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## Efficiency Formula for Polygraph Examination

In all known handbooks of psychophysiological polygraph examinations (Abrams, 1989; Konieczny, 2009; Matte, 1997), there is little information on when the polygraph examiner should perform a polygraph examination and when it is better not to carry out an examination.

Polygraph examiners from Moscow (Charin, 2006) were probably the first to focus on the fact that under certain conditions polygraph examination may be

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less successful or completely ineffective. This is very important to polygraph examiners from the private sector. If the private polygraph examiner performs ineffective polygraph examination, the customer may not pay for the service. Polygraph examiners working in government institutions do not face the risk of not receiving payment after unsuccessful examination. However, a polygraph examiner working in a government institution wastes time and money on the examination. In our view, the most damage is related to the fact that after an unsuccessful polygraph examination, the society loses confidence in the effectiveness of polygraph examination.

A polygraph examiner from Moscow (Charin, 2006) suggested evaluating the effectiveness of polygraph examination based on the parameters laid out in Table 1.

Table 1. Evaluation of the effectiveness of polygraph examination (in official checks)

Information on the case	5	10	15	20	25
Realization of the case	7	14	21	28	35
The significance of the case to the examinee	8	16	24	32	40

Information on the case – when almost all employees of the institution know about the details of the case, 5 points are given; when the employees of the institution where the examination is performed are poorly informed about the case, 25 points are given; an intermediate number of points is given in other cases.

The realization of the case is the examinee's ability to evaluate the circumstances in the case. If he/she was under the strong influence of alcohol or in a state of trance following consumption of drugs, 7 points are given. If during the event the examinee was fully sober, 35 points are given.

The significance of the case to the examinee – if the case is of little significance (for example, a sum of 5 dollars is missing), 8 points are given; when the case is very significant (for example, a sum of 20,000 dollars is missing), 40 points are given.

The points of the three parameters are summarized for each case. If the sum of points is less than 50, Moscow polygraph examiners do not recommend

starting a polygraph examination. If the sum of points is from 50 to 70, the test may be both successful and unsuccessful. If the sum of points exceeds 70, there is a high likelihood that the polygraph examination of this case may be successful.

Since we perform criminal polygraph examination only with the event knowledge test (EKT) (Saldžiūnas et al., 2008), our tests are not influenced by the leak (publication) of information on the case. In the polygraph examinations, the following parameters are also important to us: the qualifications of the polygraph examiner, the time elapsed between the case and the polygraph examination and the preparation of good versions of the case. Polygraph examinations are, of course, influenced by other factors (Saldžiūnas et al., 2009); however, in our opinion, the use of too many parameters is irrational in the practical evaluation of polygraph examination effectiveness.

For several years we have been using the following formula created in an empirical way for the evaluation of effectiveness of polygraph examination:

$$P = \frac{30(2S+K+2I)}{15+G^3+T}, \%$$

P – the likelihood that psychophysiological polygraph examination will be performed successfully (%)

S – the significance of the case (3–10)

K – the qualifications of the polygraph examiner (3–10)

I – the quality of information gathered on the case or versions (3–10)

G – the inebriety of the person during the event (0.5–5 per mille)

T – the time elapsed between the case and the examination (0,1,2,.....years).

**N.B.** Indicated here are the optimum limits of parameters. In the case of lower values than of S, K and I, there is no point in performing the polygraph examination. The influence of alcohol from 0 to 0.5 per mille practically does not influence the result. Parameter G should also reflect the influence of drugs on the examinee during the case. In such a case, the polygraph examiner sets the value of parameter G based on his experience.

Figures 1, 2 and 3 show how the likelihood of the successfulness of psychophysiological polygraph examination varies together with the change in parameters S, K, I, G and T.

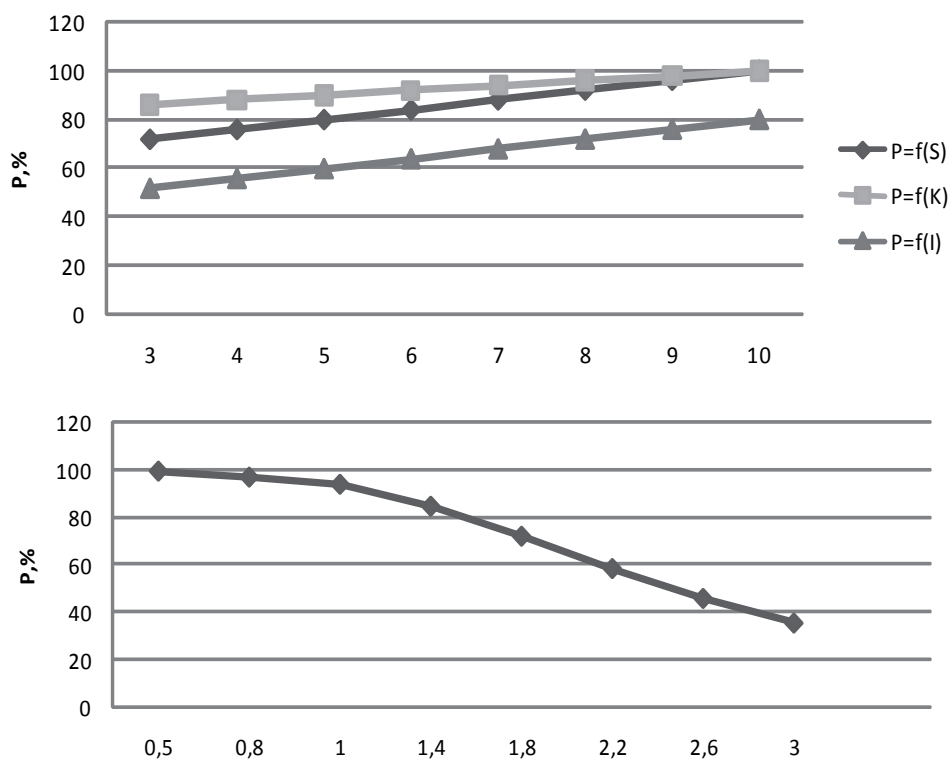


Figure 1. The dependence of the effectiveness of psychophysiological polygraph examination on  $S$ ,  $K$  and  $I$  in the case of fixed remaining parameters:  $P=f(S)$ , when  $K=10$ ,  $I=10$ ,  $G=0$  and  $T=0$  (no more than 1 year passed from the event);

$P=f(K)$ , when  $S=10$ ,  $I=10$ ,  $G=0$  and  $T=0$ ;

$P=f(I)$ , when  $K=10$ ,  $S=5$  (crime of little significance),  $G=0$  and  $T=0$ .

Figure 2. The dependence of the effectiveness of psychophysiological polygraph examination on  $G$  in the case of fixed other parameters ( $S=10$ ,  $K=10$ ,  $I=10$ ,  $T=0$ )

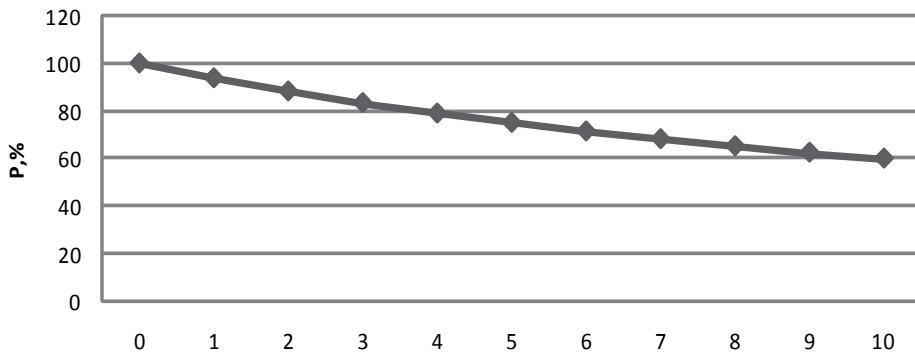


Figure 3. The dependence of the effectiveness of a psychophysiological polygraph test on T in the case of fixed other parameters ( $S = 10$ ,  $K = 10$ ,  $I = 10$ ,  $G = 0$ ).

The information illustrated in Figures 1–3 is not absolutely precise. These values are only for orientation purposes. For example, the effectiveness of the examination can depend on time elapsed after the case completely differently, as the stability of memory is different among all individuals.

We recommend the following:

- a) when P is less than 50%, psychophysiological polygraph examination should not be performed;
- a) when P is more than 50%, but less than 70%, psychophysiological polygraph examination can be problematical;
- c) when P is more than 70%, it is likely that polygraph examination will be successful.

The application of formulae in practical polygraph examinations is illustrated with two examples.

*Example 1.* A murder was committed seven months ago. Forensic medicine experts established approximately how many times and to which body parts the victim was hit, presumptions were made about the murder weapon and the causes of death were determined. The police arrested two suspects who were present during the crime. Both suspects provided their own versions of the case, i.e. made allegations towards each other of having beaten the victim. Both claimed that they had not beaten the victim personally. The criminal police applied to the polygraph examiner with an application to determine how many times, to which body parts and with which tool each suspect hit the

victim. At the time of the crime, each suspect had a bottle of beer. Before the examination period, the polygraph examiner had successfully tested about 300 criminal cases and on about 20 occasions explained the conclusions of polygraph examination in courts.

The following values can be inserted into formula:  $S=10$  (murder),  $K=9$ ,  $I=9$  (two versions of suspects which perfectly suit the forensic medicine conclusion regarding the injury),  $G=0$ ,  $T=0$ . The calculation showed:  $P=94\%$ .

N.B. The polygraph examination was performed successfully. The court made the judgement based on the conclusion of polygraph examination.

*Example 2.* An elderly woman died as a result of falling down the stairs. The prosecution service suspected that she could have been pushed down the stairs by her son. In the process of the criminal investigation, it was established that the son was under the strong influence of alcohol during the accident. The polygraph examination was planned to be performed within half a year of the event. The polygraph examiner was highly qualified.

The following values can be inserted into the formula:  $S=10$  (murder),  $K=9$ ,  $I=3$  (criminal investigation versions have almost no proof),  $G=2.5$ ,  $T=0$ . The calculation showed:  $P=31\%$ . The polygraph examiner refused to examine the suspect with a polygraph.

## Summary

The effectiveness of psychophysiological polygraph examination is not precise; it can be useful only for the prediction of a potential result.

In order to avoid complexity of the formula, only several main parameters of the effectiveness of psychophysiological polygraph examination  $P$  are used.

Knowing the effectiveness of psychophysiological examination, the polygraph examiner can make the decision:

- to perform a polygraph examination
- to refuse to examine the case (person)
- to offer the client to gather more information (carry out expertise) on the case in order to develop better versions or find another polygraph examiner with higher qualifications.

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