, and many, many more. How do we correct the situation?
The polygraph profession must embark on a systematic effort to upgrade itself in terms of both education and application. One of the major deficiencies is the lack of adequate training in physiology, psychology, and scientific methodology. As a result, many examiners are unaware of the basic principles of interviewing techniques with regard to establishing the optimal psychological atmosphere for each subject, the intricacies and subtleties of question formulation and their introduction to the subject (especially control questions), and the administration of the test. These problems indicate a generalized insensitivity to the role of personality factors and psychological processes.

Even more distressing is the frequent lack of adequate training in the basic psychophysiology of the response measures and the interpretation of polygraph charts. It is appalling to read some of the clearly erroneous and uninformed statements and explanations concerning physiological mechanisms and measures, which appear in polygraph texts and training materials. Furthermore, there are many leading schools and renowned individuals that teach "global" chart interpretation, argue against the use of the galvanic skin response (scientifically shown to be the most consistently useful measure), train examiners to ignore reactions which precede the end of the question (although they are well established as the most useful), consider drops in cardio and respiration baselines as reactions even though they are not, and resist efforts to employ numerical evaluation of polygraph charts in spite of repeated demonstrations that it is far superior to any other method of chart interpretation.

Along with the alarming state of training and knowledge, there are still leading examiners and schools that advocate the general use of scientifically indefensible techniques and claim accuracy rates which exceed 99%. It is no wonder that the list of public horror stories grows daily. The failure to use the best available techniques and the lack of familiarity or willingness to acknowledge the scientific
literature concerning accuracy rates and risks of errors has resulted in reckless statements and glaring errors. This can do great harm, especially in the criminal justice system or the public arena.

Finally, the problem of pre-employment screening must be dealt with objectively if the polygraph profession is to survive. Against a background of substantial scientific support and useful, legitimate experience with polygraph examinations in specific situations, the commercial pre-employment screening test falls far short of the mark. Virtually everyone will agree that there is not a shred of scientific evidence concerning the accuracy of employment screening. Furthermore, there are legitimate concerns about coercion, invasion of privacy, and subterfuge in their application. Almost all examiners with whom I have discussed the subject will privately admit that the effectiveness of employment screening derives from the atmosphere which is conducive to admissions against interest, not to the accuracy of the polygraph outcome. However, their public position is quite different. By clinging to such an approach in the face of mounting, legitimate opposition, the polygraph profession risks losing everything. The rising tide of legislative actions bears witness to that warning.

As the applications of polygraph techniques grow in public visibility and use in the criminal justice system, the polygraph profession must make greater efforts to meet the challenge and provide its valuable services to society. It must voraciously digest the growing scientific literature, it must improve its training programs, it must employ the latest research findings to refine its techniques, and must adopt a public posture of a true profession, abandoning extravagant and unsupportive claims of accuracy along with socially offensive and indefensible techniques. It is time that vested economic interests and inflated egos give way to a professional approach based on scientific foundations and a dedication to public service.
Uncertainty.

In order to appreciate the word “uncertainty” as the best one-word answer to this important question, it is helpful to first have a broader understanding of polygraph and testing, including the following concepts:

• **No unique physiology associated with deception:** all physiological phenomena have multiple purposes and there is no physiological response or behavior that can function as a deterministic indicator that is uniquely associated with lying or deception.

• **Recorded data are a proxy for deception or truth telling:** polygraph data are physiological responses for which there is a statistically significant relationship with the criterion states of deception and truth-telling. Data from multiple proxy signals can be combined in a reproducible quantitative structural model (recipe) to optimize the effective classification of deceptive and truthful cases.

• **No such thing as a perfect test:** tests are needed and used when we want to evaluate amorphous phenomena that cannot be subjected to mechanical/physical measurement.

1 This is the last of an unplanned series of essays involving the title theme “What does the polygraph measure.”
(subject only to mechanical measurement error) or perfect deterministic observation. We do not need a test when it is possible to observe deterministic phenomena or when we can measure something directly.

- **Polygraph results are probabilistic - not deterministic:** determinism is the notion that there is only one possible outcome and no possible alternatives. Deterministic outcomes are always be exactly the same regardless of human choice, behavior, or random chance. Polygraph results cannot be deterministic, because there is no unique physiological lie response, and are therefore probabilistic.

- **Differential salience:** the operational construct underlying the comparison question polygraph is that autonomic responses vary significantly to different types of test stimuli (relevant and comparison questions) as a function of deception and truth telling regarding the relevant investigation target issues. The basis of observed responses can be thought of as originating in cognition, memory, emotion and behavioral conditioning relative to the test stimuli. It is not assumed that truth and deception are physiologically or psychologically different as a function of the topic or investigation target. It is assumed only that differences in response to different types of test stimuli can provide information about the salience of the stimuli, and that differences in responses can be normed and evaluated probabilistically for deception and truth-telling.

- **Reference data:** statistical reference data are a scientific knowledge-base that describe the numerical scores (location, dispersion and distribution shape) that are normally observed or expected among deceptive or truthful persons. These data are used as a basis for comparison to determine the level of significance of an observed test result.

- **Categorical results are a simplification of probabilistic results:** test results can be interpreted categorically as statistically significant or not statistically significant, or any another categorical descriptor (e.g., positive, negative, inconclusive, no opinion, DI, NDI, SR, NSR, NO) when the test score exceeds an established numerical cutting score or when the probability of error is less than or equal to a previously declared tolerance for error. Categorical results allow for simple and convenient interpretation by persons not trained in the interpretation of probabilistic test results.

- **Polygraph does not measure lies per se:** lies are not a form of physical substance and there is no unique physical response activity that can be used to achieve either
deterministic observation or mechanical measurement of deception. The term “lie detector test” is simply a term of convenience. Polygraph test results are a measurement of the uncertainty surrounding a categorical conclusion of deception or truth-telling.

All forensic and scientific test results are measurements of the margin of error or uncertainty surrounding conclusions about phenomena that cannot be subjected to perfect deterministic observation or direct physical measurement. Tests are needed and used to make objective conclusions about things for which neither simple deterministic observation nor mechanical/physical measurement are possible. All scientific test results are imperfect and are therefore probability statements, and all conclusions based on scientific evidence – including test results - are made relative to some alternative (but that is for another discussion).

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Where There is Doubt, There is Freedom

Tuvya T. Amsel

History is filled with scientific theories that were later proven to be wrong. Cold fusion, phrenology, the discovery of the planet Vulcan, luminiferous ether, and expansion of the Earth are just a few examples. The fact that a theory was later proven wrong is not necessarily a bad thing. As astrophysicist Bernhard Haisch, says: “advances are made by answering questions, discoveries are made by questioning answers”. We grow, develop and advance through trial and error- the more we practice from the later the more advances we make.

A problem arises when researchers and scientists protect their theories zealously, as though their theory is the absolute truth. By doing so they reject other theories and actually act in an unscientific manner. As the British philosopher Bertrand Russell...
put it: “The whole problem with the world is that fools and fanatics are always so certain of themselves and wiser people so full of doubts”. Or as Plato put it: “We can easily forgive a child who is afraid of the dark; the real tragedy of life is when men are afraid of the light”.

Through history there were scientists who gained respect to the point that their vanity blurred their vision and judgment and made them forget what Carl Popper the science philosopher said: “The answers are transitory, the questions are immortal”. A recent demonstration is the case in were Dr. Anil Potti, a cancer researcher at Duke University Medical Center claimed to develop a genomic tests that looked at the molecular traits of a cancerous tumor and figured out which chemotherapy would work best. A research assistant reported potential problems to Joseph Nevins, a senior scientist and the research co-author, but his concerns were ignored. These problems eventually resulted in the termination of clinical trials and the subsequent retraction of publications. Statisticians who reviewed the research data found various errors that were explained by the research team as “clerical errors.” In spite of all this the research was published. The alarmed statisticians published their analysis but they were ignored as well.

The researchers had even set up a company and planned to sell their test to determine appropriate cancer treatments. The saga ended ONLY when a trade publication reported that Dr. Potti had falsified parts of his résumé.

Sticking rigidly to your research results without being open to yet unproven ideas ignores what Albert Einstein expressed when he said: “When I examined myself and my methods of thought, I came to the conclusion that the gift of fantasy has meant more to me than my talent for absorbing positive knowledge”. This also disregards Isaac Asimov statement: “The most exciting phrase to hear in science, the one that heralds new discoveries, is not ‘Eureka!’ (I found it!), but ‘That’s funny...’” To do so is totally wrong (and wrong is an understatement.)
Examiners be cautious

Recently we witness a growing tendency of “manualizing” everything. Books such as “How To…”, “…for Dummies” and the like, suggest remedies to all aspect of life. While believing in the necessity of protocols and checklists, the downside is that following the protocol rigorously may turn the polygraph examiner into a technician in where discretion and flexibility is a required commodity that enables the examiner to handle examinees who are not the “text book” models but rather unique individuals.

Technicians must master a set of predefined, step-by-step rules and procedures and follow them exactly. Examiners, on the other hand, must have technical aptitude plus a sense of sensitivity, creativity, and flexibility in order to adjust and react to the ever-changing conditions of polygraph tests. An examiner should have the same productive and successful interpersonal communication with a teenager as they do with an elder adult. They should be as conversant with an uneducated examinee as they are with a university professor or a CEO. Successful examiners must be able to adapt to a variety of topics and many different types of cases.

Conclusion

Examiners should internalize the rule that: “You don’t alter the examinee to the technique but rather alter the technique to the examinee.” A test should be tailor-made and not a mass production product.
The following vocabulary items were selected for their relevance to the basis of the polygraph test as a scientific and probabilistic test. Although these are not the operational concepts that field examiners work with each day, and the goal of this vocabulary list is not to provide a complete definition of these constructs, nor to encourage a requirement to memorize their definitions. Instead, it is that it will be helpful to for polygraph examiners to develop a basic familiarity with these conceptual ideas, in addition to practical expertise, as a foundation for professional and scientific competence that will more readily support the incorporation of future
advancements into field polygraph methodologies. These are not the operational concepts that field examiners work with each day, and the goal of this vocabulary list is neither to provide a complete definition of these constructs, nor to encourage a requirement to memorize their definitions. It is suggested to simply read and these vocabulary concepts in five minutes or less – and re-read them if necessary - so that increased familiarity with the conceptual vocabulary of scientific testing can support the continued development of evidence-based field practice policies for the polygraph test.

- **Classification:** the process of assigning a categorical label to an object based on observable characteristics. Polygraph tests are intended to classify statements as truthful or deceptive when a person answers simple closed questions.

- **Decision theory:** a framework for choosing actions or alternatives based on known, though limited, input information, with the goal of minimizing adverse outcomes that occur in a context of some uncertainty. Decision theory can be used in the polygraph context to choose decision rules and cutting scores that optimize certain aspects of test accuracy and error rates.

- **Deterministic:** any system or process that involves no randomness or error. Deterministic models are also not subject to interference from human behavior, and are theoretically perfect. Evaluation of deterministic models is a matter of making conclusions by observing outputs for which there are no possible alternatives for each input. Output or results from deterministic models are always the same. Evaluation of polygraph test data is non-deterministic in that results are always probabilistic because there is no physiological response that is unique to deception.

- **Inference:** the process of reaching conclusions based on accepted assumptions about known and unknown information. Logical inference is based on descriptive information. Statistical or probabilistic inference is the process of drawing conclusions about the larger unknown population based on what is observed through analysis of mathematical and statistical relationships within the sampling data. Inference in scientific testing is a process of calculating or estimating statistical values associated with conclusions about a case or observation based on knowledge from other available data. Conclusions and classifications made without statistical inference can be said to be non-probabilistic, and can be accomplished either in the form of structured algorithmic rules or through unstructured clinical intuition. Non-probabilistic inferences can be useful when it is not important to know the margin of error or uncertainty associated with individual case outcomes. Polygraph testing is a process involving probabilistic that it is useful to calculate or estimate the uncertainty associated with conclusions regarding individual test or case outcomes.

- **Information theory:** a branch of applied mathematics involving the quantification of data. A fundamental principal of information theory is that all attempts to quantify data
are inexact approximations and are therefore fundamentally statistical (as opposed to the perspective of positivism, which holds that sensory observation is the only source of correct knowledge). Information theory does not attempt to separate estimation from measurement, and measurements may be given in terms of a range of possible values. The principles of information theory can be observed in the polygraph context when statistical estimations are provided in terms of confidence intervals that describe the range of possible values in which the correct or true value is likely to exist.

- **Ipsative:** refers to practices in scientific testing in which information is obtained in terms of a comparison or forced choice between two alternatives. Ipsative procedures can also be used to compare data with information from the same individual, instead of comparison with normative data, and can be useful for measuring progress or change. Ipsative principles are used in the polygraph testing context when comparing the reactions of individual in response to different types of stimulus questions.

- **Measurement:** the collection of quantitative data and the assignment of numbers to events or objects, often in terms of counts, ratios, proportions, or physical units of measurement. Measurement may start with an initial intuition or guess, and then proceed to apply measurement instruments. The purpose of measurement is to reduce the uncertainty associated with a quantity for which the data are assumed to have some portion of random noise. Harvard psychologist Stanley Smith Stevens described four types of measurement data - nominal, ordinal, interval, and ratio - in 1946, though measurement in the sciences is sometimes more strictly defined as the determination or estimation of ratios (for which there is a non-arbitrary zero point). Scientific polygraph testing requires the measurement or quantification of responses to test stimuli, and the comparison of those responses with measurements, derived via estimation theory, of the population parameters for deception and truth-telling.

- **Model:** a systematic description used to represent and convey information about the characteristics of an object or phenomena. Scientific models can be conceptual, physical, theoretical or mathematical. Scientific models provide a tangible instance to facilitate the systematic study of abstract, intangible or amorphous phenomena and can therefore be useful in testing. Though always limited in the extent to which they can represent reality, all models will involve both a set of information and a structural description of the information. Testing models in the polygraph context are designed to evaluate a structural combination of physiological responses that are known to be correlated with differences between truthful and deceptive persons.

- **Normative:** refers broadly to a standard or ideal model. Normative ethics are philosophical statements about how things ought to be, or what things are good or bad, and what actions can be said to be right or wrong. Normative data describe what is usually observed in a defined
group or population. A common strategy when attempting to calculate statistical estimates of an unknown population parameter is to rely on the central limit theorem, which holds that the means of random sampling means will converge at the population mean. Normative data can be used in the polygraph context to estimate the uncertainty associated with a test result by comparing the result with our knowledge-base regarding the populations of truthful and deceptive persons.

- **Pseudoscience**: activities or ideas that may superficially appear to be, or may be intended to be, scientific but lack the basic requirements of science in terms of testability, falsifiability, and the rejection of professional practices based on false or unsupported hypotheses or ideas. Pseudoscientific ideas and practices are isolated from other forms of science, lack ability to advance synergistically with other fields, and may involve a central authority figure and an overemphasis on holism that prevents systematic analysis and scrutiny. The term “junk-science” has also been used to describe pseudoscientific ideas and activities. “Cargo-cult-science” is a term sometimes used to describe ritualistic practices that may appear as if intended to be goal directed though they are controverted by evidence or inconsistent with reality.

- **Science**: the systematic acquisition and development of knowledge through the scientific method of hypothesis and observation of data or evidence, with a fundamental requirement replicability and reproducibility. Scientific hypothesis are testable and falsifiable suggestions about how the reality and the universe works. Untestable and unfalsifiable ideas are not scientific. Hypotheses that are not supported or controverted by evidence are said to be false. Scientific theories are those ideas that are supported by evidence, though they are always incomplete and subject to change with new emerging evidence. Laws in science are foundational ideas that are not likely to ever change. Because human knowledge is limited, and there is always more to learn, scientific conclusions are made by comparing the strength of evidence relative to some alternative. Although practitioner skill and competence remain important, polygraph testing makes use of the practical application of numerous fields of science, including psychology, physiology, information theory, test theory, decision theory, signal detection, measurement theory, statistical learning and others. Polygraph tests can be thought of as a form of single-subject scientific experiment that compares the strength of evidence, in the form of responses to different test stimuli, for potential alternative or categorical conclusions.

- **Signal detection**: a conceptual framework for analyzing decisions in the context of uncertainty. Signal detection theory is used to quantify the discrimination of signal information, present in patterned data, from noise resulting from random noise variation in the data patterns. Signal detection is a process of regarding potential conclusions as different hypotheses, each of which may have correct hit and false hit rates that can be associated with identifiable cost functions. Signal detection theory can be used in the polygraph context to optimize decisions, outcomes, and risks associated with probabilistic test results.
• **Signal discrimination**: the application of signal detection to problems involving two or more alternative classifications. Whereas signal detection tasks involve the discrimination between signal and noise with the goal of determining the presence or absence of the signal (Yes or No), signal discrimination tasks involve the identification and classification of different types of signals (A or B) where the presence of a signal may not be in question. The categories for signal discrimination in the polygraph testing context involve truth or deception.

• **Test**: a procedure for submitting a hypothesis, question, or assumption to quantitative analysis. The purpose of any test is to obtain evidence to support or refute a conclusion. All tests are probabilistic because they are neither physical measurement nor deterministic observation. Fundamental to test theory are the assumption of the existence of errors of measurement that can be characterized as a random variable, and the concept of correlation—a mathematical relationship between the test stimuli and response outcome categories. Test theory assumes that each person has a theoretical true score (referred to as universe score in generalizability theory) that is never actually known but would be obtained if there were no errors of measurement. Although only the observed test score is actually known, the true score is defined as the expected score over infinite iterations of the test. Test theory can be observed in the polygraph context in the use of multiple related test items that are repeated multiple times to achieve a more accurate estimate of the true score.

• **Uncertainty**: refers to something that is unknown, partially unknown, or partially unobservable. Uncertainty can refer variously to the present state of an object, to future outcomes, or to our knowledge regarding past outcomes. Uncertainty is related to but distinct from risk, which refers more specifically to undesirable effects from an outcome. Uncertainty in the testing context refers to stochastic outcomes, that include some degree of random variation, and are therefore non-deterministic and imperfect. Uncertainty in the polygraph context can be quantified by the calculation and assignment of probability densities to test results, and the use of scientific theories including decision theory, signal detection, signal discrimination, and statistical learning theory, to formulate procedures and decision outcomes that optimize desired objectives such as the maximization of correct classifications or minimization of test errors.

Reading list available on request
He Didn’t Do it

“My client says he didn’t do it.”
“Do what?”
“Sexually molest his five year old stepson. He wants to take a polygraph test to prove it.”
“Have criminal charges been filed?”
“Yes, here is a copy of the Criminal Complaint.”

Count I: On or about and between April 25, 2014 and July 19, 2014 defendant Joseph J. Pasqualli did, within the County of Sasquash, State of California, commit a felony, to wit the sexual molestation of a minor child under the age of twelve years, to wit oral copulation, in violation of Section 288a of the California Penal Code.

About the author: Michael Lynch is a Primary Instructor with Marston Polygraph Academy. He can be reached at mlynch@lawyerspolygraph.com. The opinions and comments expressed in this article do not necessarily reflect those of Marston Polygraph Academy or the American Polygraph Association.
The Time of Reference – The specific time period(s) upon which the test questions will focus.

. . . On or about and between April 25, 2014 and July 19, 2014 . . .
“Does your client understand the Time of Reference, when the act or acts allegedly took place?
“Yes, he says he had no contact, sexual or otherwise, with the minor during that period.”

The Frame of Reference – The allegations under indictment, pending court action, criminal conviction, civil judgment or pending investigation which an examinee declares to be untrue. The primary issue in a polygraph examination relating to an indictment, court action, criminal conviction or civil judgment.

. . . the sexual molestation of a minor child under the age of twelve years . . .
“Does your client understand the Frame of Reference, the elements of the Penal Code with which he is charged?”
“Yes, I have read the section to him and he says he understands it.”

The Target Issue – The behavior that forms the basis of the polygraph examination technique, format and test questions. The behavior denied by the examinee.

. . . to wit oral copulation . . .
“Has your client been informed of the Target Issue, the specific behavior the minor child alleges?”
“Yes, he has read the transcribed statement the child gave to the police.”

“As Count 1, if the Criminal Complaint contains all of the elements required in test question construction, I will only ask your client if any part of that document is true and correct. If your client believes his answer to the relevant question, you can take my opinion of no deception indicated to the prosecutor and ask for dismissal of the charge.

“What is the relevant question will you ask my client?”
“I will test his credibility using a Utah Zone Comparison test format. This test has been validated for use as an evidentiary format. I will ask him the same relevant question worded differently:”
Is any part of Count I the truth?
Concerning Count I of the Criminal Complaint, is any part of it the truth?
Is any part of the Criminal Complaint filed against you the truth?

“What if my client does not believe his answer to the relevant question?”
“If your client does not believe his answer to the relevant question, he can invoke attorney client privilege and my test and my opinion will never be revealed.”

“It sounds like a win-win situation for all concerned; go ahead with the test.”

“//
“I have informed your client of the results of the examination and my opinion thereof. Using the requirements of validated test data analysis, your client scored a minus 9 points. He does not believe his answer to the relevant question.”

“Thank you for your opinion. I think we will invoke attorney client privilege.”
This cartoon was published originally by the Tennessee Law Review Association, Inc. in 22 Tenn.L.Rev. (February 1953)
1. **(Before conducting the exam) Locate the normative reference table for the test question format and test data analysis method**
   - Reference tables are error statistics that indicate the expected proportion of false-negative errors for truthful classifications and the expected proportions of false-positive errors for deceptive classifications

2. **(Before conducting the exam) Determine the alpha boundaries and numerical cutscores.**
   - Alpha is commonly set at .05
   - Alpha = .01 for increased precision (increased non-significant/inconclusive results)
   - Alpha = .10 for decreased inconclusive results (increase error rate)
   - Alpha is an administrative decision, often not determined by field practitioners
   - Locate the largest error statistic that is smaller than the required alpha boundary, then determine the numerical cutscore in the adjacent column
     - Alpha for truthful classifications
     - Alpha for deceptive classifications
       - For subtotal scores of diagnostic exams divide alpha by the number of RQs to get the Bonferroni corrected alpha. Then locate the largest error statistic that is smaller than the corrected alpha and determine the subtotal cutscore in the adjacent column

3. **(After conducting and scoring the exam) Calculate the test error statistic using the correct reference table for the exam format and scoring method**
   - **Event-specific diagnostic exams**
     - Grand total score: locate the grand total score and determine the p-value (probability of error) in the adjacent column
     - Sub-total scores: Locate the lowest sub-total score and determine the p-value in the adjacent column
   - **Multiple issue screening exams**
     - Negative scores: Locate the lowest sub-total score and determine the p-value in the adjacent column
     - Positive scores: Locate the lowest sub-total score and determine the Sidak corrected p-value in the correct column for the number of RQs

4. **Interpret the result (translate the numerical and statistical result into usable human language)**
   - **Decision rules**
     - **Event-specific diagnostic exams**
       - Grand total rule: simplest and most accurate
       - Two-stage rules: increased sensitivity and decreased inconclusives
     - **Multi-issue screening exams**
       - Sub-total score rule: use only the lowest sub-total score
   - **Report the results:**
     - Analysis method: evidence-based, norm-referenced, standardized
     - Numerical and statistical results: score, cutscore, p-value, alpha
     - Use of any statistical correction: Bonferroni or Sidak when used
     - What is the empirical meaning of the numerical and statistical result?
     - What is the simple categorical conclusion?
The Seasoned Polygraph Examiner

By Donald J. Krapohl
Many of you may be familiar with the comedian Jeff Foxworthy. Mr. Foxworthy is famous for his standup routine where he regales audiences with his life experience as a “redneck.” For my international friends who may not be familiar with “redneck,” it is an expression used in the US, typically denoting working-class people in the southern United States from rural areas. “Redneck” at one time was considered a term of derision, but not as much today. Mr. Foxworthy, through his comedy, has pointed out that rednecks don’t just come from the American South, but are everywhere. We all do silly things that suggest we are sometimes ignorant of etiquette, educationally challenged, or take crazy risks to show off in front of our friends. Mr. Foxworthy celebrates these individuals as having a “glorious absence of sophistication.” We all know rednecks, and though we hate to admit it, all of us have had one or two personal experiences in redneckedness.

Jeff Foxworthy’s most famous routine is where he talks about the indicators for being a redneck. The line starts out with a description of often-outlandish behavior, and finishes with “…you might be a redneck.” For example: If you ever financed a tattoo, you might be a redneck. Or, if you ever mowed your lawn and found a car, you might be a redneck. Or, if you ever lost a tooth opening a beer bottle, you might be a redneck. You get the idea.

Jeff Foxworthy’s routine got me to pondering about another group that I think can be distinguished by its unique behavior: the old-time polygraph examiner. Let us, for the sake of politeness, refer to them as “seasoned examiners.” As a “seasoned examiner,” I have come to recognize my peers by some of the shared things we do and say and know that are very different from the new generation of examiner. We all ran a lot of analog polygraphs, for example. Many of us have run more cases than we can accurately count. We have used our honed persuasive skills outside of the test room in less noble endeavors, such as wooing companionship or negotiating with car dealers. We remember a time before the Employee Polygraph Protection Act (EPPA) when the field was very different from what it is today. We get pretty good at catching lies in ordinary conversation, or at least we have become completely convinced that we are. And, in unguarded moments we betray the fact we can sometimes be cynical about our fellow citizens. I mean, really cynical.

Yes, being a polygraph examiner for a long time slowly shapes and forms us into something distinct from most other people, but without looking too
hard we can find some humor in it, too. So, in the vein of Jeff Foxworthy I have thrown together a few thoughts about how you can tell if “you might be a seasoned examiner.” Enjoy!

If you can correctly describe any three of the following: staircase, double saddle, vagus roll, devil’s finger, brass bellows, pen wire, or pip switch, you might be a seasoned examiner.

If you have ever been caught “theming” a loved one, you might be a seasoned examiner.

If you ever said “Naw, computer polygraphs are just a fad,” you might be a seasoned examiner.

If you shouted “liar” at your television when first watching Bill Clinton’s denials about Monica Lewinski, you might be a seasoned examiner.

If you ever had an ink stain on the bottom side of your writing hand in the shape of a cardio pattern, you might be a seasoned examiner.

If you find you naturally lean left when seated, you might be a seasoned examiner.

If you catch yourself saying “DoDPI” (or for the truly seasoned, “USAMPS”) instead of NCCA, you might be a seasoned examiner.

If you can competently do a Card Stim, you might be a seasoned examiner.

If you’d rather others did not know of some of your testing practices before EPPA, you might be a seasoned examiner.

If you can remember APA seminars where some of the really good polygraph education took place in the hotel bar, you might be a seasoned examiner.

If you’ve ever lost a good shirt to ink spray when an examinee “accidently” touched the GSR plates together, you might be a seasoned examiner.

If you ever resorted to using a ruler to get better pneumo tracings, you might be a seasoned examiner.
If you have a first-hand recollection of stuff that’s now taught in the polygraph school history block, you might be a seasoned examiner.

If your chief credential is how many thousands of exams you’ve run, you might be a seasoned examiner.

If you ever ran a “one lung” polygraph, you might be a seasoned examiner.

If you lived on microwave popcorn for lunch for more than a month, you might be a seasoned examiner.

If you used to think that all polygraph techniques were validated, you might be a seasoned examiner.

If, following a night of “recreation,” you tested without noticing you had put the GSR pen in a pneumo pen cradle, you might be a seasoned examiner.

If you’ve tested more than six examinees a day, five days a week, you might be a seasoned examiner.

If you had to diagram the inner workings of a polygraph to pass your polygraph school, you might be a seasoned examiner.

If you reminisce wistfully to the age when polygraph gurus decided for us what we should do, you might be a seasoned examiner.

If your strongest argument against the findings of a polygraph research article begins with “I had this case one time…”, you might be a seasoned examiner.

And, finally:

If you ever left the office for a test in a hurry and ended up having to run charts on both sides of the paper, you absolutely ARE a seasoned examiner.

If only a couple of these apply to you, you’re probably okay. More than eight and you’re starting to venture into “seasoned” territory, and if you can relate to 15 or more, it means younger examiners are probably laughing at you behind your back.
The Concealed Information Test (CIT) is a form of lie-detection test that can be used by polygraph examiners during criminal investigations when detailed critical information about the crime is unavailable to the public. Instrumentation for the CIT can include some or all of the standard polygraph sensors—electrodermal, plethysmograph, cardiograph, pneumograph, and activity sensor. Numerical analysis often includes only the electrodermal channel using the Lykken scoring system (Lykken, 1959; 1998). A well-deserved interest in the CIT appears to be afoot, given the number of related articles and books appearing of late. One example is Memory Detection-Theory and Application of the Concealed Information Test (Verschuere, Ben-Shakhar and Meijer, 2011). This treatise on the CIT is composed of works by the leading experts in the field of the CIT, including one of our associate editors, Don Krapohl (Krapohl, 2011). The book bridges the gap between practitioner and researcher and offers exceptional insights into practical ways to develop CIT exams. The book is a must-read for examiners wanting to claim a depth of knowledge in the subject of the CIT, especially those who teach the CIT technique.

During our review of the published literature on the CIT we became aware of a potential misunderstanding for how to evaluate the CIT results. Arguably one of the most informative references on conducting the CIT is from our own journal Polygraph (Krapohl, McCloughan, & Senter, 2006). That article gives detailed instruction on the CIT including: training non-polygraph examiners on crime scene details, gathering case-related information, constructing CIT questions, pretest practices, conducting the CIT exam, and
evaluating the electrodermal responses with the Lykken scoring system. Unfortunately, their section on decision rules and their Table 1 have been a source of confusion for some readers.

We sought to clarify the decision rules for the Lykken scoring system and probability based inferences for test results. This article will serve only as a supplement to the Krapohl et al. work, and readers are directed to that publication for more complete information on the administration of the CIT. The goal of this article is to help polygraph examiners and referring professionals make better use of the CIT by having a clearer understanding of the meaning of the test result.

Authoritative sources on the CIT recommend using the Lykken scoring system for test data analysis (Krapohl et al., 2006; Lykken, 1959; Lykken, 1998; Meijer, Verschuere, & Ben-Shakhar, 2011). A number of published studies have used the Lykken scoring system to report on CIT accuracy (Elaad, 1998; Lykken, 1959; MacLaren, 2001). Briefly, the Lykken scoring system converts ranks of electrodermal response amplitude to integer scores. When the CIT key question response is ranked 1st it receives an integer score of two. When the key question response is ranked 2nd it receives an integer score of one. CIT key question responses receive a score of zero if the rank value is not 1st or 2nd. The scores for each CIT are then summed for a total test score. That test score is then compared to a cutscore to make a categorical conclusion of deception or truth telling - though this is often presented in metaphorical terms such as “guilty knowledge,” or “concealed information”. More recently, the CIT has been described as a “recognition test,” where test results report whether or not the subject indicates recognition of concealed crime details.

The decision rule originally described by Lykken (1959; 1998) was to compare the total score to a cutscore equal to the N (the number of CITs) and use an N+1 cutscore rule to make classifications of deception/guilt. In other words, according to Lykken, scores less than or equal to N would be classified at truthful (i.e., the subject was assessed as not having knowledge or information about the crime details). A useful way to learn the Lykken decision rule is through example: if we conducted an examination that included six CITs, a score of 6 or less would be indicative of the subject being “innocent” (Lykken 1959). An exam with five CITs resulting in a score of 5 or less would be indicative of “innocent” (Lykken, 1998). The simple rule-of-thumb for CIT cutscores with the Lykken scoring system is this: N+1 or greater = guilt/deception.

A more precise, and possibly more
useful, manner of reporting CIT results would be as a probability. Calculation of CIT probabilities is a mathematical combinatorics problem involving a multinomial distribution (Feller, 1968; Timm, 1989). The CIT is multinomial because there are three possible outcomes (scores of 2, 1, and 0) with weighted probabilities that are determined by the number of non-Key alternatives (for example .2, .2, and .6 if there are four alternatives plus the key item to evaluate). The CIT can include one or more trials, but in practice cannot achieve a .05 level of precision with less than two trials. The number of trials will be determined by the number of available critical items of crime evidence. A convenient way to simplify complex combinatoric and statistical problems is through Monte Carlo simulation. Krapohl et al., (2006) showed an example of this procedure by simulating the multinomial probabilities of getting combined score of twos, ones, or zeros to calculate the values in their Table 1.

Our Table 1 (below) shows an exact mathematical/combinatoric calculation of the multinomial probabilities for Lykken CIT total scores for 1 to 10 key items. Comparison of the similarity of these exact calculations with those from the Krapohl et al. simulation illustrates the usefulness of Monte Carlo methods when dealing with complex problems.
Table 1. Inverse cumulative distribution of multinomial CIT scores for 1 to 10 key items.

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The assumptions underlying the CIT is that “innocent” subjects will respond randomly to well-prepared CIT exams. In this case, “well-prepared” means that there is distinct concealed information that has not been leaked or telegraphed to the innocent/truthful subject. Experts have recognized the importance of this and discussed the value of having a blind examiner who does not know (and therefore cannot leak) information about the critical items conduct the CIT (Lykken, 1959; Meijer, Verschuere, & Ben-Shakhar, 2011). If we assume that the scores of innocent people are random scores, then we can use the observed cumulative proportion from Table 1 above to estimate the probability that an innocent person will produce a score equal to or greater than the observed test score.

Another assumption of the CIT is that guilty/deceptive subjects will have responses that are non-random and are instead loaded onto CIT key questions that describe critical information about the crime. We do not have normative data for guilty/deceptive subjects, and therefore do not have enough information to characterize the distribution of guilty/deceptive scores. For that reason we cannot make probabilistic inferences about guilt/deception using CIT scores. (We can make probabilistic inferences about innocent/truthful subjects only because we are willing to declare an assumption that their responses to each item are random and so their total scores can be characterized by a probability distribution.) The basis for a logical, categorical inference about guilt/deception is a probabilistic inference about whether or not the score is consistent with innocence, based on the comparison of an observed test score with a proportion of a distribution of scores that is assumed represent innocent/truthful scores. An example might help to better understand the values listed in the Table 1 and Figure 1.

Assume we were to give a 5-CIT examination series to a subject who claimed to have no knowledge of the crime event or details. In this example there will be one key item or “probe” and five neutral or “irrelevant” items - with one of those irrelevant items always presented first and not evaluated. In the most general sense these neutral questions serve the function of a control stimulus because they serve as a basis for comparison. The probability of the truthful/innocent subject’s largest reaction occurring on the key item by random chance is one in five (20%). The probability of the second largest reaction landing on the probe randomly is also one in five (20%). And the random chance probability that any of the third, fourth or fifth largest reaction lands on the probe is three in five (60%). These proportions will become the weighting probabilities after calculating the multinomial probabilities.
The probability of random responses for each individual CIT does not change but the aggregated probability does change as the number of CITs increases. The cumulative probabilities in Figure 1 below were calculated using combinatorics by John Kircher of the University of Utah (J. Kircher, personal communication, January 22, 2015). Figure 1 shows an inverse cumulative distribution of multinomial scores for 5-CITs. The distribution of scores is inverse in the sense that we are computing the cumulative probability of all scores equaling or exceeding a given score. When using the Lykken cutscore of N+1 for 5-CITs the result is a false-positive error rate of less than 10%. When these Figure 1 probabilities are rounded to two decimal places they match the simulated probabilities for a 5-CIT exam from Table 1 of Krapohl et al. (2006).

Figure 1. Cumulative probability of random scores equaling or exceeding a given CIT score for a 5 CIT using the Lykken scoring system
As you can see the probability of our randomly responding subject getting a score of zero or greater after five CITs is 1 (100%). There is about a 92% chance for our randomly responding subject to get a total score of one or greater on the five CITs. As discussed, a high total score is considered inconsistent with randomness. So for example, if a subject scored 7 or greater on a 5-CIT exam, the probability of that occurring due to randomness is only .032 (3%), an unlikely event. High total scores are not common for random scores and can be regarded as inconsistent with randomness and more likely to have occurred due to non-random loading of responses onto CIT key questions. As the total scores increase, you can see the probability of such a score from a randomly responding subject decreases. By the time we get to the correct Lykken cutting score of six or greater for this scenario, the probability of a subject responding randomly is about 9%. That number is the estimated false-positive rate for this scenario. Ethical testing practices require that the tolerance for error (the false-positive rate or “alpha”) is stated prior to testing, and this determined by agency policy in response to the testing context.

A caution here! It is correct to estimate the random probability of an innocent person getting a score of six or greater in our example to be about 9%. That does not mean there is a 91% chance he is guilty. It simply does not work that way and we can’t use our Table 1 or the Krapohl et al. (2006) Table 1 to provide a probability estimate of guilt. Table 1 in Krapohl et al. is titled in a manner we feel could confuse a reader, so we wanted to help clarify what these tables are, what they represent, and what inferences can be drawn from them. In Krapohl et al. the label states “Table 1. Probability of examinee having knowledge of crime details as a function of the number of CITs and exam score.” Although the text in the Krapohl et al. manuscript clearly and correctly describes the probability meaning, their Table 1 title may be read and misinterpreted by some as a probability of guilt - which it is clearly not. The Krapohl et al. Table 1 might more correctly be labeled ”Probability an innocent examinee getting a given score or higher by chance as a function of number of CIT's and exam score.”

What may be reasonably inferred from the either Table 1 is the probability that a truthful/innocent person would receive a score or greater, assuming the test was properly constructed and conducted. As mentioned above, we currently do not have a published distribution of guilty scores from which to calculate a probability of guilt. Until we have such a distribution we can’t report a probability of guilt. It is simply incorrect to report the inverse of the "consistent with innocent" probability as the probability of guilt in
this case as they do not share the same distribution. The inverse of Table 1 (the inverse cumulative distribution of random scores) would simply be the cumulative distribution of random scores. The cumulative distribution and inverse cumulative distribution are complimentary in that they sum to 1. This is because both probabilities describe the random distribution of truthful scores. Although we cannot compute probabilities about guilt/deception, we can make logical or categorical inferences about this. When the probability is low that a truthful/innocent person receives a high CIT score, we can infer that the person is deceptive/guilty.

Another note of concern regarding the cutting score. The Krapohl et al. (2006) text recommends a cutting score equal to the number of CITs. As you can see in Figure 1, choosing a Lykken cutting score equal to the number of CITs nearly doubles the false-positive rate across the entire table of probabilities. In our example above, a cutting score of five would result in an estimated false-positive rate of about 20%, a rate exceeding that for almost all validated technique listed in the American Polygraph Association Meta-Analytic Review (APA, 2011). Indeed one of the oft-cited benefits of the CIT is protection of the innocent because of the low false-positive rate (Elaad, 1998; Iacono, 2011; Krapohl, 2011; Lykken 1959; Lykken, 1998; MacLaren, 2001).

In order to reap that low false-positive benefit one must choose the correct cutting score. We recommend using the N + 1 cutting score originally published by Lykken (1959; 1998).

In summary, we did not attempt to address concerns about the reported differences between the laboratory and field false-negative results. We also did not attempt to provide detailed descriptions of the many studies of the CIT or list the recommendations for better incorporating the CIT into police work. For information on that (and much more) we highly recommend the interested reader study the Verschuere, Ben-Shakhar and Meijer (2011) treatise. As there is already an excellent “how-to” paper published on conducting the CIT (Krapohl et. al, 2006) we did not delve into descriptions for conducting the CIT. Our goals were much simpler. We chose to try to provide a better understanding of the decision thresholds of the Lykken scoring system and a better appreciation of the probabilities for CIT result reporting. We hope by doing so we can increase practitioner interest in studying the CIT to see if there is a place for it in their professional repertoire.
References


From Chip Morgan

Nepal (official name the Federal Democratic Republic of Nepal) is a landlocked country in South Asia. This small country stands bordered by China to the north and is surrounded by India to the west, east and south. Home to Mt. Everest and the Himalayan chain, Nepal has been described as a piece of heaven on Earth and is featured in travel books as one of the most beautiful destinations in the world.

Culturally, this primarily Hindu and Buddhist country has dealt with a lot of upheaval in the last 15 years. Formerly a very stable monarchy, this once peaceful country has experienced the slaughter of the entire royal family, the succession of a weak King to the throne, a prolonged civil war, abdication of the throne and the eventual formulation of a representative democratic form of government.

A decade long Maoist civil insurrection was highlighted by bombings, random shootings, kidnappings and terrorist activities, until the government and the Maoists agreed to a ceasefire and peaceful resolution in 2008.

One remnant of the decade long period of strife is that a generation of young Nepalis who came of age during this period of war continue causing problems to this day. As a consequence, violent crime is continuing in Nepal at a much higher rate than the historical norm for this society.
Throughout the above difficulties, the Nepal Police has been tasked with trying to maintain law and order, in spite of a lack of direction from the central government. In fact, at the time of this report, there is still no constitution in Nepal; the lawmakers have been arguing about one since 2008 and have been operating on a “continuing resolution” basis.

The very fabric of society has changed in Nepal since the days of the monarchy. Virtually unheard of prior to 2001, violent crime has taken a tremendous upswing in the country. Kidnapping and murder, along with rape and child abuse now occurs with regularity in the country. The result is the infrastructure of the law enforcement community has been strained trying to deal with the increase in crime. In this setting the Nepal Police, some 67,000 members strong, is seeking to modernize and embrace forensic science as a viable crime fighting tool.

**The U.S. assists in bringing Polygraph training to Nepal**

In an effort to provide assistance with criminal investigations, the United States Department of Justice’s International Criminal Investigative Training Assistance Program (hereafter referred to as ICITAP), offered to provide polygraph training to international certification standards and offered to provide the necessary infrastructure support to set up and maintain a polygraph program.

The Academy of Polygraph Science (a division of the Stoelting Company) with
a home campus in Ft. Myers, Florida, USA, was contracted to deliver polygraph training in Nepal. The Stoelting Company provided the polygraph instruments and APS School Director Ben Blalock coordinated the complete Basic Polygraph Course of instruction, as delivered by Instructor Gil Witte and certified by the American Polygraph Association.

The first Nepal Police Polygraph Class graduated 10 police examiners on January 7, 2014. The graduates were all eligible and have become members of the American Polygraph Association as Associate Members.

The Nepal Police examiners received extensive mentoring by the Academy of Polygraph Science throughout 2014. Senior Instructor Chip Morgan conducted an extensive mentoring period for the Nepal examiners in-country, as well as set up the basic framework of a working police polygraph unit.

**Polygraph today in Nepal**

The 2014 class conducted over 500 criminal polygraphs in their first year of operation, using Utah specific-issue testing as the primary testing technique and scoring all charts using the Empirical Scoring System. This polygraph unit has exceeded everyone’s expectations and has secured many admissions and confessions as a direct result of the use of polygraph. Many high profile cases, some of which were cold cases, have been resolved with the aid of polygraph.

The Nepal Police are fully committed to continuing the polygraph program and requested an expansion of the unit. In January 2015, the second Polygraph Basic Class commenced in Kathmandu, Nepal, once again being coordinated by the Academy of Polygraph Science, under School Director Ben Blalock and being instructed by Chip Morgan. The 2015 class also includes three members of another Nepal law enforcement agency, the Armed Police Force, which is primarily tasked with border security and handling disaster relief.

To date, there are no private polygraph examiners in Nepal and no private examinations have been authorized by the government.

The Nepal judicial system has been cautious but receiving about the concept of polygraph admissibility in criminal proceedings. Currently, there is no case law in Nepal concerning polygraph. However, the polygraph results have been admitted as part of the investigative file into court, as secondary evidence, in a number of cases.

The Nepal Police have conducted numerous training segments for the judges and prosecutors throughout the country explaining polygraph.
BOOK REVIEW

Credibility Assessment: Scientific Research and Applications

Review by Réjean Belley

1 Originally published in Polygraph 43 (3).
The September 11, 2001 events have deeply impacted peoples’ minds and heightened states’ concerns for security. Huge efforts have been deployed by governments to counter terrorism and protect their populations and critical assets from terrorist acts through improved security practices. Perhaps this new reality is most perceptible at airports and border crossing checkpoints but, behind the scene, its ramifications are far more reaching. They already had a measureable impact on a range of programs pertaining to national security such as public safety and the protection of strategic infrastructures. This of course includes the vetting of all personnel who have access to sensitive assets, a process in which polygraph testing plays a predominant role. Prompted by this unprecedented security initiative, research received a significant boost to improve already existing credibility assessment methods and develop new ones.

In this context and a decade or so after the publication of Kleiner’s mark-setting Handbook of Polygraph Testing, the recent publication by Raskin, Honts & Kircher of Credibility Assessment is timely. This book stands in a class apart, in that it spans the realm of credibility assessment methods and initiatives from a scholar and expert perspective. If it makes a significant place to polygraphy, its scope expands the boundaries of psycho-physiological detection of deception (PDD) to include assessment methods that evolved from other disciplines.

Chapter 1 poses the simple but important question, “How good are we at assessing the credibility of suspects based on behavioural cues?” and concludes that even we professionals, are not as good at it as we might want to believe. Chapter 2 does an expert review of programs and methods implemented to assess credibility at portals (e.g., airports), acknowledging the complexity and unique challenges posed by real-time mass credibility assessments requirements. Chapter 3 speaks to the validity of polygraph testing and provides an in-depth comparative review of the methods currently used for diagnostic decision making. Chapter 4 addresses the delicate problems of countermeasures and provides an assessment of their effectiveness based on scientific evidences. Chapter 5 introduces a procedure for detecting deception using ocular metrics in conjunction with a structured reading task. And Chapters 6 and 7 point to slowly emerging chunks of understanding of the neuro-processes involved.
in acts of deception. As one progresses from chapter to chapter, a conceptual landscape with the following important landmarks progressively appears:

* Behavioural cues, passively observed during the course of an interview or interrogation are, in and by themselves, poor indicators of deception.

* Behavioural indicators when embedded in carefully planned actions dynamically delivered by the interviewer, such as strategic use of evidence or cognitive overload induction, allow for beyond chance-level discrimination between liars and truth-tellers.

* Research on ocular metrics from reading can reliably discriminate between liars and truth-tellers, with accuracy rates up to and entering the 80% range.

* Physiological indicators, such as those used in PDD, are generally more effective than behavioural cues and ocular motor metrics to detect deception.

* The above holds only if credibility assessment protocols, which include the manipulations applied and indicators monitored for diagnostic decision-making, are consistent with psychological and psycho-physiological principles pertaining to motivation, emotion regulation, cognitive processing of information and functioning of the central nervous system, as established by scientific research.

* The problems associated with credibility assessments are context-specific and demand for equally specific theorizations, modelizations and assessment methodologies. A refreshing reminder may be that the “one size fits all” approach to credibility assessment is at the very best ill-suited, when not simply inapplicable across contexts.

Beyond these general landmarks, it is for the reader to explore the chapters and topics that most speak to them to discover a well of well-founded information and expert views consistently delivered in a clear, concise, documented, never complacent nor passionate style. This book stands as a prime example of what a response to the National Research Council’s 2003 report should be like, and constitutes a true scholar portal to the science, complexity and art of credibility assessment. It brings the reader to better appreciate how much this domain like neurosciences overlaps with a number of already well established disciplines, each relying on its own conceptual and methodological
paradigms to explore and model the problems specifically posed to credibility assessment in a given context. The purpose is to come up with assessment tools that are scientifically founded and present metric qualities that meet acceptability thresholds for their intended use.

Correlatively this book is also a portal for the practitioners, including us polygraphists, interested in drawing from this rich trans-disciplinary research effort to expand their understanding of the credibility assessment science and improve their practices. It also provides insightful reviews of a number of credibility assessment initiatives and issues of interest for field applications that may assist security managers and subject-matter experts responsible for providing advices and recommendations to shape up the credibility assessment programs in place in their organizations.

I enjoyed reading this work, Credibility Assessment, which I have no doubt will also capture the interest of all professionals seeking to expand their knowledge and understanding of this rich and important field of research and practice.

Good reading.

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