

## **About statistical approach to processing and interpretation of experimental results on revealing of the human abilities to the extrasensory perception**

*A.G.Lee, A.G.Chunovkina*

The restrictions in the use of the universally accepted approaches to the statistic treatment of the extrasensory perception measurements (ESP) according to the Bernully hookup without taking into account the specific nature of such phenomena are shown. The ESP ability inconstant and hardly controlled by a person himself, it can be manifested during rather short time. The new approach to the statistical treatment of the results is based on the analysis of the sequence of the right answers in the series and the using of the successive statistical procedures (criteria) which take the peculiarity of the ESP into account. The estimation of the first-kind error for the proposed method is given.

The traditional way to obtain the statistically right results is the repeating of the same experiment many times with different operators and performance of many-days and many-hours tests. But at the present time such approach didn't allow to obtain the reproducible results because of the nonadequacy of used experimental techniques to the investigated phenomena and their imperfection. The well-known techniques of testing ESP are based on the statistical methods taken from the exact sciences [1-8]. They were suggested 25-50 years ago. But as it often happens the techniques taken from the exact sciences are found to be noneffective while studying the biological objects especially in the psychophysiological and mental sphere because they don't take into account the specific features of the human perception. To the great extent such a situation is due to the fact that the ESP investigations are made by the people with the technical way of thinking who are not acquainted with the biological systems, human mentality and the perceptual process. The elaboration of the new approaches to the ESP measurements, the searching of the new mathematical models taking into account the human mental activity are necessary.

In a general way the well-known method of the ESP measurements corresponds to the classical Bernully hookup. One takes  $N$  envelopes or boxes and puts one of the  $m$  objects inside (the objects must be of the same type but of the different color or material). The examinee is suggested to define the color or material of the subject inside the closed envelope or box and the right answers are fixed. The Vasilyev's Fund of Parapsychology often uses one of the following methods: one has to choose ten boxes with the required object from twenty, to divide ten red cards in the envelopes from ten blue ( the so-called "skin-optical vision"), to define different objects i.e. metals, plastics, wood, parts of plants, animals, insects in the closed boxes (the dowsing tests). The prosopopy is studied with the use of the generator of the pseudoaccidental numbers. In some cases the research programs are made as the games and this fact essentially improves the experimental results. In all cases one has to predict one of the four or five variants given by the generator i.e. the number, the Zener's card, the direction of the plane's flight and etc. One series includes twenty efforts. But the Bernully mathematical description of the experiment is nonadequate to the investigated phenomenon and causes the serious objection because it is apriori proposed that the examinee's ability can be characterized by the constant  $p$ , i.e. the probability of the right answers can't be changed during the experiment. The last condition provides the statistical reproducibility which is necessary for statistical methods.

But the results of investigations carried out by the Vasilyev Fund and the scientific association "Psychophysics" with the aim of searching the people with pronounced abilities had shown that it is of no matter. The mass screening of the population with the use of the above-mentioned techniques [8,9] was carried out in 1988-1992 at the Exhibition of Economic Achievements and also at the Art House. Also two TV competitions named "The Extrasensers of Russia" were organized in 1991 and 1992. The competitions and investigations revealed the people with high results, both the people who found their abilities themselves and those who didn't suspect about there unusual abilities. 800-

1500 people were examined by several kinds of the test. The error for different tests complied 3-5%.

The average amounts of the right answers for ESP tests are tabulated below:

Table N1

number of the series	I	II	III
1	5.36±0.05	5.56±0.06	4.22±0.03
2	5.21±0.07	5.29±0.08	3.95±0.05
3	5.1±0.10	5.14±0.12	-
mathematical expectation	5.00	5.00	4.00

Here:

I - means the extrasensory perception (N=20, m=2);

II - the playing variant of the research program; (prediction of the plane's flight direction)(N=20, m=4);

III - The Rhine's test (prediction of the Zener's card)(N=20, m=5).

Every time an examinee was tested in a new way. Looking at the first table one can mention the larger amount of the right answers in the first series in comparison with another ones. The distribution of the right answers in the next series is close to the accidental one. Attention is drawn to the fact that the asymmetry in the distribution of the results of the first series and displacement of the average in the direction of the increase of the right answers take place. The best results were obtained while using the playing programs. Every series includes several groups of the right answers accumulated in 35-40 seconds. It should be mentioned that even the most successful operators show the distribution of the right answers close to the accidental one after the second series. If the distribution in the second and next series is absolutely accidental, the results should be distributed near the curve corresponded to the accidental distribution with the average equal to the mathematical expectation. But the approximation of the results of the next series to the accidental distribution is unilateral.

Thus, all investigated phenomena are manifested more brightly in the first series and in the next ones they become accidental. While using the classical statistical approach all effects "disappear" i.e. they become statistically unreliable. The increase of the experimental time and the number of series doesn't raise the reliability of the results, but, on the contrary, diminish, because during the experiment all the effects seem to be manifested less than in 30-45 seconds. The statistically reliable treatment of the results obviously needs the analysis the first series only and the different operators therewith should solve the same task. Using such approach one can prove the existence of the ESP working with the large groups of people, though the statistically reliable proof of the ESP abilities of a single person is still very complicated problem [9-11].

Such results were obtained during the EEG-investigations of the ESP [12-15] when the longitude of the special states of consciousness was determined and it comprised less than 5-30 seconds. During the professional work the extrasensers can show the necessary for the ESP manifestation shorter-acting (several seconds) inversion of the functional brain asymmetry with increasing activity of the right hemisphere having any initial profile of the functional asymmetry [11].

By these means the investigations show that many factors such as the correspondent mood, feelings, tiredness, loss of the interest to the task, the knack of concentration on the problem and others influence upon the results of the testing. Under the real conditions one shouldn't say about the statistical reproducibility at all, but only during some period of the time special for every examinee. It follows that the main objection against the Bernully approach is the proposal that p is invariable quantity and as a result, an unjustified choosing a number of tests.

One of the possible alternatives is the use of consequent statistical procedures (the criteria). An examinee is suggested to answer a question and his answer is controlled immediately. If the

series of the right answers is permanent and rather long, the testing should be ended with the positive result. This experiment can be organized in two ways: the operator can be acquainted with the results (the reverse communication) or not. In the first case the original training takes place and one should expect higher results. Broadly speaking, one should end the stage of training (the tuning stage) before the beginning of the experiment. The few wrong answers will not spoil the whole picture (as in the classical case), because both the investigator and the examinee should be oriented not on the number of the right answers from the overall amount of the questions but on the longitude of the series of the right answers.

In the case of the negative result, the testing can be finished if the examinee suggests it himself or if the investigator suggests (looking at the examinee's state). We don't want to fix the time of the experiment because this will entail the necessity of the additional subjective proposals. To our point of view, this question should be solved in an empirical way.

Let's describe the organization of such experiment and the interpretation of the results in details. As an example we can take the test with definition of the colors (its results are also right for the Rhine's and dowsing tests).

During the experiment the examinee is suggested to determine m colors. The investigator must prepare quite enough number of envelopes with pieces of every color (approximately equal to the number of the observations). The investigator offers one of the envelopes, choosed accidentally, to the examinee, in so doing the first doesn't know about the color in the envelope too. Then after the answer they both check it and so on.

The appropriate length of the series of the right answers n can be defined taking into account the small probability of such event in the case of the accidental guess:

$$[1/m]^n < \alpha$$

here m is the number of the right answers;  $\alpha$  is the probability of n right answers in the case of the accidental quest; n is the length of the series of the right answers (it should be chosen as minimal satisfying the given condition).

$\alpha$  can also be defined as the probability of the erroneous determination of the abilities (usually chosen as 0.05 or 0.01).

All statistical conclusions include the errors of two kinds, that are why together with erroneous determination of some abilities one can erroneously disclaim the existence of any abilities. In our case the calculation of the error of the second kind is rather complicated and demands previous establishment of the number of the experimental observations and a considering of different cases to collect the probabilities  $p_i > 1/m$ . Inasmuch as we refused from such additional strictly formalistic limitations, let's take into account only the errors of the first kind, the more so as they are the governing factor. The values of n for different m and  $\alpha$  are given in the Table N2.

Table N2

The first-kind errors  $\alpha$  depending on the length of the series of the right answers n and number of the defined objects m

m \ n	1	2	3	4	5	6	7
2	0,5	0,25	0,12	0,06	0,03	0,02	<u>0,01</u>
3	0,33	0,1	0,06	0,02	<u>0,01</u>	~0	~0
5	0,2	0,04	<u>0,01</u>	~0	~0	~0	~0

In conclusion we want to mention once more that the effectiveness of the mathematical and statistical methods is defined by the rightfulness of their use. The approach to the organization of the experiment and treating of the results mentioned above doesn't eliminate previous one at all. It

seems likely that it would be profitable to use both approaches on the first stages of testing and carrying out of prior searching investigations. The test based on the use of binomial distribution and interpretation of the results following the Bernully schedule is more strict. It demands both the manifestation of extrasensory abilities and its reproducibility during rather long time (corresponding to the number of the tasks in the test). Preference to any of methods should be given on the base of concrete tasks and experimental material with the aim to build more adequate model of investigated phenomenon.

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