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ANDRZEJ FRYCZ MODRZEWSKI KRAKOW UNIVERSITY

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Journal of Andrzej Frycz Modrzewski Krakow University

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Office
ul. Herlinga-Grudzińskiego 1C;
30-705 Kraków (Poland)
e-mail: aszuba@afm.edu.pl
www.polygraph.pl

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Articles

From a Rigid Cover to an Elastic One Via a Blanket too Short. An Adaptive Polygraph Approach¹

Avital Ginton

PhD;

Independent practitioner and researcher, AV-GN, Polygraph, Applications & Research, and part time lecturer,
Faculty of Law, Tel-Aviv University (C/O Prof. Shlomo Shoam), Israel.; ginton@inter.net.il

Key words: Adaptive Polygraphy, Relevant Issue Gravity, RIG, Comparison Question Test, CQT, Polygraph, Deception Detection

Abstract

The Polygraph test or the Psychophysiological Detection of Deception is a short blanket that cannot cover everything without paying in errors; a clever polygraph examiner and a wise usage of polygraph must make a choice whether to cover the feet or the head with this short blanket and conduct the examination accordingly. But a wiser approach should look to turn the short blanket into an elastic cover that can deal differently with different people and different situations.

Following two-three decades of blessed efforts to develop strict standardization in the field, the time has come to start steering the polygraph ship back to greater flexibility and creativity,

¹ Based on an oral presentation in the 48th annual seminar of the American Polygraph Association, 2013, Orlando, FL. USA.

this time relying on scientific thinking and knowledge. Thus, contrary to the existing trend in the field, I call to drive modern Polygraphy towards developing a scientifically based approach that follows the motto of “Different Things to Different People and Different Situations”. In other words, I call for developing an adaptive approach or *Adaptive Polygraphy*. The Relevant Issue Gravity (RIG) Theory (Ginton, 2009) is presented here as a major theoretical and practical carrier for evolving and shaping the *Adaptive Polygraphy*. The article analyzes the current situation and draws some lines to follow in developing an *Adaptive Polygraphy* approach.

Preface

Among the most Frequently Asked Questions (FAQ) regarding polygraph testing, we can find the question of “How accurate is the Polygraph?” or the more sophisticated version of it “What do we have more, False-Positive or False-Negative errors and what are their respective rates?”. Beyond the fact that there are a variety of techniques and usages, which might affect the accuracy, I would like to point out the existence of three distinct approaches or attitudes to these questions that are based on different assumptions, which might result in diverse answers to those questions as well as different implications. I would term these three generic approaches: A Rigid Cover, A Blanket Too Short, and An Elastic Cover.

A Rigid Cover – Assumptions:

1. Accuracy rate of Polygraph tests is an actual figure representing the real quality of the test and not just a statistical manipulation. Our task is to find proper ways to expose this existing figure (or figures, in case we differentiate between various techniques or formats of tests).
2. A certain percentage of the test’s outcomes is not clear enough to make a call and deems Inconclusive.
3. Accuracy of detection and rate of Inc outcomes might be different for Deceptive and Truth-teller examinees. Our task is to expose these existing differences.

A “Competition” between several fixed numbers, the results of independent studies, ended up in some sort of averaging them, with the highest methodological achievement of using Meta-Analysis as a means for estimating the final figure (be it 90%, 85%, 70%, etc.).

I call this approach A Rigid Cover because it ends up with certain fixed figures claimed to be the estimated accuracy rates of the test, as genuine characteristics

of it, which indicate the proportion of correct outcomes (True Positive and True Negative) covered by the test. Almost all of the tens validity research cited in the APA report of the Meta-analytic Survey of Validated Polygraph Techniques (APA, 2011) are products of this approach. There might be disagreements about the size of the figures, but the debate is about which figure represents better the genuine accuracy of the test. Thus, it is based on the assumption that there is such a thing as “a genuine accuracy characteristic of the test”.

A Blanket Too Short – Assumptions:

1. Both types of errors are inherently embedded in the tests, and the detection rates cannot reach perfection.
2. The actual figures of the detection and inconclusive rates are subject to our manipulations in conducting the tests or analyzing the outcomes. It is mostly a trade-off manipulation that changes the Inconclusive and error rates (FP vs FN).
3. We are acting within a pay-off matrix in which it is possible to increase one sort of detection and accuracy rate at the expense of lowering the other.
4. The philosophy or policy held by the examiners or their organizations with regards to the preferred cost-benefit relationship that is manifested in the pay-off matrix affects these rates.

I call it “A Blanket Too Short” – having in mind a person who has to decide whether to pull the short blanket to cover his head and shoulders and by that exposing his feet to the cold, or to cover his feet and leave his shoulders and head to the cold. The size of the blanket is fixed, but the way it affects the person who uses it is very much under his control. An example of that will be the use of different cut-scores in making a decision about the veracity of the examinee (e.g., Elaad, 1999; Ginton, 2013; Honts and Driscoll, 1987; Krapohl, 2005).

An Elastic Cover – Assumptions:

A third approach involves an additional assumption that precedes the four that stand behind the “blanket too short” viewpoint, as follows:

1. It is possible to act at the level of an individual exam to increase the overall detection or accuracy rate while keeping the probability of automatically paying in errors at a low level.

2. Both types of errors are inherently embedded in the tests, and the detection rates cannot reach perfection.
3. The actual detection and inconclusive rates are subject to our manipulations in conducting the tests or analyzing the outcomes. It is mostly a trade-off manipulation that changes the Inconclusive and error rates (FP vs. FN).
4. We are acting within a pay-off matrix in which it is possible to increase one sort of detection and accuracy rate at the expense of lowering the other.
5. The philosophy or policy held by the examiners or their organizations with regards to the preferred cost-benefit relationship that is manifested in the pay-off matrix affects these rates.

I call it “Elastic Cover” since this approach aims to optimize the way the examination is conducted and analyzed per individual case, resulting in elasticity in these regards.

Two things should be asked concerning “The Elastic cover”: Is it really possible to affect the results without introducing uncontrolled, chaotic consequences? And is it the right thing to do in pursuing the truth?

Whereas to the first question, many examiners believe that their behavior can push the results towards each of the two possible outcomes – DI or NDI, by manipulating the pretest interview without increasing the irrelevant noise, no research was published yet that demonstrates it. Nonetheless, I take the liberty to mention a small experiment conducted in 2004 as part of an R&D project in Israel that never got finished².

It was a mock crime simulating smuggling drugs and cold weapons into an “Airport”.

Four eight-people groups were recruited from the community. Two were “smugglers,” and the other two, non-smugglers. After entering the ‘airport’, an ‘incriminating information’ cast suspicion on them of smuggling and concealing a weapon and drugs in a hidden place in the airport halls, and they had to go through a polygraph test. A matrix of incentives and punishments were applied to induce motivation. The experiment was conducted under IRB conduct to ensure the safety of the subjects. There was an even number of guilty and innocent subjects.

² The project was aimed to develop a non-intrusive unnoticed device for psychophysiological deception detection. The referred experiment which has never been sent for publication was conducted by Ginton Avital and Kleiner Murray.

The subject passed CQT followed by two CIT tests. Half of them went through a standard pretest interview, and the pretest of the other half included a special intensive comparison questions' stimulation. As expected, results indicated that those who went through an intensive stimulation of the comparison sphere significantly moved towards the NDI side. Thus, it demonstrated empirically that the examiner's behavior could maneuver the outcomes. Still, an important question was left on a different level: Suppose it is found that these maneuvers improve correct results. Should these controlled manipulations be used, and when?

Turning a 'Blanket Too Short' into an 'Elastic Cover' that adapts itself to fit the actual examination at hand by adjusting the pretest and the test to the specific examinee and the particular circumstances rather than applying a stiff standardized technique needs a profound understanding of the factors involved in polygraph testing, followed by analyzing their relative loads in each individual examination or subgroups of them.

In principle, these tailor-made examinations can bring, so to speak, the feet and shoulders or head under the cover by optimally reaching and exploiting the testing potential embedded in the polygraph and its methods (Ginton, 2013).

It should be stressed that the transition from a factory-made polygraph test mode to a tailor-made polygraph mode does not mean to play against the standardized "one size fits all" by introducing more formats, allowing each examiner to choose his/her preferable format for a particular case, be it the X format or rather the more suitable Y format. The customized or tailored approach that this article offers goes far beyond that, as will be presented throughout the article.

"From Rigid to Elastic Cover via a Blanket too short" is not only a metaphor; it is also a call for scientifically based *Adaptive Polygraphy* because the elastic cover is where the future of the polygraph lies.

A Bit of Background

Since the early works of Keeler in the 30ths (Keeler, 1933), Reid in the 40ths (Reid, 1947), Backster in the 60ths (Backster, 1963), and other ancestors of modern Polygraphy in the 20th century, we have witnessed introductions of a variety of polygraph techniques, methods and tactics, (for historical perspective see Krapohl & Shaw, 2015; Matte, 1996; NRC, 2003; Raskin, Honts & Kircher, 2014). Some of them included theoretical claims, while others lacked any clear spoken theoretical

reasoning to support their specific method or justify the suggested technique variation. Nevertheless, one may assume that all of them always contained some kind of presumed rationale or justification, including the unarguable face validity statement (sometimes unspoken) “it works for me all right”. Assuming examiners want to succeed in their work, if they encountered feedback that tells them they were doing very poor work, they would probably incorporate this feedback and make some changes in the way they were functioning. In the same vein, if they stick to their technique, one may assume that it really works for them. Alas, professionally, this is not enough. If we want to adopt some scientific claims or values in our profession, “It works for me” is but the very first step in the path that establishes scientific quality in the polygraph profession.

The essence of science is to move from a subjective point of view to an objective one. The method or the technique should work for every qualified person, and as long as this could not be established and proved, we are not dealing with scientific-based methods; rather, this is an art skill in the best case and a “mambo-jumbo” business in many others.

Several important steps have been taken in the last few years, mainly by the American Polygraph Association or under its umbrella, to make the polygraph a more scientific-based profession. To name a few: Validation of techniques; Models of Best Practices; Models of TDA; ASTM standards.

The leading common theme in all these pieces of work is that we need to establish research-supported rules to guide our practice and introduce standardization to the examinations, which is a fundamental brick in the psychometrics testing theory.

Due to the complexity and the multi-factorial issues dealt with by the behavioral and biological sciences, it is customary to use research methods that target the central tendencies of phenomena which are formalized in general principles and rules that concern most of the existing variance while sometimes treating the individual differences or the variation between existing situations as irrelevant noise.

When it comes to applications, some standards are developed and implemented to ensure that the applications are conducted within the framework posed by those rules. Practically, this is a must for avoiding chaos. However, because the standards are based on central tendencies, they are inefficient or even harmful to people or situations that are off these centers.

An extreme strive for rigid standardization in the name of science, unfortunately, tends to ignore the complexity of the field; and it seems to be based on a simplistic and limited concept of what science is, let alone that there is more than just science in practicing Polygraphy.

Along with the scientific foundations of the Psychophysiological detection of deception, we should remember that much art is also involved. We should adopt the scientific methods not only in favor of standardizing the test's stages, question formats, and data analysis, but also to improve our understanding of the "art" quality found in our work rather than suppress it in the name of science and standardization.

Over standardization, in its extreme form, adversely affects creativity, open-mindedness, flexibility, and humane touch, which are very important for further developments in our area, including pursuing the significance of personal and situational differences to the understanding and practicing Polygraph testing.

We should not, in the name of science, throw away the tailor-made approach in conducting polygraph examinations that for years has characterized the work of the best polygraph examiners and shift into the standardized "scientific" mediocre kind of work.

Within a broader and more sophisticated approach, those important and necessary moves in the last few years are only the first steps, and probably, I dare to say, the easiest ones. The following steps must deal with the individuals and specific situational variance not as noise but as part of the phenomenon that needs to be systematically addressed and explained.

An example of that can be found nowadays in medicine. A clear trend to shift from the simple standardization of diagnoses and treatments to individualized or personalized medicine is taking place. It is based on pursuing individual differences between the patients in biological, psychological, and environmental aspects and applies tailor-made diagnostic yardsticks and treatments compatible with the specific variations found in that specific patient at the time.

This medical philosophy and practice, which is highly affected by the new developments in the field of the human genome, says that modern medicine should be Personalized Medicine, meaning **"Different Things to Different People."**

Adaptive Polygraphy – Different Things to Different People and Different Situations.

Polygraph testing, or the Psychophysiological Detection of Deception, is a short blanket that cannot cover everything without paying in errors; a clever polygraph examiner and a wise usage of polygraph must choose whether to cover the feet or the head with this short blanket and conduct the examination accordingly. But a wiser approach should look to turn the short blanket into an elastic cover that can deal differently with different people and different situations.

Contrary to the existing trend in the field that adores the strict standardization, I call to start steering the ship of modern Polygraphy towards developing a scientifically-based approach that follows the motto of understanding and conducting “Different Things to Different People and Different Situations”. In other words, I call for developing an adaptive approach or *Adaptive Polygraphy*.

That might be the only way to improve our performance beyond the glass ceiling of 85–90% accuracy and 10–20% INC rate.

Science cannot contradict nature whether we mean biological, psychological, or social life, and in philosophy – the mother of all sciences – we can find the phrase of Aristotle “The worst form of inequality is to try and make unequal things equal”. Rephrased two thousand years later by Thomas Jefferson to: “There is nothing more unequal than the equal treatment of unequal people.”

Probably they meant to endorse ethics and social justice, but it is also valid to other spheres, including polygraph testing. Whenever we deal with individuals and particular cases, we encounter assortments of people and circumstantial differences to be dealt with. We should not ignore the differences but rather explore ways to treat them by an adaptive approach. As a matter of fact, to a certain degree, this has been done for years. One of the very basic instructions to a polygraph examiner is to adjust the language level to the examinee and, if possible, phrase the questions using words that the examinee has used during the pretest interview. However, the *Adaptive Polygraphy* approach means a broader and deeper range of adjustments.

We should adapt the examination to the subjects rather than squeeze the subjects and the case to fit a standard and a rigorous test. As already mentioned above, standardization is usually built on central tendencies and a limited variety of circumstances. It seems to work all right with a generic test conducted on a generic examinee by a generic examiner and also obeys an extrapolation of the Pareto principle, which states that for many outcomes, roughly 80% of consequences come from 20% of the causes, or for many phenomena, 80% of the result comes from

20% of the effort. Thus, for the general society, it is beneficial to rely on central tendencies, but what about the ignored 20%? Dealing with this is not a simple matter. A claim might be heard that in chasing this 20%, we might lose a significant portion of the 80%, and we should better stick to the standardized material that yields decisions in about 80–90% of the tests, 90% of them correct. This means that 76% of the total outcomes are correct decisions, 15% INC, and 9% errors (e.g., American Polygraph Association, 2011). In opening the field to methods and ideas that have not yet been verified, we risk worsening the situation, not to mention moving away from scientific norms.

Nevertheless, in principle, one cannot deny that if we manage to apply the “elastic cover”, the situation will be improved. Unfortunately, there is still a ‘small question’ to be solved. How do we get there? The presented approach suggests a specific vehicle to get there – the Ginton’s RIG theoretical framework (Ginton, 2009; Ginton, 2019) as put forward in the present article.

The RIG theoretical framework – the carrier of the *Adaptive Polygraphy*

To begin with, a few preliminary questions must be answered first. In answering these questions, we have to turn to the very basic polygraph matter and advance from there step by step.

Why and What triggers the Autonomic Nervous System (ANS) reactions?

The function of the ANS is to increase the prospects of survival. This is done by keeping internal Homeostasis and reacting to current or anticipated significant changes in the external world. Facing such significant changes results in involuntary reactions of the ANS, aimed to adjust to the changes and improve the chances to survive. The intensity of the reactions is positively correlated with how significant is the stimuli to the organism.

Why do people react with Autonomic Nervous System activity changes to Psychological stimuli?

Other than pure physiological functions, attaching significance to stimuli is a psychological process, and most occurred or expected changes in the environment gain their significance from psychological functions and processes such as perception, memory, learning, feeling, etc.

Two kinds of processes are involved in attaching significance to stimuli, Bottom-Up and Top-Down. While Bottom-Up processes are mainly affected by the physical qualities of the stimuli, the Top-Down processes are driven by the individual state of mind and the psychological qualities of the stimuli.

Why do people react with Autonomic Nervous system Changes when they Lie?

The default in communication between people is transmitting the truth. Any act of communication that deviates from the default is a change that needs to be addressed by adjusting the ANS activity, i.e., physiological reaction. Thus, in general, lying is a significant event that affects/changes both parties' minds. Lying puts the liar in a risky situation due to possible adverse rebound from the surroundings. All of the above are relevant to survival. Note, however, that telling the truth might also be risky sometimes and certainly, significant on many occasions.

Given the above answers, it seems reasonable to apply a psychophysiological test to detect lying. The first technique, known as the Relevant/Irrelevant (R/IR) test, compares the physiological reactions to Relevant questions concerning the investigated suspicion to the responses measured when nonrelevant neutral questions were posed to the subject. It turned out that almost all liars react stronger to the R questions, but also, a significant number of the truth-tellers did so. There was a fundamental need to develop a questioning technique that pulls the truthful subjects from the group that their test points to deception.

The technique that provides this feature is the Comparison Question Test, previously known as the Control Question test – the CQT. This technique is attributed to John Reid³ in the 40s of the previous century (Raskin and Hont, 2002; Reid, 1947). One can speculate that at first, the way Reid looked at the Control questions was more a means to control for the existence of non-deception elements that stimulate the ANS response and not as a means to pull the truthful people out of the 'reacting-as-liar' group. Therefore, he used the term Control Question and not something like Extrication, Rescue, or Disengagement Questions⁴.

However, the CQT method manages to do more than just control for non-deception elements that stimulate the ANS response. It manages to cause a reversed differential strength of reactions between Relevant and Comparison questions in

³ A different version was attributed also to Rev. Summers in the late 30s (Krapohl & Shaw, 2015)

⁴ Control in the Reid technique is different from its meaning in research methodology, which caused a continuous misunderstanding between polygraph practitioners and academicians.

Deceptive vs. Truthful subject. Deceptive subjects react to the Relevant questions with stronger physiological responses relative to their responses to the Comparison questions, whereas the Truthful subjects react to the Comparison questions with stronger responses than their reactions to the Relevant questions. How does it happen?

In 2009 Ginton published a new concept that he termed the Relevant Issue Gravity (RIG) relating to this question. As already been mentioned (Ginton, 2013), the RIG can function as a vehicle to reach *Adaptive Polygraphy*. To understand it needs to go back to some essence of the RIG theoretical framework.

The Relevant Issue Gravity theoretical framework distinguishes between two fundamental elements of the CQT. The first deals with explaining the origin of the physiological responses accompanying the act of lying. The second concentrates on explaining the phenomenon of a reversed pattern of relative reactions' strength to Relevant and Comparison Questions in deceptive vs. truthful subjects. The following account focuses on the second element. Some parts literally repeated similar accounts written by the author in a previous publication (Ginton, 2019).

Upon arrival to the test, and even before that, both the Guilty and the Innocent are busy consciously and pre-consciously in cognitive and emotional mental activity related to the Relevant Issue. It is frightening for both of them, and they are very much under its influence in a way that entraps their attention. This mental and emotional preoccupation with the forthcoming examination regarding the relevant issues involves much more than just the fear of the test's possible consequences. It also contains memories, images, a stream of associations, elevated motivations, etc.

The higher the intensity of this ongoing preoccupation of the mind (cognitively & emotionally) with the Relevant Issue, the more compelling the attention invested in it, which in turn increases the preoccupation of the mind in a positive feedback loop. The more you think about it, the more your attention is stuck in; the more your attention is stuck in, the more you think about it.

It is a trap for attention resulting from what Ginton has termed: The **Relevant Issue Gravity (RIG)**.

The **Relevant Issue Gravity (RIG)** is a psychological force induced by the aggregation of qualities that the relevant issue possesses, which attracts and binds the examinee's attention to it. It is the product of some general qualities that the relevant issue always possesses due to the very fact of being a relevant issue on the test,

plus more specific, case-related characteristics, interacting with circumstantial and personal factors.

The relevant issue attracts and binds the attention of any normal examinee, whether deceptive or not, and as a byproduct causes considerable neglect of other issues or stimuli. The more significant the issue to the examinee, the greater the amount of attention he invests in it, which means an increased RIG strength, resulting in less free-floating attention available to him/her.

The RIG strength indicates the degree to which the suspect's attention is attracted to and stuck in the relevant issues, and it is a product of many circumstantial and personal factors.

The RIG can take various levels of strength, and there are good reasons to assume that, on average, the RIG strength for the deceptive subjects is stronger than for the truthful ones. (see Ginton, 2019 for more details), as illustrated in Fig. 1.

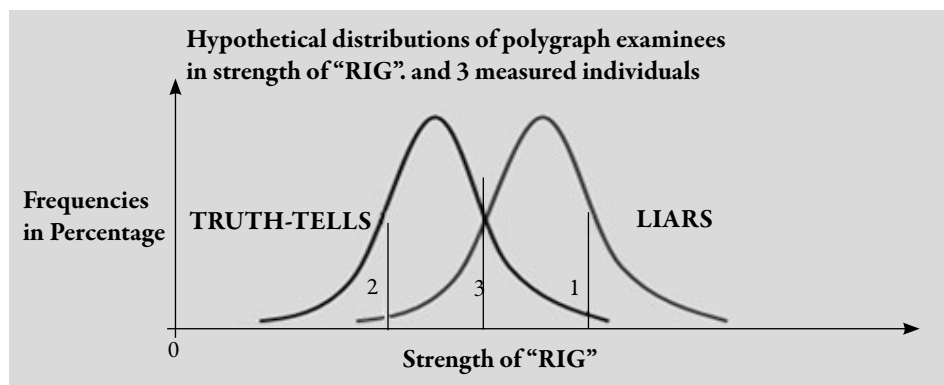


Fig. 1. Hypothetical distributions of strength of "Relevant Issue's Gravity" ("RIG") in Truth-tellers and Liars, with values of 3 individuals. It is assumed that the RIG's strength is higher for the population of liars and roughly speaking there is 90% chance that #1 is a Liar and #2 is a Truth-tellers while #3 has equal chances to belong to either one of the populations.

In order to pay attention to the comparison question, one should first detach himself to a certain degree from the relevant sphere.

One way to measure the strength of the RIG for a particular suspect is to find how much it takes to distract the examinee's attention away from the relevant issue. The harder it is, the stronger the RIG that the examinee holds.

This shift or change in the focus can be achieved by introducing baits to attract the examinee's attention away from the relevant sphere.

In principle, the baits can take various forms with different levels of attraction. Within the set of polygraph examinations, the examiner introduced the baits in the form of what is known to be the comparison questions and the pretest interview that leads to their formulation. Since the RIG strength for deceptive subjects is high, it is hard to detach their attention from the relevant issue sphere and shift it to the comparison one. At the same time, it is much easier to succeed in this with truthful examinees whose RIG strength is weaker.

The most important task the polygraph examiner has in the CQT is managing the diversion of the truthful examinee's attention from the relevant sphere to the comparison ones with minimum effect on the deceptive examinees. A matter which is impossible to standardize without giving room to the existing variability among cases.

The higher the success of these baits to attract the attention, the stronger will be the impact of the comparison questions and the psychophysiological reactions to them.

According to the RIG strength theory, stronger reactions to the comparison questions indicates a lower level of RIG strength and, therefore, a higher probability that the examinee belongs to the truth-tellers distribution, i.e., he/she is probably a truthful subject and vice versa.

Note, however, that if the baits are too big/strong, they might attract almost any person's attention and shift it to the comparison sphere in almost any circumstances. The opposite holds for too small or too weak baits that might fail to attract attention at all. It is just a matter of dosage that a professional examiner must take into account, and the preferred dosage of the Attention-Attracting-Baits should follow the **Goldilocks Principle** (Krapohl & Shaw, 2015, p. 68; Ginton, 2019, p. 190).

The Goldilocks principle. It is derived from a children's story, "The Three Bears", in which a little girl named Goldilocks finds a house owned by three bears. Each bear has its own preference for food, beds, etc. After testing each of the three items, Goldilocks determines that one of them is always too much in one extreme, one is too much in the opposite extreme, and one is "just right".

Whatever the polygraph case is, this principle stays the same, but the actual values of the “just right” level of the attention-attracting-baits must be changed to fit the individual subject and the specific circumstances.

Not adjusting the size or the degree of the baits to the case means discarding the real meaning of the Goldilocks Principle.

The wise meaning of the Goldilocks Principle for CQT:

- “Too strong” or “Too weak” baits are not fixed objective values, but rather case-dependent matters, and so is the “Just Right”.
- The examiner should adjust the size or the degree of the baits to the case.
- The difference between typical and great examiners lies in their capability to master this delicate matter.
- The RIG strength for a deceptive examinee is high, and therefore his attention is stuck in the relevant issue; however, under some circumstances, the RIG strength of truthful examinee is also very strong, and therefore he is prone to produce FP error unless the examiner will recognize the danger and adjust the pretest to increase the attractiveness of the Bait. Examples of such cases are alleged victim or a high-profile suspicion; if the examiner would not act to increase the weight of the bait, it is reasonable to expect a higher risk for FP. This is the meaning of applying *Adaptive Polygraphy*. “One size does not fit all” a good examiner should identify the difference between subjects and circumstances and adjust the test accordingly.
- “One size fits all, or else we lose standardization” is the motto of the Evidence-Based devotees in our profession, who, in the name of science, worship zealously the strict standardization that prevents chaos but also adversely affects flexibility and creativity. That means that one should not play with the amount or level of the Attention-Attracting-Baits from case to case, from one examinee to another.
- Conversely, in line with the RIG strength rationale, it is recommended to keep some flexibility and invest in deepening our understanding of the CQT by asking “WHY”, developing new hypotheses, try them, and put them into objective tests.
- It should be stressed once more **that the Deception Factor is not the only factor affecting the strength of the RIG. There are a variety of personal and circumstantial factors that also affect it, as shown in illustration 2.**

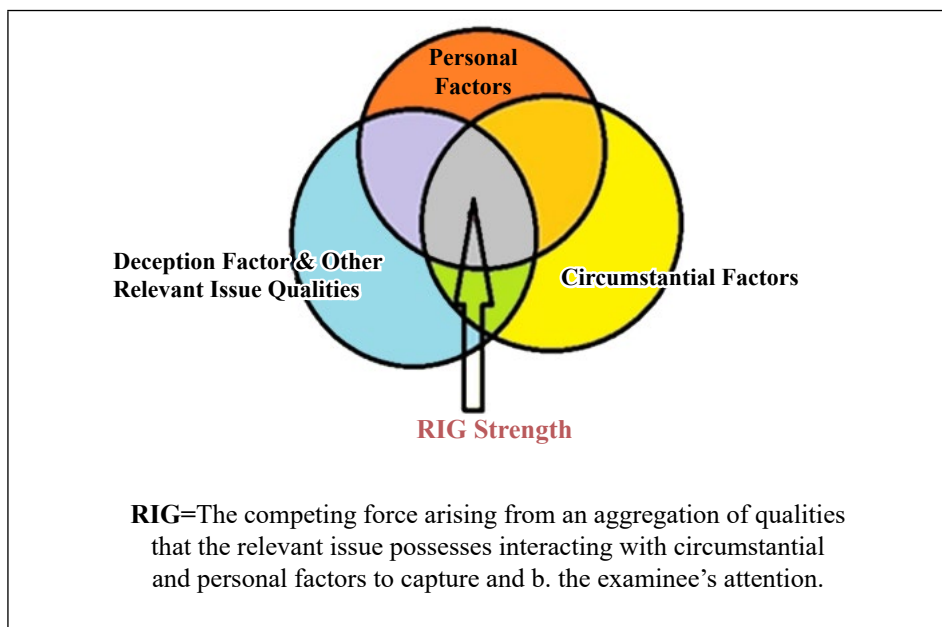


Fig. 2. Factors affecting the RIG strength

All these factors are irrelevant for identifying deception or truthfulness, but they affect the RIG strength and, by that, influence the attention shifting processes between the relevant and the comparison spheres. *Adaptive Polygraphy* should take this into account and adjust the size of the baits set for attracting and shifting the attention away from the relevant issue towards the comparison sphere.

We should be aware of the existence of such factors in each case, and when we encountered a heavily loaded factor in a particular case, we must not ignore it in the name of objectivity and standardization. Instead, we should relate to it and adjust the pretest interview to suit that specific situation.

In particular, we should maneuver the level or the size of the bait that we are presenting in our effort to divert the examinee's attention from the relevant to the comparison sphere. That is to say, that the examiner should play with the amount of emphasis we/she put on the Comparison vs. the Relevant questions to balance the assumed effect of the identified extra factor on the RIG strength. In fact, this is the meaning of how to use the Goldilocks principle wisely in presenting the "Just Right" bait for optimizing the CQT outcomes.

This might be a seed for developing in the polygraph profession, a scientific-based approach that does not refer to all sorts of variability as something to ignore or “fixed” statistically as if it were noise. Instead, variability should be recognized as a phenomenon that has to be treated with what I have termed “*ADAPTIVE POLYGRAPHY*,” in which the polygraph testing procedures and dynamic will not be “one size fits all” but “Different Things to Different People and Different Circumstances”.

Examples of Factors other than Lying Vs. Telling the Truth that might affect the RIG strength

Some factors seem more likely to affect the RIG, while others seem unlikely to do so. Nevertheless, the idea of scientific-based *Adaptive Polygraphy* means to go beyond intuition into research that looks for evidence on both sides, the one supporting the existence of a phenomenon and the counter side that supports the lack of the phenomenon. Thus, if it seems, for instance, that age is not likely to affect the RIG, we still have to check it in order to rely on that in applying *Adaptive Polygraphy*.

- **Issue’s Factors**

- Severity in terms of formal consequences (e.g., the expected punishment).
- Objective Emotional loads (e.g., minor sexual offense vs. minor theft).

- **Personal Factors**

- Age.
- Level of education.
- Previous criminal experience.
- Previous polygraph experience.
- Personality type or traits (e.g., obsessive vs. scatterbrained).
- Working status (e.g., manager vs. low-level worker).
- Social status (e.g., a teacher vs. a mechanic; celebrity vs. “no-body”).
- Socioeconomic level.

- **Circumstantial Factors**

- Strength of Existing evidence.
- Depth and length of prior interrogation.

- Public profile of the case (e.g., no one heard about vs. daily headlines).
- Same or different gender of the examiner.
- Ethnic issues.
- **Concrete examples**
 - Alleged victim case.
 - Witness to a traumatic event.
 - Recidivist criminal.
 - High profile case.
 - Reexamination.
 - ADD/ADHD –Attention Deficit (Hyperactive) Disorder
 - OCD subjects.
 - Serial offense.
 - A criminal turns the state's evidence.
 - Retracted admission.
 - Suspecting false admission.

As mention before, a primary means in applying *Adaptive Polygraphy* is adjusting the baits for diverting the attention from the relevant to the comparison spheres. That should be done based on research rather than mere intuition; however, as long as no hard data available, it is suggested that instead of doing it intuitively, before starting the test, to screen the case along the categories mentioned above and estimate the expected impacts they would have on the RIG strength of the examinee at four levels (Low, Medium, High, Overwhelming). That should adjust the level by which you are to emphasize the comparison vs. the relevant issues and questions.

Of course, to do it, the examiner must be trained to identify the variance between subjects and circumstances and adapt the baits' strength to suit the appropriate balance between the relevant and the comparison questions in each particular test. It used to be part of the training but unfortunately, not anymore. It is about time to go back to this vital practice.

In most cases, we can only rely on our judgment of how particular facts affect the RIG strength; however, increased awareness of this notion and investment of research efforts in the forthcoming years might bring about research-supported information that will direct us in this regard.

The *adaptive Polygraphy* should play a role in dealing with Idiosyncratic and “Paradoxical” Reactions such as Blood volume drop; Increased Pulse rate; Increased Pulse amplitude; Change in extra systolic beat rates, Hyperventilation; Irregular breathing; Fast breathing, and more so.

Research has shown that the response analysis will be better off without considering these reactions as valid responses for our purpose. Nevertheless, experience polygraph examiners have encountered cases in which these responses were significant. Research that will focus on these outliers might improve our understanding of the matter and our success rate by using adaptive analysis.

Along with the understanding that polygraph examiners should not function outside of any standardization or without having any scientifically proven support to their technique, we should beware not to narrow our steps and minds beyond the minimum necessary to avoid chaos.

Examiners should be able to practice their work with enough freedom to enable flexibility needed for adjusting the test to the specific examinee and circumstances, and during the years to achieve research support to the differential treating of the individual case. Interestingly enough, let me remind you that even when it comes to test data analysis (TDA), it is well documented that the rate of success achieved by the original examiners is higher than the one achieved by more objective analysis made by others (Raskin and Honts. 2002).

This is not the place to elaborate about the polygraph in court versus investigation. However, it is clear to the author that one of the enemies of the adaptive polygraph is the drive to bring the polygraph as evidence to the court. The constant squinting towards the court of law should be restrained. The proper place for the polygraph is the investigation dynamic and not the judicial arena. We as polygraph examiners are looking for the truth, not for justice, whereas the justice system is not bound to the truth alone but other values as well (see, for instance, the ‘Fruit of the poisonous tree’ dilemma). As polygraph examiners, we cannot treat every examinee equally; we should give him an equal chance to let his version show up. For this to happen, we have to treat anyone in a tailor-made approach which by definition is not exactly the same in each case. On our way to reveal the truth keeping equal treatment to each case is wrong, whereas it is the right way to go with the judicial philosophy of the western culture. Hence, the bottom line is that the efforts to qualify for evidence in court are damaging to maximizing the polygraph potential.

How to avoid stepping on a slippery slope to Chaos?

Intuitively, *Adaptive Polygraphy* seems to contain the danger of stepping on a wet slippery slope that might bring us back to the chaos that characterized the situation a few decades ago. Any examiner can do anything, and as long as he measures physiological reactions to questions or to other kinds of stimuli related to an investigated issue, he may claim to practice psychophysiological detection of deception. That is, of course, not what this concept means.

The “*Adaptive Polygraphy*” should strive to be a scientific-based approach that allows flexibility within the limits of scientific knowledge and/or scientific thinking and reasoning. It is an approach that looks at the variance among examinees and circumstances not as noise to ignore but as a source of information and insights that looking only under the street lamp with rigid or semi-rigid boundaries would not get us there.

How to control the danger of a wet slippery downwards embedded in the *adaptive Polygraphy*? This is not an easy mission, and it takes time to achieve. Fortunately, the danger is not an immediate one because, after a decade or two in which polygraph examiners were educated and pushed to adopt best practice methods in a variety of polygraph issues and got used to working within those frameworks, they are not eager to say the least, to leave their comfort zone and search for ‘professional adventures’. That gives us time to introduce the recommended change of *Adaptive Polygraphy* at a slow pace allowing for in-depth processes to take place.

The first in-depth change should happen in training polygraph examiners. It starts from the student admission. As it is currently practiced in most schools, people are admitted based on minimum qualifications: a Bachelor’s degree, no criminal record, and being able to pay for a ten-week course. No one really cares about their cognitive, temperamental, and some other personality features, although it is recognized that those matters are crucial for being a good examiner. Unfortunately, some serious professionals think that having a good scientific test means to erase any humane touch that, by its very being humane, introduces variance to the test, which they see as a noise. If this is how they think about what a good test means, then no wonder we can and even should treat the candidates’ personal suitability to become examiners as something to ignore on our way to becoming a scientific-based profession. There is no genuine evaluation and going-on process of selection during the course, and very few students who entered the first day do not get a school diploma from a qualified polygraph examiner when the course is over. Yes,

they can spell out the basic history, legal status, and a few polygraph test formats with rigorous scoring methods. However, they hardly encountered any real dilemma or faced living polygraph cases that introduce the range of real-life diversity in subjects and circumstances. They are trained to believe that “one size fits all”, or at most that there are a couple of models they have to choose between them and follow them to the dot. Also, the number of students per instructor is usually too high, and while it may suit the parts of the lecture, it is problematic when training exercises are concerned. That is not the case where training is more than a factory that produces examiners for profit. There are such places, but there are too many schools or polygraph training programs worldwide that do very poor work. Efforts to impose standards on schools have dealt with outside matters, i.e., the envelope of our profession, and failed to deal with the essence of the problem, which is a poor in-depth understanding of Polygraphy.

All of these should be changed, although, given the existing business factors in the equation, it will take lots of effort and patience. Nevertheless, we should start pushing in this direction, going through a mode of keeping humane touch, encouraging self-thinking, and deepening the understanding of the issue instead of obeying strict rules to their dots.

Quality control is a second important element in controlling the danger of the Adaptive Polygraph being a slippery slope towards chaos. Open-minded quality control of knowledgeable and experienced professionals should prevent messy examinations but enable caution variations that the examiner can explain its logic. Quality control is a place that can integrate new experiences and aggregated knowledge into a corpus that is more than anecdotal events. But that, of course, needs the right attitude, which is led by the Adaptive Polygraph approach.

A closing remark

One more word on the future of our profession – The psychophysiological Detection of Deception.

It is my belief that whether or not we turn to *Adaptive Polygraphy* in the next few years using our current psychophysiological measurements, the accelerating progress in brain research will bring us eventually to the *Adaptive Polygraphy* paradigm one way or another. The scientific detection of deception ought to become more versatile in order to improve its performance which means applying “*Different Things to Different People and Different Situations*”.

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On the Influence of Sleep Deprivation on the Results of Polygraph Testing

Małgorzata Mickoś

lawyer; Katowice, Poland

Marek Leśniak

University of Silesia, Katowice, Poland; ORCID 0000-0002-1204-0988;
marek.lesniak@us.edu.pl

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Introduction

Standards of polygraph examination exclude testing sleep-deprived people. Lack of sleep (and examinee exhaustion) is a factor that can contribute to false polygraph examination results (including false positives). Based on behavioral assessments (careful observation of examinee behaviour during a pre-test interview and subsequent stages of polygraph examination), the critical role of examiners is to recognise incidences of lack of sleep and, consequently, to postpone the moment of

testing. Professional literature treats the lack of sleep as a temporal inability to be subjected to the test (Widacki, 2018, 434). However, such a decision is nowadays usually powered with experts' intuition (their experience) rather than the results of empirical research. There is therefore a need for conducting studies like the one presented below.

In practice, a sleep-deprived person could take a polygraph examination for two main reasons. First, examinees may deliberately deprive themselves of sleep to interfere with the results of tests. Secondly, such a deprivation may be connected with external circumstances of a particular examination. In a case involving a jewelry store robbery in Katowice, police officers wanted an expert to examine the building's security staff. They wanted to have outcomes of screening tests on the day of the theft. The expert refused to perform the test because the security guards were tired after the night shift. In any event, a polygrapher should not yield to pressure and test sleep-deprived persons.

The main goal of the research reported in the present article is to explore the influence of sleep deprivation of tested subjects on the accuracy of polygraph test results.

The background

Sleep is a condition connected with the reduction of sensitivity to stimuli, certain lethargy, and slowing down of the bodily functions, combined with the elimination of consciousness in the daily rhythm with a state of arousal (Avidan A. Y., Zee P. C., 2007; 10). It is "a complex behavioral state necessary for neurological, somatic and psychological health throughout the lifespan, affected by the structural and functional condition of the brain, and influential on neuropsychological performance for better or worse" (Colrain, 2011). People who have not slept for 24 hours or more exhibit impairment of such cognitive functions as perception and retention of information and recall; sleep deprivation increases the likelihood of fake memories (Frenda et al., 2014). The lack of sleep reduces concentration (Maquet, 1994) and the ability to process information from the previous day (Crick, Mitchison, 1983). As a rule, strong physiological reactions occur after 24 hours without sleep, and the body becomes weak (Herschner, Chevin, 2014). Since the lack of sleep has such a comprehensive impact on the functioning of the human body, it must also impact the psychophysiological variables recorded by the polygraph to a significant extent.

The number of hours of sleep needed to regenerate the human body is highly individual. It changes during lifespan (Colrain, 2011) and depends on many factors. These include genetic components and individual experiences. The average human demand for sleep is estimated at eight hours a day; sleeping less than six hours does not satisfy the regeneration needs (Greer, 2004).

Sleep disorders belong to two distinct categories: dyssomnias and parasomnias (Sykut et al., 2017; 55). The former relates to the length or quality of sleep, and the latter are disturbances that occur during sleep. Sleep disorders may also be associated with mental and/or somatic disorders. For instance, temporary sleep disturbances may result, among other things, from working various shifts and/or traveling to another time zone. In the context of a polygraph examination, two pieces of information may be significant: temporary or permanent sleep problems affect a third of the population, and these problems often continue for longer spells of time (Colrain, 2011).

The research questions

Based on the information presented above, the authors formulated the following main research question:

- Does depriving the examinee from sleep influence the accuracy of polygraph examination results (in Peak of Tension version)?

The authors also formulated two further research questions:

- Does the effect described in the main research question depend on the examinee's gender?
- Can the effect described in the main research question be modified with energy drinks?

The method

The research described below was experimental. The subjects were 48 persons, aged 20–65, 23 men and 25 women. Participation in the study was voluntary (every subject signed an appropriate statement).

Participants were divided into groups A, B, and C. Group A was the control group and included well-rested subjects who had slept for at least six hours be-

fore being tested. The persons from group B had not slept in at least the last 24 hours before being tested. Group C included subjects who had not slept in at least the last 24 hours before the moment of test, but they had drunk the same energy drink (100ml) 30 minutes before being tested. Every group (A, B, C) was divided into subgroups (a and b). Participants of subgroups marked “a” (Aa, Ba, Ca) watched a 3-minute video showing a robbery with breaking an entry (the perpetrators took the money). Members of the subgroups marked “b” did not watch the movie. The experimenters offered special care for members of B and C groups (to protect them against the negative consequences of sleep deprivation), however the expert who conducted the polygraph examinations did not know the affiliation of examinees to a specific group (to avoid the expectations effect). Every group and subgroup included a similar number of men and women, and the participants were also distributed evenly by education.

The polygraph examinations conducted used POT (Peak of Tension) tests, a test commonly used in polygraph examinations (Widacki, 2018; 445; Konieczny, 2009; 68). The authors believe that the test is more suitable to laboratory test conditions and the nature of the event the test questions were designed for. During the examination, participants were asked about a stolen thing (presented in the video). All the subject underwent three tests. Each of the three tests included the same general question (did you know it was stolen) and the same six detailed answers (A car? A painting? A TV-set? Money? A watch? A laptop?), but the questions were arranged in different orders. The detailed questions were designed to be equally likely for people who had not seen the movie. Strength of the response to individual detailed questions was ranked. The question which received the strongest response in a single test was assigned 2 points. The question that elicited the second most significant response was assigned 1 point. For the psychophysiological index of concealing knowledge of the event, the subject was assumed to obtain at least 4 points (in three tests) when asked about money. (It was money that was stolen in the video.) The date of the polygraph test was set at random for each subject. The examination took place between the 2nd and 5th day from being shown the video. It was impossible to test all people on the same day, as there was only one expert examiner. All participants were instructed before the examination (not by the examiner) that during the test they were expected to confirm that they possessed no knowledge of the event that the investigation concerned.

The results

In group Aa, six subjects (75 per cent) responded in a way that was characteristic of concealing their knowledge of the stolen item in the video they had seen. In group Ab, three subjects (37.5 per cent) responded in that way, giving false positive outcomes.

In group Ba, two subjects (25 per cent) responded typically for concealing their knowledge of the stolen item, and in group Bb there was one person (12.5 per cent) reacting in that way.

In group Ca, four subjects (50 per cent) responded like people who conceal their knowledge of the circumstances of an incident. In group Cb, one person (12.5 per cent) reacted in that way.

The results of polygraph tests achieved by women and men were similar. In groups Aa, Ba, and Ca, the reactions characteristic of concealing information about the burglary were displayed by seven out of fourteen women. Among men, that was the case with five out of ten. In groups Ab, Bb, and Cb, such responses were displayed by two out of eleven women and by four out of thirteen men.

	Group A (16) subjects without the deprived need for sleep, eight men and eight women, aged 19-25		Group B (16) subjects with the deprived need for sleep, eight men and eight women, aged 19-65		Group C (16) subjects with the deprived need for sleep who consumed the energy drink, seven men and nine women, aged 18-63	
	Subgroup Aa (8) subject with knowledge of an event item (stolen money)	Subgroup Ab (8) subject without knowledge of an event item (stolen money)	Subgroup Ba (8) subject with knowledge of an event item (stolen money)	Subgroup Bb (8) subject without knowledge of an event item (stolen money)	Subgroup Ca (8) subject with knowledge of an event item (stolen money)	Subgroup Cb (8) subject without knowledge of an event item (stolen money)
with symptomatic response to conceal knowledge of an event item (stolen money), at least 4 points	6	3	2	1	4	1
without symptomatic response, less than 4 points	2	5	6	7	4	7

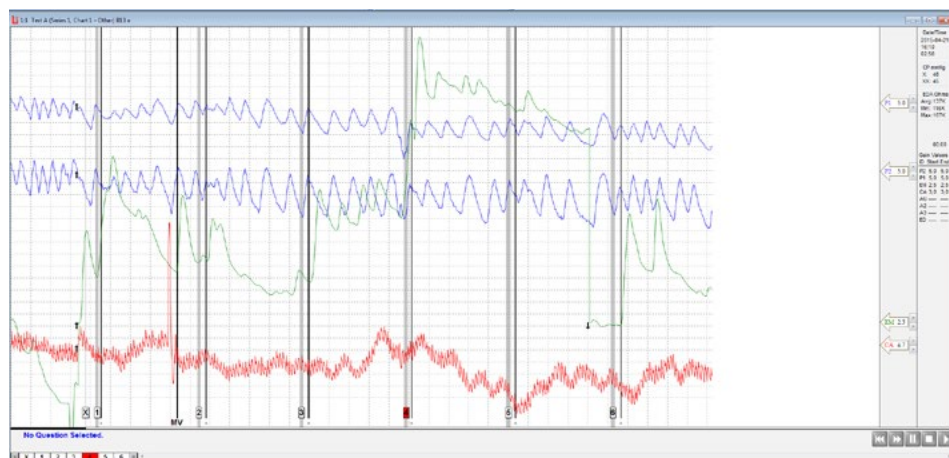


Image 1

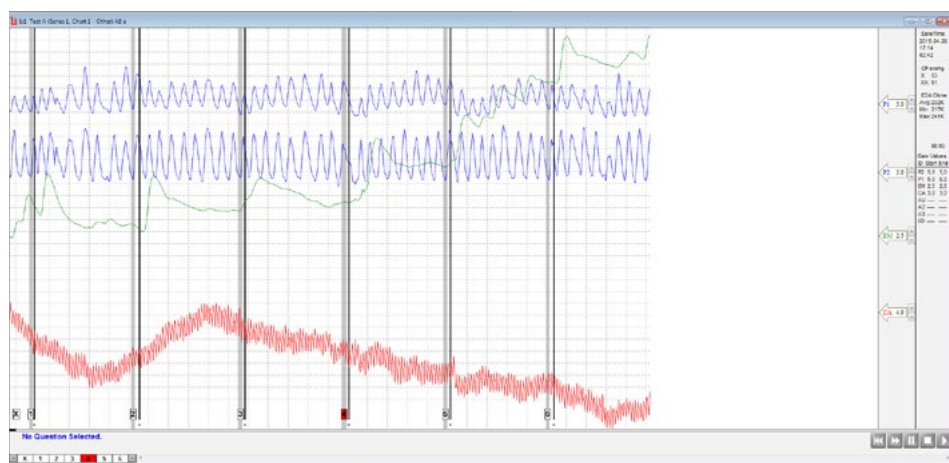


Image 2

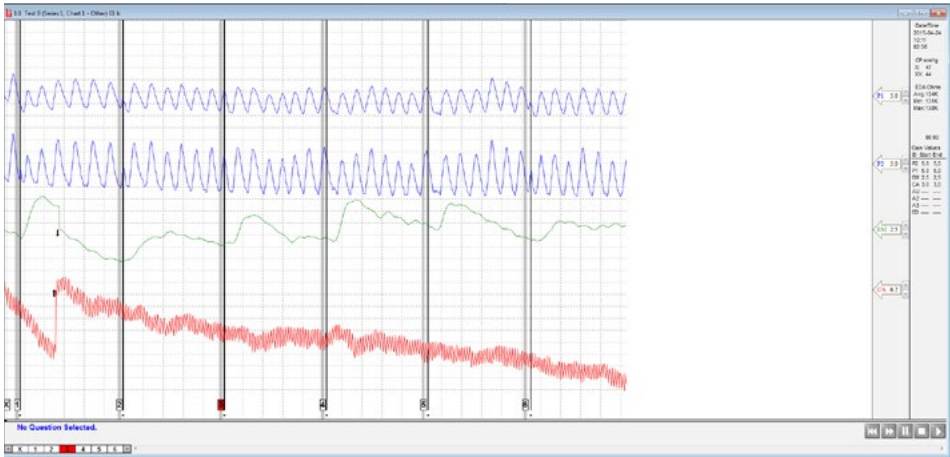


Image 3

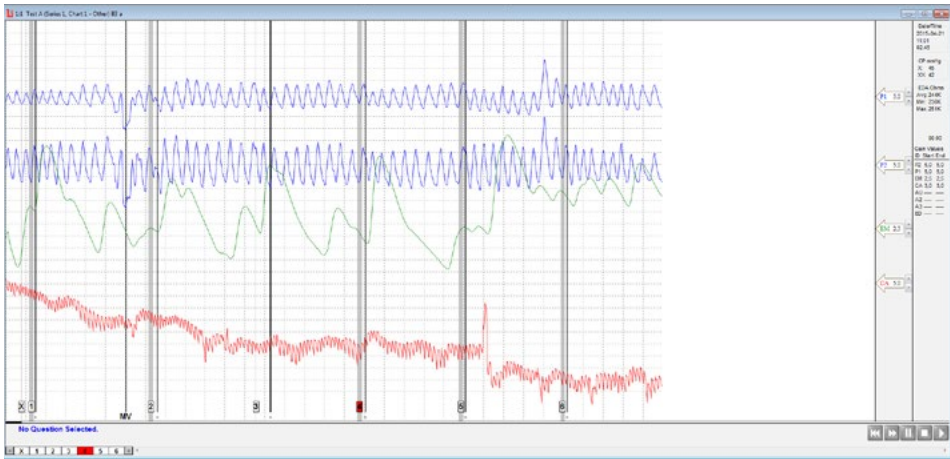


Image 4



The results obtained in the study justify the claim that:

- Sleep deprivation in a subject reduces the accuracy of a POT test polygraph examination. Such a lack of sleep reduces the accuracy to a level that renders the test useless.
- Energy drink intake by people with sleep deprivation increases the accuracy of a POT test polygraph examination. Nonetheless, in this case, the accuracy of test results is still in no way superior to predicting the outcome of a coin roll.

- The effect of sleep deprivation on the outcome of polygraph testing does not depend on the subject's gender.

Discussion

In the light of the reported research results, the expert should routinely ask the person if they slept on the day of testing and if so for how many hours. The existing practice is justified by the results. Pre-test interview forms usually include asking about the subject's sleep hours (also in computer programs used in polygraph testing). However, the discussion about the minimum number of hours of sleep required for taking the examination remains open. The way people behave in sleep deprivation is highly individualised, and depends on many factors. Considering the research described above, it seems reasonable to test only subjects who have slept at least six hours. However, sleep quality may vary, and even such a period of sleep may fail to guarantee proper recovery.

The discussed results show that consumption of an energy drink by the subject does not improve the effectiveness of the study to a sufficient extent. Therefore, even having multiple cups of coffee will not change the situation. Regardless of the pressure from the person who commissions testing (or a supervisor), polygraphers should be assertive and refuse to examine in such circumstances.

Sleep deprivation causes similar disorders in psychophysiological reactions in women and men. In general, the accuracy of results in the group of people who did not conceal their knowledge of the circumstances of the event was somewhat higher among women. However, the number of women was lower (by two) than that of men. Therefore, this outcome requires verification in studies on a larger population.

The study presented in this article was intended to be extended to a larger population, because the current project is too small for statistical inferences. Unfortunately, the restrictions caused by the Covid-19 pandemic did not allow an extension. Such studies are, however, planned for the future and will include an attempt to determine specific patterns of reactions in sleep-deprived persons. Such patterns can be used, for example, to detect people who conceal the fact of being sleep-deprived from the expert.

As already mentioned in the first part of this article, sleep deprivation is usually considered a temporary obstacle to conducting a polygraph examination. As noted in The Background section, such a deprivation may be caused by serious mental and/

or somatic disorders. In the latter case, it may not be possible to carry out the polygraph test at all. Such a situation should be disclosed during the pre-trial interview. It should also be remembered that temporary and permanent sleep problems affect as many as a third of the population (Colrain, 2011).

Obviously, the polygrapher too needs a good night's sleep too to carry out their tasks properly. They should not be tired while conducting the test, and are also vulnerable to sleep disorders. Yet this is a subject for another study.

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Major Ludwik Krzewiński, MD – the Creator of Polish Narcoanalysis

Jan Widacki

Andrzej Frycz Modrzewski Kraków University, Kraków, Poland; ORCID 0000-0001-9174-3501;
jan.widacki@gmail.com

Key words: narcoanalysis, narcoanalysis in Poland, Mjr. Krzewinski

The European Polygraph 2021/1 published an article on the creator of Polish narcoanalysis entitled “The Use of Narcoanalysis by Polish Counterintelligence in the 1930s”. The biography of Ludwik Krzewiński, and especially his wartime history, deserves a study. An additional point of interest concerns his contacts with the US Military Intelligence Service after 1945 and perhaps also earlier during his stay in the Philippines.

Ludwik Krzewiński (Ludwik Kawalek until 19 February 1929) was born to Jan Kawalek and Maria, née Sawczuk, on 19 May 1898 in Sułkowszczyzna, Mościska County in the Lwowskie Region. He had three brothers: Feliks, Stanisław, and Ignacy, and two sisters of unknown names. The Kawaleks actively supported the fight

for independence, with proof being the active participation of Ludwik's father and brothers in the defence of Lwów. Ludwik himself, as well as his sisters, helped to collect gold to support the Polish Legions. His father was arrested by the Russians after photographs and documents of the Sharpshooters were found on him during a search, and Feliks Czech, fiancé of one of his sisters, died as a second lieutenant in the Polish Legions. (The fundamental source for drafting Ludwik Krzewiński's biography before 1939 is his personal file that can be found in the Military Historical Office of the Central Military Archives [sygn. 1769/89.2710]). A good resource for studying his later life are the files of the case against the officers of the Independent Technical Section (ITS) from the Second Department of the Polish General Staff files in communist Poland early in the 1950s. They can be found in the Archives of the Institute of National Remembrance, the Central Archives of Modern Records (Archiwum Akt Nowych – AAN) and the State Archives in Warsaw (Archiwum Państwowe w Warszawie).

In Lwów, Ludwik first attended the Henryk Sienkiewicz Primary School and later Secondary School No. 4. While in his secondary school, he joined the Sokół (Falcon) Polish Gymnastic Society and the Boy Scouts, completing the course for scouting instructors in 1913–14. As an active member of the Society for the People's School (TSL), he visited villages on reading and writing courses for illiterate Poles. When he volunteered to join the Polish Legions at the outbreak of the First World War, he was rejected due to his age (he was 16) and "measly physical condition". Yet in 1914–16 he was involved, together with his sisters, in organising the aforementioned aid for the Legions. During the capture of Lwów in the wake of the Russian offensive of 1915, Ludwik and his father were arrested, beaten, and detained in a POW camp for six weeks. After the Russians were driven back, he was forced into the Austrian Army in 1916. His request to be transferred to the Polish Legions resulted in assignment to the 24th Infantry Battalion of the 19th Imperial-Royal Landwehr Infantry Regiment (Lwów) and posting to the front. When he and his battalion returned to Lwów in 1918, he stole blank documents from the battalion's clerical office, and used a hectograph to forge seals and signatures of Austrian officers, to help Poles desert the Austrian Army and leave for the Kingdom of Poland, where the Regency Council embarked on the organisation of the Polish Army. In this area, Krzewiński cooperated with the underground Polish Military Organisation. In September 1918 he was sent to the officer school in Kamionka Strumiłowa, where he was disarmed and arrested by the army of the West Ukrainian People's Republic. He successfully fled his Ukrainian captivity and reached Lwów, where the Polish Ukrainian hostilities were raging. In the city, he was beaten

with rifle butts and wounded with a bayonet by a Ukrainian squad. A Polish patrol saved his life. Beaten and wounded, Krzewiński made it to his family home at ul. Szeptyckiego 3. From there he took a Russian rifle, which, it seems, had been stored there since the Russians' retreat from Lwów, and joined the fight. He participated in the attack on the Church of St Yuri. However, the wound sustained earlier and the aftermath of the beating made him resign from further armed struggle. He passed his weapon to other defenders of Lwów, and took to assembling telephones for the fighting Polish troops.

On 19 December 1918 he joined the Polish Army and was assigned to an artillery battery, fighting Ukrainians in the battles of Rzaśnia, Sołonka, Kulparkow, Krzywczyce, and Dublany. Due to a relapse of his former injuries, he had to spend several weeks in hospital in February 1919. His artillery regiment, originally given the number 1, was later renumbered 4 and finally – 5. On 19 March 1919 Krzewiński was granted the “Orlęta” Honorary Decoration for *“bravery and faithful service to the Homeland, in memory of the past fight and the defence of Lwów and the Eastern Marches”* [A transcript regarding the diploma for the “Orlęta” Honorary Decoration, WBH-CAW sygn. 1769/89.2710].

Late in 1919 Corporal Ludwik Kawalek was ordered to join a course for military paramedics in Lwów. He also embarked on medical studies at the John Casimir University in Lwów, which he had to suspend due to service until 1922, when he returned to the university. For the duration of his studies, he “was transferred and entered into the files of Sanitary Battalion No. 6 stationed in Lwów. On 23 March 1924 he was promoted to second lieutenant (with effect from 1 February 1919) [Order of the Minister for Military Affairs, WBH-CAW sygn. 1769/89.2710]. In 1923 he completed his education, however, still without being conferred a doctorate, and was assigned for internship to the 14th Jazłowie Uhlan Regiment and later to the 43rd Infantry Regiment of the Borderland Riflemen (Dubno garrison in Volhynia). By an order from July 1924, he joined the Military Sanitary School in Warsaw for an eight-week course in protection against gas weapons. In 1927 he was granted a doctoral degree in medicine at the Medical Faculty of the John Casimir University in Lwów, and in 1930 he was transferred from the 6th Sanitary Battalion to the Military Gas Institute in Warsaw, to the position of experimenter. Lt Ludwik Kawalek changed his family name to Krzewiński on 19 February 1929 [Lwów Regional Office, L;Ac 138/nazw.ex 1929, WBH-CAW 1769/89.2710], was promoted to captain on 1 January 1930 [Personal Order of the Minister for Military Affairs No. 5/30, WBH-CAW sygn. 1769/89.2710], and on 9 December

1930, “Ludwik Krzewiński was joined in holy matrimony with Jadwiga Karolina Fryderyka Ehrlich [Record Book for 1930, No. 499 RC Parish of St Alexander]” in the Church of St Alexander in Warsaw. A son, of an unknown name, was born to the Krzewińskis on 9 January 1933 [Annual addendum to the Qualifications List for 1934, WBH-CAW, sygn. 1769/89.2710].

In 1931 he became a lecturer at the Centre for Sanitary Training. Enjoying the opinion of a good lecturer, he was recognised for his work, and in 1931 received the Silver Cross of Merit. The application for the award of the cross, signed by the Minister of Internal Affairs, Bronisław Pieracki, reads among others: “As a lecturer in the Clinical Unit of Military Gases at the Central Sanitary Training (sic!), he is professionally devoted to warfare chemistry and the treatment of warfare poisonings. With respect to the above, he is an ardent supporter of the idea of protecting the civilian population against toxic gases, a subject he devoted plenty of academic and expert research to. He works creatively as an inventor of kits and dressings against toxic gases for the Gas and Air Defence League (Polish acronym LOPP), and also lectures and writes manuals for civilians etc. His activity significantly contributes to the development of air and gas defence organisations” [Application for the Cross of Merit for Cpt. Ludwik Krzewiński, MD, WBH-CAW sygn. 179/89.2710].

Opinions written by his military superiors portray Krzewiński as a “*stalwart, honorary officer, with a profound sense of personal dignity, friendly, ambitious, diligent and meticulous at work*” [Annual addendum to the Qualifications List for 1930, WBH-CAW, sygn. 1769/89.2710]. Another reference, from the time of his employment at the Centre for Sanitary Training, signed by its commander, Brigadier General Kollątaj Strzednicki, MD, reads: “*extremely talented and intelligent, he surprises with the wealth of knowledge he has acquired. He works a lot scientifically and has a penchant for inventions*” [Annual addendum to the Qualifications List for 1932, WBH-CAW, sygn. 1768/89.2710]. Krzewiński was also recognised as “a highly specialised expert in gas defence”.

On 1 December 1933, Lt Krzewiński was transferred from the Centre for Sanitary Training to the Second Department of Polish General Staff (intelligence and counterintelligence), or, to be more precise, to its Independent Technical Section.

The Independent Technical Section (ITS) was a laboratory with modern equipment employing several dozens of people, both military (mostly military physicians) and civilians. A large share of the staff had doctoral degrees. The Institute was given the fundamental task of developing technical methods and tools for intelligence and

counterintelligence purposes. Thus, it designed methods for creating and decoding ciphers, constructed tapping and also counter-tapping devices, created false certification documents, and forged fragments of costumes, such as buttons, of e.g. Soviet military uniforms (Dubicki, 2015; Widacki, 2022; Widacki, 2021b)

Moreover, the ITS conducted studies on bacteriological weapons and toxins used for sabotage and also for the purpose of eliminating individuals. In this scope, it also tested toxins and bacterial strains on living people (Widacki, 2022). One of the Section's tasks was to design methods known today as "reinforced interrogation techniques" including narcoanalysis.

In that Section, Captain Ludwik Krzewiński, MD, stood at the helm of the "medical", that is toxicological, division.

Independent of the work on "injections debilitating the will" and other works at the Independent Technical Section, especially on sedating agents installed in cigarettes, and chemicals immunising the impact of alcohol, Krzewiński continued to work on gas defence, publishing several outreach and instructional works on the subject. He published an article entitled "Physicians and gas warfare" (Krzewiński, 1932) in 1932, and "First aid in military gas poisonings" (Krzewiński, 1933) a year later. Already serving in the Second Department, he had his brochure "Ratunku! Gaz!" (literally "Help! Gas!") published by the Main Board of the Polish Red Cross in 1936. In that year the same publisher released his "Wieś polska w obliczu wojny" (literally: "Polish rural areas on the eve of war"), followed by "Tablica toksykologiczna gazów bojowych" (literally: "The toxicological table of military gases") and "Tablica ratownictwa przeciwgazowego" (literally: "The table of anti-gas defence"), both published by Komitet Obrony Przeciwlotniczo-Gazowej Biernej in Warsaw in 1938.

He also conducted various courses and training sessions in defence against gases. In official reports he was entered as *"burdened with major family responsibilities. For this reason, he gains extra income by writing articles and working for the Air and Gas Defence League"* (See: Annual Qualification List for 1935, WBH-CAW sygn. 1769/89.2710. K. 84). The Qualification List for 1938 (WBH-CAW sygn. 1769/89.2710) contains an appended note explaining that *"burdened with major family responsibilities, he gains extra income through private medical practice"*. However, it remains unknown what Krzewiński's family duties, other than the maintenance of a wife and son, were. Midway through the 1930s, a captain of the Polish Army with a family to sustain received a relatively high remuneration (400 zloty

+ 105 zloty service bonus), which was on a par with that of a judge in a municipal court, and far higher than the salary of a civil servant with higher education, not to mention the fact that the captain's salary was nearly twice as high as that of a teacher (Mały Rocznik Statystyczny 1935 GUS 1936). Thus, the remuneration of Captain Ludwik Krzewiński, MD, would have been sufficient to maintain a family of three without any extra income.

The opinion of the Chief of the Second Department, Colonel Tadeusz Pelczyński, from 19 November 1935 reads: "*he obtained good results in psychotechnical, physiological, and graphological tests, while the results in the specialist medical field, significant for his work, are poorer (...). Conducting research work in the only technical and research institution of the Second Department of the General Staff, he is developing into an expert hard to replace. He should be used for technical services in intelligence*" [The Annual Qualification List for 1935, WBH-CAW sygn. 1769/89.2710, k. 84.]. The opinion also records that, besides command of German and Russian in speech and writing, he has made progress in learning French [*ibidem*]. The Annual Qualification List for 1938 reads that Ludwik Krzewiński "*is studying English – tolerable good results*". As his works in "psychotechnical" and "physiological" research are not known, it is hard to ascertain what research was meant. It is known from other sources that the Institute of Mental Hygiene in Warsaw purchased a Darrow photo polygraph from the US in the 1930s (Widacki, 2021a). Not only is there no trace of the use of that expensive device, unique in contemporary Poland, in any of the works of the Institute, but there are even no works on the subjects for which a photo polygraph could have been useful. That may give rise to the suspicion that the Institute of Mental Hygiene purchased the device for the Second Department, or that it was the Second Department that purchased the polygraph pretending to be the Institute, although there is no proof of the above.

The expediency of Krzewiński and his work for the intelligence services is validated by the opinions of the successive heads of the Independent Technical Section of the Second Department of the General Staff, Cpt. Harski and Mjr Harland (the annual qualification lists for 1936 and 1937, WBH-CAW sygn. 1769/89.2710).

In 1937 Krzewiński received the Medal of Independence from the President of the Republic of Poland for his fight for the country's independence before 1919 (Order of the President of the Republic of Poland of 5 August 1937, Monitor Polski Official Gazette of the Republic of Poland 1937, item 294). Apart from that medal, and the Silver Cross of Merit and the "Orlęta" decoration mentioned above, he also received the "Poland for its Defenders" medal (for the war of 1919–20), and the

Medal of the Decade. Shortly before the outbreak of the Second World War, he was promoted to major.

As Jan Golba testified (minutes from the interrogation of J. Golba on 20 December 1951, files of the Regional Court for the Capital City of Warsaw, sygn. 4038 AP w Warszawie), preparations for the evacuation of the ITS began on 6 or 7 September 1939. Documentation was burned, bacterial strains were destroyed in Lysol baths, some equipment was packed into crates, and the rest was damaged and left. The personnel with their families were ordered to an evacuation train at the Eastern Railway Station. On the night of 7/8 September, the train set off eastwards, to Brześć (Brest). After a few hours' stay in Brześć, the train made for Zdobunów. From there it went towards Złoczów, but near Krasne it was bombed by German aircraft and could not go any further. The evacuees scattered, some moved in a disorganised manner towards Złoczów, to find a chance train, still working, that took them to Kopyczyńce. Some of the ITS personnel (especially civilians and families) decided to return home on their own. Others, including a group of officers in command with Golba and Krzewiński, went towards Kołomyja, where they hoped that some resistance could be organised. After the Soviet incursion on the night of 18/19 September, a group of ITS officers including Major Krzewiński crossed the Romanian border. Initially, Krzewiński and a handful of other ITS officers stayed in the Vatra Dornei mountain resort near Suceava, from where they were taken to Slatina in Olt County, and later to Drăgășani. There they were separated.

Major Krzewiński and Lieutenant Colonel Gano left for Bucharest, where French visas had been organised by the Polish Embassy. They set forth on the journey on board a ship from Constanța.

In France, Krzewiński was made the head of medical service in the 1st Grenadier Division being formed since September 1939 from the officers and soldiers of the Polish Army defeated in the September campaign, and now breaking through to France mostly via Romania. They were all sent to the training camp in Coëtquidan. The formal order to form the 1st Infantry Division in France was issued by the Commander in Chief General Władysław Sikorski on 13 May 1939. Originally, Colonel Stanisław Maczek was appointed its commander, and at the same time promoted to brigadier general. In January 1940, the division was entrusted to Colonel Bronisław Duch (brigadier general from 3 May 1940) (Smoliński 1965; Biegański 1990). In April 1940 the division was quartered in Lorraine, first near Colombey-Belles and later around Lunéville. In May 1940 the division, composed of 16,000 officers and soldiers, became part of the 20th French Army Corps. As part of that

unit, the 1st Grenadier Division fought in the French campaign in June 1940. After the Germans broke up the 20th Corps, the division retreated towards the Baccaret Woods near Meriller. There, the remnants of the French corps and the division were surrounded. Their last defensive stand was the area of Neureville. With the French entering parley about the suspension of hostilities, General Bronisław Duch disbanded the division on 21 June 1940, ordering the soldiers to break through to the south of France or to neutral Switzerland. Some actually managed to reach Switzerland, where they were interned until the end of the war, others, including Ludwik Krzewiński, became prisoners of war, while others with General Duch and higher officers of the Second Department (including Stefan Mayer and Jan Golba) managed to reach the UK and the Polish Army reorganised itself there from scratch (*idem*; Mierzwiński 1990).

The later fate of Krzewiński remained unknown. Unverified gossip spread among Polish officers both in emigration in the UK and, after the war, in Poland. He was rumoured to have escaped from custody or to have been released due to his health condition (Account by J. Golba from the interrogation on 3 January 1952, files of the Regional Court for the Capital City of Warsaw, sygn. IV K 103/53, Archiwum Państwowe w Warszawie, sygn., 4038). Having left the POW camp, he moved southward, to the unoccupied part of France [Lt Col. Golba knew about the story of Major Krzewiński after leaving the POW camp, including the journey from France to reach America via Australia (*sic!*), and being a Japanese prisoner in the Philippines, from conversations with the friends and acquaintances of them both during and after the war, on the territory of the occupied Germany and in England. Golba mentioned Gen. Duch as one of his interlocutors, from whom he supposedly received that information. (See: Minutes from the interrogation of J. Golba on 3 January 1952, files of the Regional Court for the Capital City of Warsaw, sygn. IV K 103/53, Archiwum Państwowe w Warszawie).

Together with a pharmacist named Bednarz (first name unknown), a Pole he met in the camp in France and who had family in the US, Krzewiński decided to go to the US. In Marseille they managed to board an American ship in the autumn of 1940. It headed for America via Australia. Both during the war and after its conclusion, there were rumours among the soldiers of the Polish Armed Forces in the West that the ship with Bednarz and Krzewiński on board was torpedoed, allegedly near South Africa, and then the two somehow reached Japan or the Philippines, were taken prisoners by the Japanese there, and after the war reached the US, where Krzewiński was believed to have worked in a cosmetics factory, and later developed

his own prosperous cosmetic service in New York.

Conducting an investigation into ITS officers early in the 1950s, the prosecutors of the communist Polish Ministry of Public Security suspected that Krzewiński's contacts with the Japanese after 1941 were an extension of the cooperation conducted by the ITS back in the 1930s (Interrogation of J. Golba on 3 January 1952, files of the Regional Court for the Capital City of Warsaw, sygn. IV K 103/53, Archiwum Państwowe w Warszawie, sygn., k. 42). Other than the validation of the fact that the Pole planned to leave for Japan in December 1939, there is nothing to confirm that conjecture. It was not even found whether the journey was planned before September 1939 or only after Krzewiński reached France in the autumn of 1939. The latter is however less probable, just for the reason that, while in the army in France, Krzewiński was not assigned to intelligence services but was the head of medical services in a regular frontline unit.

Based on unverified gossip, Krzewiński is believed to have become a Japanese prisoner in the Philippines. However, as Japan was not at war with Poland, and, moreover, the Polish and Japanese intelligence services cooperated during the war (Pałasz-Rutkowska 1995), Ludwik Krzewiński was not treated as a prisoner of war but as an internee. Allegedly, being a physician, he treated American prisoners of war in the camp, where he stayed until Americans liberated the Philippines in January 1945, when he left for the United States.

It remains unclear when Krzewiński finally reached the United States. Either it was on 12 March 1945 from Canada, as suggested by the records of United States Border Crossings from Canada, or, which is more probable, he arrived in San Francisco from Manila on 15 May 1945. According to the records on that file, entering the US, Ludwik Krzewiński declared that he wanted to reach New York, and defined his intention concerning the stay as “to remain permanently”. He also gave Manila in the Philippines as his last permanent address.

Unverified rumours among his friends from the time of military service spoke of Krzewiński finding employment in a company producing cosmetics in New York, and then supposedly running a beauty parlour. Anyway, there was a general conviction that he coped very well.

American documents add “Kerstyn” before the family name “Krzewiński” making him Ludwik Kerstyn Krzewiński. His true fate after the defeat of France in 1940 can be gleaned from a memo of an officer of the War Department's Military Intel-

ligence Service, Lt. Col. R.W. Weaver from 1st July 1945. It seems that, from the moment of his arrival in the US, the Pole remained within the realm of interest of the US military intelligence services. The said memo was drafted slightly more than a month after his arrival in the US, and must have required personal contact with an officer of the American intelligence service. Two weeks before, on 14 June 1945, Krzewiński was interrogated by the Military Intelligence Service (Carus, 2017). The subject of the interview was Polish research on biological (bacteriological) weapons conducted before 1939 as well as the know-how of the Polish intelligence services about such weapons in the USSR, Germany, and Japan. It remains unknown whether these were the only contacts of Krzewiński with the American intelligence service, and whether the Americans were only interested in biological and chemical weaponry, or whether he was also questioned [about narcoanalysis and Polish experience with it prior to 1939].

Thanks to the interest of the Military Intelligence Service in Ludwik Krzewiński, we can learn about his true journey after becoming a German prisoner of war after the defeat of France in 1940. The aforementioned memo states that Krzewiński fled the POW camp in France and reached the part of France unoccupied by Germans, and in Marseille boarded a ship going to Indochina, which at the time was French. He reached Saigon after its capture by the Japanese, and left the city with his assistant (Bednarz?) to reach Manila on 22 November 1941. There he was waiting for transport to the US. However, the Japanese attacked Pearl Harbour in the meantime. It was then that Krzewiński volunteered as a medical officer eager to provide services to the American authorities. Yet, due to his command of English, still poor at the time, he could only be enlisted in the Quartermaster Corps as a lorry driver shuttling American soldiers. After the Philippines were captured by the Japanese, Krzewiński was interned (although he was not a prisoner of war as Poland was not at war with Japan) in Santa Tomas, where he became Assistant Chief Medical Officer in the POW camp, and later the Chief Medical Officer in POW camp Cabanatuan. After the liberation of the Philippines by the Americans he was, as the author of the memo put it, “returned to the U.S. by our authorities”, which may mean American intelligence.

According to his obituary, Major Ludwik Kerstyn Krzewiński died on 12 March 1971 in New York, leaving behind his wife Renee and son Richard [Daily News, New York City, 14 March.]. The fate of his family who stayed in Poland remains unknown.

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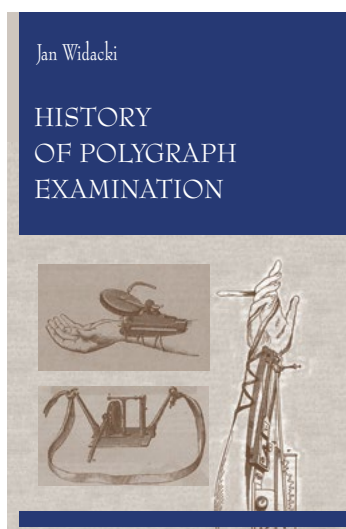
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Book reviews

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***History of Polygraph Examination* by Jan Widacki,
Polskie Towarzystwo Kryminalistyczne, Warszawa 2021**

This 6 ½ by 9 ½ inch hard cover book contains a table of contents, seven chapters, a conclusion, bibliography, summary, and names index within 178 pages. Its first publication was in Polish in 2017, and subsequently translated in English by Piotr Krasnowolski with cover design by Oleg Aleksejczuk and reviewer by Marek Leśniak in 2021. Publisher: Polskie Towarzystwo Kryminalistyczne, ul. Zgoda 11,

loc. 300, 00-08 Warszawa. ISBN: 978-83-960666-0-2. This book was part of the project WPAiSM/DS/2/2019-CON, and financed by the Ministry of Science and High Education.

This is a well-written and organized book. It is also well annotated with footnotes on almost every page identifying sources of information. The book is filled with photographs of pioneers in the field of polygraph science, and early instruments used in recording certain physiological parameters. It discusses the contributions made by the earliest pioneers such as Hermann Von Helmholtz (1821–1894) who constructed and used the ophthalmoscope for studying the retina of the eye to Grover Cleveland (Cleve) Backster (1924–2013) who developed the Backster Zone Comparison Technique in 1960 with the first quantification system of the physiological data in chart analysis as the sole determinant of truth and deception with inconclusive results when the data fails to meet the minimum score threshold. The evolution of the polygraph instrument is thoroughly discussed with several photographs displaying the Larson Cardio-pneumo-psychogram, the Berkeley psychograph, the Darrow photopolygraph, the Keeler polygraph, the Stoelting polygraph, and the Lafayette polygraph instruments. A minor discrepancy was found on page 115 where it is stated that the Backster Zone Comparison Technique was developed by Backster in 1916; the correct date is 1960. However, I believe that the major contribution of this book is in its comprehensive presentation of the innovative developments made by European and Asian pioneers in the field of polygraph examinations, now known as *Forensic psychophysiology*. In 1996, the American Society for Testing and Materials (ASTM) established the controlling standards for *Forensic Psychophysiology*, a title which it enacted for the discipline of psychophysiological detection of deception (PDD) examinations. I highly recommend this book to anyone interested in the history of truth-verification and lie detection.

James Allan Matte

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**Aleksandr Motlyach: *Poligrafologia (Polygraphy)*,
Izdatelstvo Osvita Ukrainy, Kyiv 2021, pp. 568 (in Russian)**

The Author has dedicated the handbook to two groups of readers: polygraph examination trainees and professional polygraph examiners. It consists of two major parts: one devoted to theory, and the other to practice. The theoretical part is presented in eight chapters, and the practical in seven.

In the “theoretical part” we can find the basic information about polygraph and polygraph examination, and the legal status and history of such examination. In this part of the book, the section most interesting for the readers from Western Europe and America is the information about the history of psychophysiology and polygraphy in the tsarist Russia, former Soviet Union, and in post-Soviet countries. That historical information, unfortunately incomplete, is also inaccurate at places. The part dedicated to the legal status of polygraph examination in Ukraine (Chapter 7 § 3, pp. 150–164) is also very interesting.

In the “practical part”, the Author describes among others the techniques of polygraph examination, types of tests, construction of questions, and the methods of pre-test interrogations. Generally, the techniques discussed are the American ones (AF MGQT, Utah ZCT, Federal ZCT), and the descriptions are only based on Russian and Ukrainian literature. American and other foreign literature is absent from the bibliography, which is a weakness of the book. Nonetheless, the whole shows that knowledge of polygraph examination in Ukraine is on a good level, and, as mentioned above, some of the historical information is invaluable.

Jan Widacki

Polygraph. Science and Technology. Announcements

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From the Editors

On 1 December 2021 Marcin Gołaszewski defended his doctoral thesis entitled “Polygraph Test Data Analysis Methods: The Notion of Subjectivity in Opinions Issued by Expert Witnesses” (supervisor: Professor J. Widacki, reviewers: Professor T. Tomaszewski and Professor M. Leśniak) at the Andrzej Frycz Modrzewski Kraków Academy.

Its abstract is published below.

Please note that the editors of *The European Polygraph* welcome information about doctoral theses on the subject of polygraphy and are ready to publish it.

Summary of Doctoral Dissertation

Marcin Gołaszewski

Author: Marcin Gołaszewski, MA; Andrzej Frycz Modrzewski Kraków University — Faculty of Law, Administration and International Relations

Supervisor: Professor Jan Widacki, PhD

Thesis title: Polygraph Test Data Analysis Methods: The Notion of Subjectivity in Opinions Issued by Expert Witnesses

Key words: polygraph examination, data analysis, methods, expert witness, subjectivity

Polygraph (variograph) examinations are used in forensic sciences, personnel screening, operational work of uniformed services, the supervision and therapy of sex offenders, and also for assorted private purposes. Under the Polish criminal proceedings, the opinion of an expert witness in the field of polygraph examinations is deemed admissible evidence with the status of circumstantial evidence. A polygraph examination consists of: a pre-test interview, formulation and review of test questions with the examinee, the measurement of the physiological changes during the tests, data analysis, post-test interview, the drawing up of conclusions, and the issuing of a written opinion.

Individual methods of polygraph test data evaluation feature a significant margin of subjectivity, which is construed as freedom of interpretation not subject to objective, precise criteria. Decisions made by an expert witness in the context of such discretion tend to be affected, among others, by the initial perceptions considering the subject matter of the examination and the pressure exerted by the environment in which the expert operates. The systematisation of the methods for analysing test data is especially useful for polygraph practitioners. On the other hand, the awareness of subjectivity in expert polygrapher opinions, and of their causes and potential impact, is necessary for accurate assessment of the evidence by all participants in the proceedings, and by the court in particular.

In the introduction to the dissertation, the author discusses the substance and application of the polygraph examinations, their status in the Polish criminal procedure, and the expected requirements pertaining to the expert witness's opinion. Problematic issues and related research hypotheses were formulated and later verified (also empirically). The problem questions were defined as follows:

1. When assessing polygraph curves, does the polygrapher tend to be biased (knowingly or unknowingly) by other information and evidence collected in the course of the proceedings?
2. Are the methods of numerical interpretation of records better than the qualitative method ("better" meaning returning more accurate results and leaving a narrower margin of subjectivity)?
3. Are different final test results obtained depending on the actual numerical analysis method employed (when it comes to assigning the subject's responses to relevant questions as typical of the reference population of either truthful or deceptive answerers)?
4. Are the methods of the numerical test data analysis with a narrower rating scale (3-point) more objective than those with wider (7-point) scales?
5. Which assessment of the polygraph records is more accurate: conducted in accordance with the blind scoring method or by the polygrapher who conducted the examination?

The first chapter discusses the general factors that may affect the correctness and reliability of the judgments of polygraph experts. The author presents selected issues accompanying the examination, not resulting from logical reasoning and strict adherence to the prescribed procedures, and thus having a negative impact on the reliability of polygraphers' evaluations. Observations regarding potential inaccurate measurements

are discussed. The author reflects on the importance of appropriate expert witness' credentials related to the expected standard of training (the scope of specialised knowledge), work experience, and personal qualifications.

The second chapter focuses on a comprehensive systematisation of methods of interpreting polygraph examination data. The author describes and compares the assumptions of these methods, their effectiveness and the degree of agreement between evaluators.

These methods have historically evolved from the qualitative method (i.e., global interpretation of the records throughout the chart, without additional measuring tools and quantitative estimation of differences in the magnitude of changes in the bodily responses) towards objectification in the form of the quantitative-qualitative methods (ranking of reaction significance and numerical estimation of differences in responses to relevant and control questions). The key ranking methods are: horizontal system and ROSS (Rank Order Scoring System). The most widely discussed numerical methods are the systems introduced by Lykken, Backster, the US Army (later extended to federal institutions in general) and Utah, and the ESS (Empirical Scoring System).

The third chapter of the dissertation covers ways to reduce the margin of subjectivity in interpreting polygraph examinations by validating and standardising tests, harmonising testing procedures, clarifying characteristics that are considered diagnostic, and the application of a quality assurance policy. Finally, the author recapitulates the conclusions of the dissertation and presents the results of the verification of hypotheses put forward in connection with the research problems considered.

The hypothesis that information concerning a person undergoing a polygraph examination that an expert is familiar with before carrying out the evaluation of the data recorded by the device affects the subsequent chart analysis has been confirmed. However, the increased risk of confirmation bias occurs only when the differences in responses to compared questions (relevant and comparison) are not too distinctive, or the tracings are difficult to interpret. The author believes that it would be optimal to make only those documents available to the polygraph expert that are essential for issuing an opinion, in particular without the expert opinions of other specialties (with some exceptions).

The hypothesis that numerical methods lead to more accurate test indications than qualitative methods has not been confirmed. Moreover, in terms of freedom of interpretation, a significantly narrower margin (compared to the qualitative method) was observed only in the case of the numerical ESS system (with a 3-point rating scale). When using the Utah system (with a 7-point rating scale), experts were no more in

agreement than those who performed a global analysis of polygraph charts (despite the diagnostic criteria in the Utah system being seemingly more objectivised).

Hypotheses have been proven that there are no significant differences between the validated methods of numerical analysis in terms of the final results obtained in comparison questions tests (CQT) and, furthermore, that methods with narrower (3-point) rating scales are more objective (they ensure more frequent repeatability of test results, and lead to greater inter-rater agreement) than wider (7-point) rating scales. The hypothesis that evaluators using the method of blind interpretation make the diagnosis with greater accuracy than the experts who have personally conducted polygraph tests has also proved to be true. In the light of these findings, the author recommends considering the introduction of blind scoring as a routine supplement to the examination procedure.

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For example (in references):

Reid, J., Inbau, F. (1966), *Truth and Deception: the Polygraph ("Lie-detector") Techniques*, Baltimore: Williams & Wilkins.

Abrams, S. (1973), Polygraph Validity and Reliability – a Review, *Journal of Forensic Sciences*, 18, 4, 313.

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