Summary of Doctoral Dissertation

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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-ratrer 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.