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Polygraph Examination and the Crisis of Traditional Concept of Forensic Identification

For some time now, certain practical and theoretical achievements of forensic sciences have become subject of a very serious criticism. It is difficult to say what was at the root of this process: whether it was the glaring neglect on behalf of the experts and others in the trial of the so called "Birmingham Six" (although this very case is often considered a milestone in expertise quality), or other, unfortunately numerous examples of drastic expert errors, which led to penalizing innocent persons, or the increase of methodological awareness of some academic authors. Undoubtedly, both factors had their role here – dramatic social response to the judicial mistakes, as well as essential deepening of the interest in epistemological aspects of forensic sciences. The

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latter has to be considered more important, since without questioning the very basis of hitherto assumed identification theory, the expert errors and as a consequence also judicial ones, would probably be regarded accidental in the generally efficient mechanism, based on – except for DNA tests – views of the 19th century founders of the forensic system, their direct successors, and the experience of the generations of police officers dealing with identification, and transfer of this knowledge to (often uncritical) juridical groups.

Polygraph examination has always been a subject of controversies, which leads to the question if the current wave of criticism, directed basically against certain classic foundations of the forensic identification, can reach also this technique. The purpose of present comments is to attempt to decide this question.

First, let's consider if the most general theoretical assumptions of the polygraph examination are coherent with classic theoretical views of forensic science.

The first rule, determining the possibility of even performing forensic identification, is the rule of transfer – formulated in 1920s century by E. Locard. Put most simply, it states: every contact leaves a mark. Participation in an event, or more generally: conceiving by a person of information about certain event leaves a memory trace. Therefore the transfer leads from event (known from participation, or from third party account) to person. The subject of the transfer is an information, and emerged mark – a memory trace in mind of this person. As every trace, also this one should be protected – its integrity should be preserved, degradation should be limited, and contamination should be avoided (K. Inman, N. Rudin 2001, p. 355–256).

Two situations of such trace should be distinguished. Until its bearer becomes a “candidate” for polygraph examination, nobody has influence on the trace's lot, exactly as nobody has influence on the marks left on a crime scene, before someone finds it. However, when a bearer at least potentially becomes a candidate for examination, then the postulates of protecting the trace become substantial, same as in case of any other trace.

Every human mind stores a huge number of memory traces. The goal for polygraph examination, technically speaking, is to establish if the inventory of traces of the examined person contains traces that are interesting e.g. to the

criminal investigation that is being led. If so, then the record of examination will show – as an impact of stimuli – responses of certain intensity. In order to affirm if registered responses are evidence of existing memory traces containing information hid by the examined person (thus proving their deception), the stimuli should be differentiated.

In a polygraph examination, the stimuli are questions, which can be divided into relevant and “other”. As a result of the examination we obtain two sets of responses: these recorded after relevant questions, and these after the “other” ones. Because in the course of specific examination it is impossible to ask all the questions that could relate to the investigated case, these sets can be considered as samples taken from one or more general populations. (C.G.G Aitken, F. Taroni 2004) It is easy to notice that the situation is typical for so called scientific evidence, and methodology of polygraphy elaborated techniques of deciding the tests results.

In general, the following results of forensic expertise are possible: true, false, false negative, false positive, inconclusive, no result (K. Inman, N. Rudin 2001, p. 357). In case of polygraph examination the possibilities are exactly the same: the result can be true (if a “sincere” person is indicated as “sincere” and “insincere” is indicated as “insincere”), false negative (if an “insincere” person is indicated as “sincere”), false positive (if a “sincere” person is indicated as “insincere”), inconclusive (if obtained record of responses do not give ground to indicate the examined person as either “sincere” or “insincere”). It is also possible to arrive at a situation where there is no result, because the subject had not agreed to be tested.

From general duties to be fulfilled by a forensic expert, we can list the following: (1) obligation to deliver material hitherto unknown or supporting certain vision concerning the examined event, (2) material localized in context of the evidence collected so far, (3) facilitating the decision for the trial decision-maker and (4) material obtained only in person, or under personal supervision. (B. Caddy, P. Cobb 2007). It is clear that also in this case, the duties remain the same for the polygraph expert.

Now, let us consider what today is the subject of criticism towards the traditional theory of forensic science.

First of all, it is noted that the central assumption of identification, i.e. that if two traces are indistinguishable from one another, than they are produced

by one object, is theoretically and practically groundless. As a result, another assumption is made: if two traces do not come from one object, then they differ from each other (Reader would kindly notice that the second assumption is not a logical conclusion of the first). We also have the third assumption, which is that some traces are characterized with “discernible uniqueness”, meaning that they are individual and unique and therefore the first or second assumption must be true (M.J. Saks, J.J. Koehler 2005, p. 892–895).

In addition to that let us say that the pronouncements about the individuality of the trace (which usually is one of the first things done by expert), concluded with a remark that “the trace has individual features” and thus are suitable for examination, is often made subjectively, basing on the expert’s experience, so clarifications that are sometimes added, such as “the traces have forensically indistinguishable features” are justified only by the subjective beliefs of the expert, and nothing more. These weaknesses do not prevent experts from deriving actual advantages from applying the individualization rule, by giving firm, categorical opinions, with definite conclusions. Moreover (and it is hard to say what is worse), “discernible uniqueness” releases experts and excuses forensic scientists from developing methods of measuring features of the examined objects, gathering data characterizing their population, studying the distribution of variance of features, testing their independence or calculating and explaining the probability of accordance of the observed features of investigated material (M.J. Saks, J.J. Koehler 2005).

The result of attacking the forensic individualization rule is the lack of theoretical and practical justification of the expert opinion of handwriting, fingerprints, tools traces, hair (at least in case of microscopic methods), teeth, bullets, footprints and footwear – in short all these expert opinions that rely on comparing the traces which are considered to present discernible uniqueness (M.J. Saks, J.J. Koehler 2005, *ibid.*)

We can find the continuation of this determined criticism of the expert evidence applying the individualization rule, in the work of M.J. Saks, J.J. Koehler (2008, p. 199). The reasoning is the following. Forensic identification consists of two steps: first we compare an item of evidence (questioned sample) to an item gained from a known source and determining the level of their convergence. The second step is to determine the probability that they originate from the common source. Both of these steps present risk

of making a mistake, however this risk is not researched. Not only does the practice show the possibility of expert errors, there is also data proving that the same experts examining the same material (unknowingly, at some time interval) arrived at different conclusions, probably influenced also by differing information about the cases contexts given to them (*sic!*). There is – according to authors – no scientific argument supporting the use of the individualization rule. The expert, even if stating a full accordance of features of the evidence and comparative material, should not categorically conclude a common source of their origin. “Expert should explain that, in finding that two patterns match, they have placed the suspect object or person in a pool of one or more objects that match the evidentiary marks. The strength of the likelihood that the known object or person shares a common source with the questioned object or person depends on the size of the pool. No scientific justification exists for assuming that the size of the pool is one” (M. J. Saks, J.J. Koehler 2008, s. 216–217).

From these reservations the authors exclude only the DNA expert opinions, stipulating urgent exclusion of the traditional forensic expert opinions in the present shape from the trial application.

Besides, even forensic examinations of DNA had its affair with the notion of uniqueness. Some time ago FBI announced that they will authorize its experts to give opinions about person’s individual identification based on blood, sperm or other biological materials found at the crime scene, if the probability of the compatibility of the DNA sample features derived from the questioned trace and the other, randomly selected sample is lower than 1/260 billion. In this situation the expert could decidedly state that the level of the scientific certainty is sufficient to exclude from the group of donors the questioned material all the other people in the world, besides the donor of the comparative material; the certainty of common source of both samples was not to be doubted. This concept was criticized by many specialists: they pointed out the lack of the logical and meritorious foundation of this solution, the lack of the possibility of conducting presenting counterevidence (e.g. an alibi) and limiting the court in the establishing of judicial standard “beyond reasonable doubt” (C.G.G. Aitken, F. Taroni 2004, p. 86–87).

It was also shown that traditional opinions, with the use of the principle of individualization, are disadvantageous for the defendant, and they increase the jurors’ inclination to pronounce guilt. The lack of the persuasive efficiency of cross-examination, opposing expert and instruction for jury in the traditional expertise was emphasized (D. McQuiston-Surret, M.J. Saks 2008, a good list of the critical literature about the traditional identification methods can be found there). Similar criticism can be also presented in

the moderate version; particularly the ontological foundations, logical and mathematic principles of individualization and its general forensic sense are defended, however without the support for the present experts' practice in this field (see D.H. Kaye 2008). The last is also being attacked more and more ruthlessly, with indication that forensic expert opinion can work perfectly without the concept of "uniqueness" and "individuality", and abandoning both ideas will result in increased methodological examinations standard, with all the positive consequences of this fact (S. A. Cole 2009). S. A. Cole argues that: uniqueness is not needed, because its process cannot be well motivated, it is also irrelevant taking under consideration its evidential value of forensic assays. The idea of individualization can be supported after conducting a sophisticated theoretical construct, but its usage is maleficent and it stops the development of the forensic areas that apply „individualization". The price of the elimination of the uniqueness and individualization will be resignation from the definite opinions, but it will be more honest; the example of DNA examinations showed that "forensic science can live without individualization" (S. A. Cole 2009, p. 17). The problem is that the change of the paradigm of opinions requires a) an immense effort of scientists and experts, b) which is not in the interest of the latter, and c) not necessarily is beneficial for the courts of justice which were freed from the labor of thinking by traditional expert opinions.

The three points above are the deepest manifestation of the crisis, which is discussed here.

The American National Research Council of the National Academies in its moderate report states directly that in the recent years in the USA many different factors led to the increase of the requirements towards the incoherent and underfinanced forensic infrastructure, which raised serious questions and anxieties regarding validity and reliability of some forensic methods and techniques, as well as the ways of presenting expert opinions' in courts (National Research Council (NRC) 2009, section 1–4). Radical authors (like the above-cited S. A. Cole and D. H. Kaye and others; see further paragraphs) criticized this report despite embracing its conclusions, and indicating the lack of determination in formulating the proposals for improvement.

The end of the era of the categorical experts' opinions will come along with the end of the lawyers' complaints about the "expert's dictatorship". What is even more important – according to A. P. A. Broeders – „Forensic scientists should not be allowed or should not take it upon themselves to usurp the role of the expert is to pronounce upon the weight of the forensic evidence, not to address the ultimate issue" (A.P.A. Broeders 2007, p. 332).

Consequently forensic science has found itself – not only in US – “under siege” (K.M. Pyrek 2007). It’s not the kind of siege where the attacking forces intend to exterminate the local population upon capture (at least not in its entirety). It is rather an attempt to force the defenders to engaging into substantial discussion, to establishing a reliable overview of situation and to implementing major revisions.

However sometimes the besieged stumble somewhat. It was in 1997 that a consortium of American traders produced an *amicus curie* letter in which we can find following comment: “the great bulk of expert testimony provided by law enforcement officers does not involve scientific theories, methodologies, techniques, or data in any respect (...) Instead, law enforcement officers testify about such things as accident reconstruction, fingerprint, footprint and handprint [identification], handwriting analysis, firearms markings and toolmarks and the unique characteristics of guns, bullets, and shell casings, and bloodstain identification” (after M. J. Saks, J.J. Koehler 2005). Along with M. J. Saks and J.J. Kohler, consider the irony of this pronouncement. Probably it was caused by that kind of temporary weak-mindedness, which was known, already to St. Peter. But did the besieged themselves note it?

In this context, polygraph examination rather should not find itself at the risk of a new wave of criticism, mostly because its theory does not use either the concept of the individualization or the uniqueness. However, there is a possibility of new suggestions for modernizations of expression of probability (or larger: uncertainty) during determination results of polygraph examination. This tendency was clear already in the recent report of National Research Council concerning polygraphy (National Research Council (NRC) 2003).

But there is no space for doubts: “All results for every forensic science method should indicate the uncertainty in the measurements that are made ... (NRC 2009, section 6-1)”, and at the Recommendation 3 of the report we can find: “The National Institute of Forensic Science (NIFS) should competitively fund peer-reviewed research in the following areas: (...) (c) The development of quantifiable measures of uncertainty in the conclusions of forensic analyses” (section 6–6).”

In comparison with similar forensic techniques like handwriting analyses, tool identification, bite marks identification and other above-mentioned techniques, forensic polygraphy is in a very good situation. Validity, reliability and accuracy of basic techniques and tests in polygraph examination are well known. Moreover, strictly fixed values of that factors determine admission of specific method to practice (D. Krapohl 2006).

The problem of relaying the uncertainty of the examination results in the reports from field examinations is not solved yet. It is well understood that there is a lot of sources of uncertainty and thus one clearly positive aspect of the current crisis is, or will be, that the experts will be coerced into giving the measures of the uncertainty of results, and so definite opinions will be eliminated. There is no clear idea how to present the information about uncertainty in practice. There are many possible options and discussion about it is needed. It should be focused on epistemic/cognitive aspects of examinations. If so, results of examinations presented in a disciplined manner and made clearly understandable for the audience will become a new element of quality. As M. Redmayne accurately points out: the expert opinion "must be communicated in clear and meaningful terms, and be accompanied by sufficient background information to enable other decisions-makers to contextualize the results." (M. Redmayne 2000, p. 311).

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