A TRANSOCEANIC ESP EXPERIMENT

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ABSTRACT: When, in 1939, word was received at this Laboratory that Dr. Karlo Marchesi, a physician of Zagreb, Jugoslavia, had produced significant scores in a lengthy series of ESP tests, it was proposed to him that he attempt to identify the cards in decks set up for the purpose in this Laboratory. He complied; and between August, 1939, and May, 1940, in three different series, attempted to identify the cards in a total of 353 ESP decks located in Durham. The score average was above the mean expected by chance, but not significantly so, except in the third series taken by itself.

However, we applied a method of evaluation recently introduced to this field of study, which is quite as reliable as the usual critical ratio method, but which is more complicated. This method utilizes the fact reported by Rhine last September that certain patterning of hit-distributions occurs in the run of twenty-five trials. It was found in this earlier work that these patterns for the run as a whole were reflected, as it were, in the segments, or five-trial portions within the run. As a matter of fact, it was the correlation between these patterns in the segment and the patterns in the run as a whole that constituted the major finding in the paper referred to. The method of determining whether or not the results were explainable by chance consisted in finding how much evidence there was of this relation between the hit-patterns of the segment and those of the run as a whole. This method is called "covariation between salience ratios," the term for the measure of the patterning. We found that the covariation of salience ratios for the segment and the run in the work with Dr. Marchesi gave a probability of .00014. This is a highly significant probability which clearly excludes the chance hypothesis.

It may not be clear at once how a series which averages but little

above chance can show significant hit patterns such as this work gives, but this is due to the fact that part of the pattern gives a negative deviation and part, positive. The patterning cuts across the "chance" line and the two trends of deviation cancel each other. Yet the patterns themselves (i.e., segment and run) are enough alike to exclude the chance hypothesis. The curves in Figure 1 give some idea of this relation, but, of course, the covariation results are the real basis for the conclusion.

Under the circumstances of the experiment, with 4,000 miles separating the cards and the subject who was trying to identify them, there can be no doubt that any knowledge shown would have to be extra-sensory. The only interpretation possible if the results are not explainable by chance or by sensory modes of perception is that an extra-sensory way of perceiving has been exercized in producing the results.

After Dr. Marchesi had acted as percipient in the first two of the three series, he proposed that a number of subjects in Durham attempt in like manner to identify the cards in decks set up in Zagreb. Ten subjects at Duke made a total of 1,000 runs, 10 each daily for 10 days, and these likewise gave a small positive but insignificant total deviation. When the scores of the Duke subjects were evaluated by the salience ratio and covariation method, the resulting probability was .12. This, too, was insignificant.

When the Marchesi data and the Duke data are evaluated together by means of the covariation of salience ratios of the run and the segment, the work as a whole gives a covariation CR of 3.11 and a probability of .0012, which is significant.

The fact that the hit-patterning or salience of the run is related to that of the segment is itself an interesting phenomenon, apart from the evidence it contributes to the occurrence of ESP itself. Such salience effects are being studied extensively, and a number of studies have been or will be submitted for publication, some of them directed to the study of the nature of this salience effect, and some utilizing it as a means of discovering ESP itself. Incidentally, there is also submitted with this report a note describing a series of tests which Dr. Marchesi conducted with the cards located nearby instead of at a great distance. These tests gave much higher averages than the

distance tests, though less striking salience relations. The fact, however, that they show positive salience relations, such as are shown by the distance tests, makes them of sufficient interest to be mentioned even though the conditions were less satisfactory. They are not presented, and in fact are not needed, as support of the case for ESP which the Marchesi distance experiment contributes.

This transatlantic experiment with Dr. Marchesi represents the longest distance which any systematic ESP investigation has, to our knowledge, ever utilized. This in itself is of some interest, especially since the most far-reaching conclusion of the nature of ESP concerns its place in the space-time universe.

Introduction[1]

The research described in this report consists of transoceanic ESP tests conducted jointly by Dr. Karlo Marchesi of Zagreb, Jugoslavia, and one of the writers, JBR, in 1939 and 1940. The tests followed the card-identification method known as DT, in which the cards are left untouched throughout the test. The results are, by one method of analysis, ascribable to chance, but by another they are decidedly extra-chance in character. On the whole, the unusual conditions under which the experiments were conducted, and the analyses of the results themselves seem to warrant our bringing these data to the attention of students of this field.

The Main Percipient and the Setting of the Experiment

Dr. Marchesi had been in correspondence with JBR since January, 1939. In the course of this contact, he reported several experimental series of ESP tests in which significant results had been obtained. In some of these, he himself had acted as the percipient. When, in May of that year, JBR received from him the records of

[1] The generous cooperation of Dr. Marchesi and of the ten American subjects who participated in these experiments is gratefully acknowledged. The assistance of Mr. Edmond P. Gibson in the recording of the cards and the checking of the records in the Laboratory is likewise very much appreciated, as is also the assistance of members of the Laboratory staff, and friends who have participated in the reading and correcting of this manuscript.

Due to the difficulties of correspondence in these times, Dr. Marchesi has not had an opportunity to see this manuscript before publication, and should not be held responsible for any of its conclusions.

200 runs of DT tests averaging 6.69 hits per run of 25 trials (a résumé of which is added below as a supplementary note to this report), he proposed that a transoceanic experiment be arranged, in which the cards would be set up in Durham and Dr. Marchesi would attempt to identify them from Zagreb. The response received was a cordial acceptance of the suggestion, and the first experiment was carried out in August of that year. Others followed in 1940, and later Dr. Marchesi suggested that a group of Duke percipients attempt to identify cards set up by him in Zagreb. A group of ten adults participated as subjects in this reverse arrangement.

Dr. Marchesi is a practicing physician, who, at the time of the experiments, held a government post in public health which he still retains. He is about forty-two years of age, and is of Italian, German, and Czech ancestry. He is the author of a book in the Croatian language entitled (as translated by him): *The Problem of Psychic Phenomena.* Dr. Marchesi states that although his medical training had inclined him to dismiss as incredible all such phenomena as that of extra-sensory perception, he was, as a result of his own experiences, and particularly his experiments, led to a distinctly favorable attitude toward the ESP hypothesis by the time the distance experiments with which we are concerned were begun.

Salience

In an earlier report (10) JBR reviewed briefly the work which showed that when the DT test (calling down through the deck without removing the cards) was used, a higher rate of deviation from expectation was obtained at the beginning and end of the run than in the middle. The hit distribution, when plotted in five points for the run, accordingly gave a U-shaped curve. These curves were reported in 1934, and similar curves were later found by others. There were exceptions, but even with the exceptions there was the general feature that the ends of the runs tended to show greater deviation from expectation (in one direction or the other) than the middle section. This standing-out of the ends, or "terminal salience" as it was called, appeared from the data available to be a general, though perhaps not invariable, effect of the DT test.

The DT work which was reported in a preceding article likewise gave a U-shaped curve, though in this case an inverted one.

This inversion, however, should be expected in view of the fact that the total deviation was negative. Pegram had obtained an inverted U-curve with the negative deviation obtained in her Low-Aim Series. With salient ends in a negative series, the inverted U-curve is a natural result.

The earlier experiment had been designed to vary the amount of terminal salience in the run, and also to induce a similar effect in the segments of the run that were produced by interruptions introduced at intervals of every five trials. As measured by the salience ratio (SR), a measure introduced for the evaluation of terminal salience, more of the latter was found in the interrupted runs than in the uninterrupted. This was true both of the runs as a whole and of the segments themselves. Thus, the standing-out of the ends of the run was increased by dividing the run into segments; and the segments themselves took on the character of small runs and showed even more terminal salience than the run as a whole.

Of primary importance was the significant relationship found between the SR's of the run and those of the segment, a fact which suggests that the salience shown in the one may be related to the other. Other significant relations statistically revealed between the SR's indicate that a general patterning of the distribution of hits is to be expected under the conditions of these DT tests, that this patterning is a matter of position of trials in the run and is in reality the reaction of the subject to the structure of the run as a whole. The segment-run relation between SR's was obtained by the covariation statistic, as described in an article by Greenwood (4) which accompanied the first salience report.

Salience as a Means of Exploring for ESP

In the preceding article on salience it was pointed out that significant evidence of salience was at the same time evidence of ESP; in fact, it was suggested that *the salience ratio and the interrelations between salience ratios are valid measures of the extra-chance character of ESP data—measures that might be used on experimental results in which more familiar methods would fail to show such extra-chance effects.* In this, and in other articles to follow, such indeed is the case.

The reasoning is as follows: If the hit-patterning which the SR (salience ratio) measures is not due to chance (that is, if there is an extra-chance distribution of successes throughout the run according to position or pattern) this distribution could presumably occur only if there were some cognitive connection between the percipient and the cards. Accordingly, to show that the results are extra-chance and hence are evidence of ESP, it need only be shown that there is significant salience or SR relations. That extra-chance patterning may occur in the absence of significant total scores is understandable when it is realized that this patterning may cut back and forth across the line of mean chance expectation, thus producing a cancellation effect in the total deviation of the series.

Significant salience effects have been found by three different methods: first, by the evaluation of the probability of the occurrence of an SR of given magnitude; second, by the covariation between corresponding SR's from two comparable subdivisions of like conditions in a research series—for example, in the preceding article this relation was computed for the Child and Adult Divisions; the third method consists in determining the covariation probabilities for the SSR-RSR relationship—the SSR's being the SR's of the segment of five trials, of which there are five in each run, and the RSR's representing the SR's of the run as a whole, in which the five segments correspond to the five trials in the segment.

Throughout the salience work reported thus far, it has been the covariation between the SSR and RSR that has contributed the best evidence for the extra-chance character of the results. This relation between the segment and the run has been a positive one throughout. It is the method applied in the present study.

The application of the SR-covariation technique to the Marchesi results came about in connection with a survey that is being made in this Laboratory of the occurrence of salience effects in DT and PDT (precognitive DT) tests for which the hit-distributions are on record or are obtainable from the records. The Marchesi records, which are based on DT tests, had not been published. (The experiments were, in fact, interrupted by the threat of war in Jugoslavia, but it is hoped they will be continued with the return of peace.) But because of their relevance to the salience inquiry it has seemed to us

advisable, in view of the international situation, to publish this interim report, dealing with that aspect of the material which is concerned with salience. This leaves for a later date, and perhaps for Dr. Marchesi himself, an eventual and more complete analysis and reporting of these, together with the other ESP experiments which he has conducted.

Distance and ESP

It may be seen from a review of the history of distance-ESP tests which JBR prepared for this JOURNAL in 1937 (7) that the Marchesi experiments involve a much longer distance than any others on record. There is, however, no reason, as far as the evidence goes, to expect any appreciable effect from longer distances than from shorter ones. While there are on record instances of a falling-off of success in ESP tests when the distance between percipient and the target cards (or agent, in telepathy tests) is extended, there are too many other instances of the lack of any such decline (with distance) to allow the conclusion that distance is a determining condition.

Added to the general evidence against any limiting influence of distance upon success as summarized in the 1937 article, there has appeared since that time a number of other striking cases that support a general conclusion. The cases of Warner (18) and of Riess (13, 14) involve only moderate distances, yet they are striking because of the high level of scoring attained by their subjects. The work of Carington (1) offers an interesting point because of the comparison of distance which is possible, since subjects in different parts of the world participated in his experiments. He mentioned that the group which happened to be located farthest away gave the best performance. This distance was from Durham, North Carolina, to England. The distance involved in the present report—approximately four thousand miles, from Durham to Zagreb—is therefore unique in extent.

PLAN OF THE REPORT

The experiments in which Dr. Marchesi acted as percipient will be called Section I, and those in which the Durham subjects participated will be called Section II. Section I will be further subdivided into four Subseries, consisting of 125, 90, 103, and 35 runs each,

given in chronological order. Section II consists of 10 Subseries, each of 100 runs, each Subseries representing the work of a single subject.

The subdivision of Section II calls for no explanation, but that of Section I should be described further. The runs of this Section were actually made in 3 sequences: the first, of 125, in August, 1939; the second, of 193 runs, in January and February, 1940; and the third, (prematurely interrupted) of 35 runs, in May, 1940. Since the Series of 193 runs was disproportionately large, it was broken into 2 Subseries, the first 90 having been conducted in January, and the remaining 103 in February. This separation was effected at the time of the checking-up of the experiments, which was approximately a year before the interest in salience arose in this laboratory. At the time the analyses were begun, we considered the question of keeping these January and February results separate, and decided in favor of doing so; first, on the grounds of comparable size of Subseries; and, second, on the grounds that even though the total deviations were slight, that of the January Subseries was positive and that of the February negative. The earlier terminal salience report had shown a tendency for a U-shaped curve of hit-distribution for positive series (2, 3, 6, 10), and an inverted U-curve for series with negative deviations (6). It is of some importance, as will be seen, that this division was made in advance of the analyses.

The Section results will be treated separately, and after the separate presentation, they will be combined.

Procedures and Conditions

Since the conditions were essentially the same for all of the experiments, one description of the procedure will suffice. The day on which the tests would begin was agreed upon by correspondence in advance. Ten runs were to be done daily, and for that purpose ten target decks of plain ESP cards were shuffled, returned to their boxes, and laid out in a North-South line in the Parapsychology Laboratory at Duke, deck No. 1 being at the South. Dr. Marchesi was not informed of the details of their position, since he did not wish to give his attention to the details of localization.

The cards (already shuffled to break up original order) were

given at least five shuffles and a knife-cut before being set up for the first day. Thereafter daily for the test series the card order was recorded for each deck at the end of the exposure period, and the re-shuffling immediately followed the recording.

For Section I the cards were set up in Durham on the day preceding that on which the subject attempted to identify them. They were in place by 5:00 P. M. in Durham, which would be 11:00 P. M. in Zagreb. They remained there until 1:00 P. M. or later the following day, which gave Dr. Marchesi until 7:00 P. M. or later, Zagreb time, to record his trials. These were made, as a rule, soon after 8:00 A. M.

The standard commercial ESP Record Pads were used for recording. Each sheet has space for ten runs. Each run is broken into five segments of five trials each by the occurrence of double lines at intervals of five spaces in the column. At the end of the series, or when it was interrupted, Dr. Marchesi mailed copies of his records to this laboratory, where they were independently checked and rechecked. He was then informed of the results.

The same procedure was followed in the reversed arrangement of Section II, in which the subjects were in Durham, except that the ten decks of cards set up in Zagreb in Dr. Marchesi's office were arranged into rows of five each. In view of the considerable labor involved in the double-checking of one thousand runs which made up Section II, a copy of the card records were sent to Duke, and the checking was done by staff members here.

The same schedule of ten runs per day was followed in Section II as in Section I.

Methods of Analysis

The critical ratio method for the evaluation of total deviation of hits from expectation was applied as usual as each series was terminated, and the chi-square method of combination of CR's was used to obtain a general measure of the several series taken as a whole.

In the spring of 1941, about a year after the Marchesi work had been interrupted, the new method of evaluating the extra-chance character of certain types of ESP data, i.e., by the use of the salience ratio, was introduced. The manner in which the salience ratio is obtained and the several ways in which it may be evaluated have

been described in the earlier report, and it may be reasonably presumed now that those readers who would be interested in the present report have already become acquainted with the method. By way of review, however, a few words may be of assistance in recalling the essential outlines. The first step consists of making a hit-distribution for the twenty-five trials in the run for the group of data being evaluated. From this, two group distributions, each composed of five subtotals, are then obtained: the distribution *of the run* is made by grouping the hits of the first five trials as one total, those of the second as another, and so on, thus giving five subtotals. The hit-distribution *in the segment* is obtained by taking the total number of hits in the first, sixth, eleventh, sixteenth, and twenty-first trials, which gives the subtotal for the first trial in the segment. In a similar way the subtotals for the other four trials in the segment are found. Thus two distributions of the same hits are obtained: one in five subtotals for the segment of the run, and the other in five subtotals for the trials in the segment.

The deviation from expectation is then obtained from each of these sets of score-subtotals, a half-point dropped (to allow for discontinuity of the data; see p. 196, Vol. 5, this JOURNAL) and the critical ratio for each position is found. This is squared, giving a chi-square with one degree of freedom. From these sets of five chi-squares the salience ratios are computed by combining the first and fifth in each set and dividing their sum by the sum of the second, third, and fourth. The quotient is the salience ratio, or SR. The SR of the run is the RSR and that of the segment the SSR. The method of finding the probability of a given SR as well as the methods for measuring the relations between SR's (by covariation) are described in an article by Dr. Greenwood which accompanied the first terminal salience report (4). The chi-squares and the SR's computed from them are shown below in Tables 2 and 3.

RESULTS

Evaluated by Critical Ratio and Chi-Square Methods

The first Subseries of 125 runs gave a total number of hits below expectation by 11 points; the second, of 193 runs, came out exactly to expectation, although when divided into the January and February

Subseries of 90 and 103 runs respectively, the deviations became + 16 and −16 respectively for the 2 Subseries. As it was decided in advance of the SR analysis that the series would be divided into 2 Subseries, it is so presented in Table 1, which contains the total results in terms of runs, deviation-CR's, and chi-squares.

Subseries 4 contained only 35 runs, since the threat of war in Jugoslavia interrupted Dr. Marchesi's activities as a subject. These

Table 1

TOTAL RESULTS EVALUATED BY DEVIATION-CR METHOD

Section I: Dr. Marchesi as Percipient

Subseries	Period	Runs	Dev.	S. D.	C. R.	χ^2
1.....	August, 1939	125	−11	±22.36	.49	.24
2.....	January, 1940	90	+16	±18.97	.84	.71
3.....	February, 1940	103	−16	±20.29	.79	.62
4.....	May, 1940	35	+34	±11.83	2.87	8.24
	Total.....	353	+23	±37.57	.61	9.81*

P (χ^2=9.81; d. f.=4)=.044

Section II: Duke Subjects

Subseries	Subjects	Runs	Dev.	S. D.	C. R.	χ^2
1.....	LH	100	− 8	±20.00	.40	.16
2.....	JGP	100	+ 7	"	.35	.12
3.....	MB	100	+39	"	1.95	3.80
4.....	CES	100	+39	"	1.95	3.80
5.....	DHC	100	−19	"	.95	.90
6.....	LHG	100	+ 5	"	.25	.06
7.....	BMS	100	0	"	.00	.00
8.....	MS	100	− 1	"	.05	.00
9.....	FSC	100	+26	"	1.30	1.69
10.....	JLW	100	− 1	"	.05	.00
	Total.....	1,000	+88	±63.24	1.40	10.53*

P (χ^2=10.53; d. f.=10)=.40

Total Marchesi.....	353	+23	±37.57	.61	9.81*
Total Duke.....	1,000	+88	±63.24	1.40	10.53*
Grand Total.....	1,353	+111	±73.56	1.51	20.34*

P (χ^2=20.34; d. f.=14)=.13

*These chi-squares were obtained by addition of other chi-squares—not by squaring CR's, as were the others in this column.

35 runs gave a positive deviation of 34, with a CR of 2.87, for which the corresponding probability, allowing for both signs or directions of deviation, would be .004. This value needs, however, to be corrected for the fact that it is but one of 4 Subseries, and the P-value for Section I as a whole as evidenced by this Subseries would be .016.

Another, and perhaps a better, evaluation of this Section is obtained by means of chi-square combination of CR's. This, as may be seen from the table, gives a suggestive but insignificant probability of .04. It is necessary to conclude, then, that so far as the deviation CR method is concerned, the results are not significant.

It will be noted that the table presents also the results of Section II, and is divided into Subseries, each representing the work of a single subject. None of these is independently significant, nor is the total deviation itself. When the chi-square combination method is applied to all the 14 Subseries, it is likewise insignificant.

The Salience-Ratio (Covariation) Method of Evaluation

Section 1. The principal method of utilizing SR's in the evaluation of the extra-chance character of a set of results consists in determining the covariation CR of the SSR-RSR relation; for example, the SSR of Subseries I is paired with the RSR of the Subseries. In like manner the SSR of Subseries II is paired with the RSR of the same Subseries. We have 4 such pairs of SSR's and RSR's for the covariation analysis of Section I. These 4 pairs are presented in Table 2 and by inspection it can be seen that they vary together to a remarkable degree. The results of the covariation treatment given

Table 2

SECTION I: MARCHESI RESULTS IN TERMS OF CHI-SQUARES AND SR'S

Subseries No.	Runs	Dev.	χ^2 IN THE SEGMENT					SSR	χ^2 IN THE RUN					RSR
			1	2	3	4	5		1	2	3	4	5	
1.....	125	−11	.72	5.52	.00	1.32	.72	.21	.00	.00	2.72	.12	.12	.04
2.....	90	+16	2.53	.03	.08	.17	.08	9.32	9.06	.42	.00	.28	1.25	14.73
3.....	103	−16	.37	.03	2.92	.15	.15	.17	.00	7.29	2.56	1.61	.25	.02
4.....	35	+34	1.51	3.92	7.51	.22	.08	.14	.22	9.73	1.51	3.24	.22	.03
Total...	353	+23	5.13	9.50	10.51	1.86	1.03	.28	9.28	17.44	6.19	5.25	1.84	.38

in Table 4 show that this is a highly significant relationship, since it gives a covariation CR of 4.05, with a corresponding P of .00014. The fact that this covariation is positive also brings it into line with the significant positive covariation CR's in the previous salience report and in others now awaiting preparation.

Table 3

SECTION II: DUKE SUBJECTS' RESULTS IN TERMS OF CHI-SQUARES AND SR'S

Sub-series	Subj.	Runs	Dev.	χ^2 IN THE SEGMENT					SSR	χ^2 IN THE RUN					RSR
				1	2	3	4	5		1	2	3	4	5	
1	LH	100	− 8	.71	.53	.03	1.66	.00	.32	.38	.25	.53	.08	.08	.53
2	JGP	100	+ 7	.08	.90	.03	1.37	.71	.34	1.12	.53	.08	1.96	.71	.71
3	LHG	100	+ 5	.08	.03	1.12	.38	.38	.30	.00	1.12	1.66	.15	.53	.18
4	BMS	100	0	.15	4.28	.25	3.84	.00	.02	.03	1.37	.53	.08	.90	.47
5	MB	100	+39	1.37	.00	.03	.25	5.76	25.46	2.62	.00	.53	2.28	3.84	1.23
6	CES	100	+39	1.12	.25	.90	.00	2.28	2.96	.03	.71	1.37	.90	1.96	.67
7	DHC	100	−19	.90	.38	.15	.00	.90	3.40	1.66	.53	1.37	1.37	.71	.72
8	MS	100	− 1	.38	.00	1.12	1.96	.08	.15	.25	.15	1.12	.03	.00	.19
9	FBS	100	+27	.90	1.37	.03	.03	1.37	1.59	.71	3.42	.00	.03	4.28	1.45
10	JLW	100	− 1	.08	.53	.03	.25	.71	.98	.15	.00	1.96	2.62	.03	.04
Total	.....	1,000	+88	5.77	8.27	3.69	9.74	12.19	.83	6.95	8.08	9.15	9.50	13.04	.75

Table 4

COVARIATION BETWEEN SSR'S AND RSR'S

A. RESULTS AS A WHOLE

Subdivision	No. of Pairs	Cov. CR	P
Sections.....	2	.86	Insig.
Subseries.....	14	3.03	.0012

B. COMPARISON OF SECTIONS BY SUBSERIES

Section	No. of Pairs	Cov. CR	P
I.....	4	4.05	.00014
II.....	10	1.12	.12
Total.....	14	3.03	.0012

Because of the unusually close relation found between the SSR and RSR, more than ordinary interest attaches to the shape of the curve representing the distribution of the deviations themselves. The

deviation-distributions for the run as well as those of the segment are shown graphically in Figure 1, which represents the pooled deviations of the 4 Subseries of Section I; that is, all of the runs in distance tests in which Dr. Marchesi acted as percipient. There it will be seen that there is a remarkable paralleling of the segment and the run distributions. In spite of the fact that three of the four Subseries give middle salience, the total pooling produces curves showing some terminal salience, although the latter is not significant. Both curves

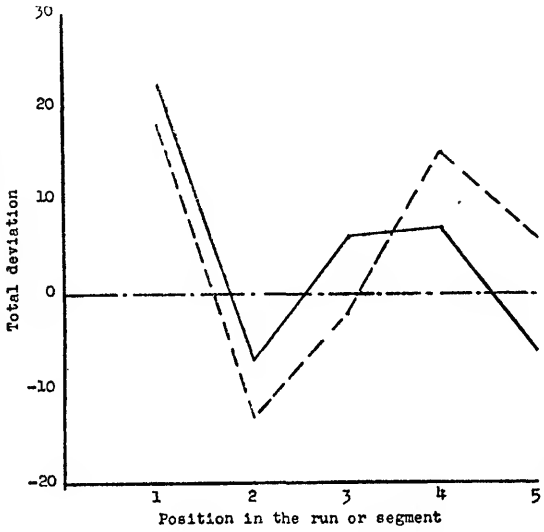

FIG. 1. Curves of total distribution of deviation of run (solid line) and of segment (broken line) in the distance DT tests with Dr. Marchesi as subject. 353 runs; deviation = + 23.

are U-shaped in the first 4 points, but the fifth point is dropped in both. This general shape is interesting in view of the long sequence of U-curves given by DT and PDT tests. (Compare also Figure 2 in which curves from other work by the same subject are offered. Especially notable is the similarity of the segmental curves [broken lines] in the two graphs.)

Section II. When the same method of evaluation is applied to the 10 Subseries of Section II, a positive but insignificant covariation is obtained. The covariation CR is 1.12, and the P-value is .12. For the details of the chi-square distribution, see Table 3.

Both Sections Combined. There is no statistical or logical requirement for the combination of the 2 series, although it is entirely legitimate to regard them as being, to some extent, parts of a larger

single exploration. Perhaps the most logical way of treating the 2 Sections in combination is to obtain a covariation CR for all 14 Subseries representing both Sections as given in Table 4. This covariation CR is 3.03, and has a P-value of .0012. The corresponding CR for the Section level (+ .86) is of the same sign but is negligibly small.

Presumably, this figure of .0012 permits the conclusion that the work taken as a whole is significant, without attaching particular weight to the segregation of the effect of the work of Dr. Marchesi in Section I. It is of course statistically legitimate to treat his work as one of two Sections of the experiment. To do so would necessitate a correction for selection consisting of multiplying the P-value of .00014 by 2, making it .00028. Or again, a correction might be made on the basis of number of subjects; since there were 11 subjects, the P-value would be multiplied by 11, giving .0015.

Discussion

Alternative Hypotheses

The following pertinent counter-hypotheses should be regarded before a conclusion is reached that ESP is evidenced in the experiment reported.

The usual safeguards of independent checking and computation have been employed, and the conditions of the testing obviate considerations of sensory perception's entering into the production of the results. The highly significant covariation CR obtained from the results with Dr. Marchesi as subject requires the rejection of the chance hypothesis.

The multiple-calling hypothesis is based upon the supposition that where more than one subject calls the same deck of cards, any similarity of symbol-patterns among the subjects might tend to affect the hit-patterning in some conceivable manner. It would be relevant here only to Section II and may therefore be omitted, since Section II is not involved in the conclusions.

The question of whether the SSR and RSR are, on a theory of chance, mutually independent, as the treatment in this paper supposes, has been discussed in the preceding paper on salience. There is no need to repeat that discussion here, except to say that it has been concluded that logically there is no ground for supposing inter-

dependence; rather, there is logical ground for supposing the two SR's to be independent. However, an empirical test has been made, and with the collaboration of Dr. J. G. Pratt, we are reporting it in this number of the JOURNAL. This test confirms the logical position taken in the earlier paper (11).

Altogether, there would appear to be no alternative to the conclusion that extra-sensory perception has occurred in these results, other than to find some weakness as yet unknown to us, either in the logic underlying the experiment, or else in the SR method of determining the extra-chance character of the results. Needless to say, both aspects of the work have had the best critical attention available to us in this laboratory.

Salience

The outstandingly high SSR-RSR covariation of Section I is the main feature of this study, but this ratio is by no means the only feature of interest. One novel aspect is that this significant covariation of SR's is obtained on the level of the Subseries ranging in size from 35 to 125 runs, whereas in the earlier work, covariation of SR's from Subseries of that size was not significant; that is, it required larger combinations than the Subseries represented to bring out any evidence of SR interrelation. Furthermore, the earlier report of salience was not based upon the work of a single subject, as this one is in Section I. The investigation of SR's of individual performers is not yet available for comparison with the Marchesi results, but it appears highly probable that his will be an exceptional if not unique individual study.

Another feature of the analysis of the results of Section I is the exceptional swing from extremely low SR's to extremely high ones, going from Subseries 1 to 2, and then through the equally phenomenal drop from Subseries 2 to 3.

It is plain that the Marchesi results showed *middle* salience rather than *terminal* in the August, February, and May Subseries. In January they showed strong terminal salience, mainly because the first position in both the run and the segment was high. But this terminal salience lasted only for the nine days in January, and gave way to striking middle salience that persisted likewise through the short series in May.

The chi-squares given in Table 2 show large fluctuations from Subseries to Subseries, especially in the three interior positions (2, 3, 4). For the run, these three positions together give a significant total chi-square of 28.88 that has, with 12 degrees of freedom, a P-value of .004. (It is interesting, too, that for the segment the corresponding value is .04.) These fluctuations of deviation, however, cancel each other in the pooling which produced Figure 1; the same must have occurred in both segment and run.

There is nothing in Dr. Marchesi's correspondence that gives a clue either to any change in conditions that might have caused the change in type of salience, or to the close similarity between the salience in the segment and that in the run. It is obvious that at least there is no simple, direct relation between SR's and the CR of the total deviation of the Subseries; for, while only one of the four Subseries (the fourth) has a significant positive deviation, it has about the same order of SR's as Subseries 1 and 3, which have small negative deviations.

One comment by the subject, however, may be of some relevance; namely, his express desire not to be given photographic detail as to the exact location of the cards. He wished to know only that they were "somewhere in space." His view was that a performance under those conditions would increase the value of the test if he succeeded in identifying the cards to a significant extent. It occurs to us that he might have been thrown back more upon his own imaginal structuring of the run, and less upon the form of the record sheet. This might have favored the concomitant structuring of both segment and run, and hence the SSR-RSR covariation. The more subjective his procedure, perhaps, the more prone he would be to such a great swing from middle to terminal salience and back, as occurred. But this is all very hypothetical as yet.

Distance and ESP Scores

In view of the earlier literature on ESP distance experiments, the question may arise as to whether these experiments may not indicate by their low score averages a retarding effect of distance, since, as was mentioned above, Dr. Marchesi had markedly better success in terms of high scores in DT tests conducted with the cards only a short distance away (see Note below). There are, however, many

other differences in the conditions of the two situations, and it cannot, therefore, be concluded that distance itself is responsible for the changed level of scoring. Particularly important may be the difference in familiarity with the local situation. While Dr. Marchesi courageously wished to attack the cards without specific knowledge of their location, it is quite conceivable that his unfamiliarity with their locus might have something to do with his rate of success. Furthermore, the great delay in finding out his success must have made the distance experiments much less lively and interesting than those conducted in his own office or home. The results of the distance tests afforded no day-to-day stimulation. Moreover, the state of the world through the period of the research was such that there was no certainty that the experiment would ever be finished, or if finished, that its results could ever be communicated to the subject. Other circumstances in the distance test could be pointed to on which hypotheses could be based to account amply for the low scores obtained, but there is no certainty to be had as to what actually caused the falling-off of deviation with transition to long-distance.

On the other hand, if we recognize, as we think the facts require, that there is unmistakable evidence of ESP, even though it is not in terms of total deviation, then it must be conceded that distance can hardly be supposed to have had any direct bearing upon the results, at least in the manner in which it is known to affect recognized physical energies; for, if the inverse square law were to be applied, a distance of 4,000 miles would surely reduce to absurdly minute intensity any energy that could have functioned in the close-up tests of Dr. Marchesi. We recognize that there is no clear and final way of determining whether distance might not be playing some part in such instances; no way, for that matter, of determining whether if a distance be sufficiently long (for example, expressible in terms of light-years) it might not diminish ESP capacity to the point of extinction. However, we may safely say that such energies as could at present be conceived to bear the transmission of the ESP symbols could not but be affected to the point of elimination by the distance of 4,000 miles. Also, the angle at which the cards lay (facing down), their close proximity to each other (25 to the quarter-inch in the box), must render them indistinguishable at a very much shorter

distance than from Durham to Zagreb. In short, considering all these difficulties and, in addition, the mountains and other barriers to any radiation of appropriate wave-length, we must reject all physical hypotheses as yet proposed. The fact, then, that any statistically significant effect was obtained stands out as perhaps only dramatizing a little more sharply the previously established conclusion (7, 12) that distance is not a limiting factor in ESP performance.

Time and Space Relations in ESP

It was the results of distance tests of ESP such as those reported here that raised the question whether time was a limiting condition to ESP performance. There have, by this time, been many researches contributing to the evidence that it is not; that is, that ESP may be precognitive (1, 5, 8, 9, 15, 16, 17). But before any systematic precognition experiments had been conducted here or elsewhere, it was asserted that the occurrence of precognition was logically inferable from the distance test results and related evidence (12; p. 291). This argument was elaborated by JBR in earlier publications (8, 9) and need not be reproduced here, except to say briefly that in a space-time world any process that is not affected by space limitations cannot be regulated by time, at least by the time which is dealt with by physics. Out of space, out of time, was the conclusion. But the argument is reversible, too, and we might say that the already considerable evidence for precognition supports in turn the hypothesis that ESP is not restricted by space. Thus the time and space experiments are, to this way of thinking, mutually confirmatory.

Summary

Dr. Karlo Marchesi, a physician of Zagreb, Jugoslavia, acted as percipient in 353 runs of DT tests, with the decks of cards located in Durham, North Carolina. The results, as measured by the usual CR method, are only suggestive, but as measured by the SSR-RSR covariation statistic, a significant CR of 4.05, and a P-value of .00014 were obtained.

A similar series of tests of 1,000 runs was conducted with 10 subjects in Durham who attempted to identify cards in Zagreb. This series gave insignificant results by both measures; however, when

both sets of results were combined and evaluated by the covariation method, the result was significant ($P = .0012$).

The results are taken as evidence of extra-sensory perception, and, under the conditions, as evidence that distance is not an inhibiting factor in ESP performance.

Note on DT Tests Conducted by Dr. Marchesi Alone

As we stated in the main body of the report, in May, 1939, JBR received the records of 200 runs of DT tests which Dr. Marchesi had conducted with himself as the subject. It was these results which led to the distance experiments. In sending these records to this laboratory, Dr. Marchesi mentioned only that he had made the tests by the DT method with a distance of 3 meters between himself and the cards, and that he was about to begin a series with 10 meters distance.

The 200 runs gave a total number of hits exceeding mean chance expectation by 279. This gives a critical ratio of 9.86, and an average score per run of 6.39.

Obviously, this series was distinctly not to be explained by the chance hypothesis, but due to the fact that the experiment was conducted in an informal manner—that is, with the subject himself playing the parts of both percipient and experimenter—there would be certain counter-hypotheses that could not be completely ruled out. There was no suggestion made that this series be published, and very probably Dr. Marchesi would concur in the view that it could not be taken as unquestionable evidence of ESP. He had evidently conducted the tests for his own satisfaction.

However, when the salience studies were made on the Marchesi distance DT records and this series of 200 runs was referred to again, it seemed in every respect proper material for a salience analysis. So far as could be determined, there was nothing in the conditions that could favor salience effects. Salience in the run and perhaps even, to a certain extent, in the segment might conceivably have been favored by the undue exposure of the top and bottom cards in the deck, but it could readily be determined if the first and twenty-fifth trials were solely responsible for any salience effect obtained.

Accordingly, the analysis was made. Both the segment and the run showed terminal salience, giving SR's respectively of 1.00 and

1.61. With only 2 and 3 degrees of freedom, these are not significantly covariant, but they are in agreement both "positive," and would of course be in line with the covariation found in the Marchesi distance tests.

The remarkable feature of the analysis, however, and the main reason for which the work is reviewed here, is in the deviation distributions for the run and the segment as represented in Figure 2. There it may be seen that the solid curve (for the run) is a very distinctly U-shaped curve, while that of the segment is a relatively close approximation. As mentioned above, the similarity between

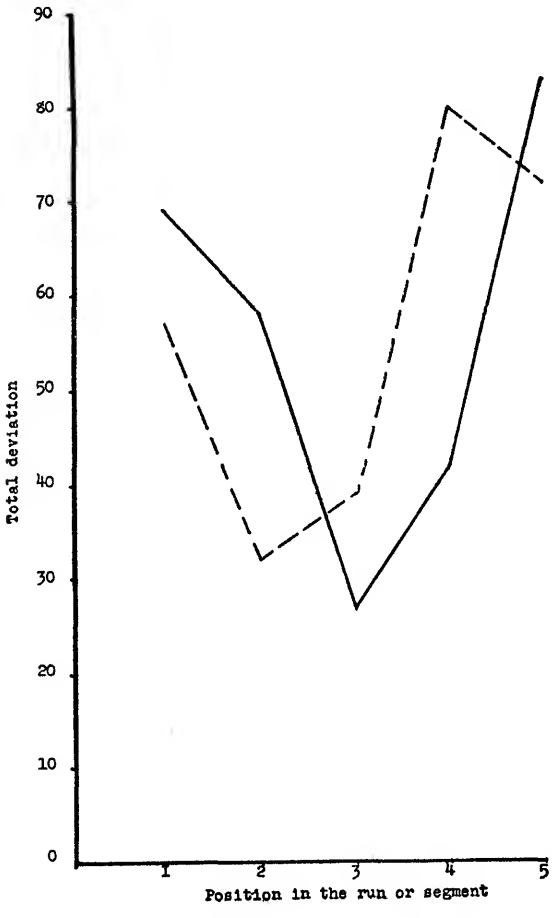

FIG. 2. Curves of distribution of deviation of run (solid line) and of segment (broken line) in Dr. Marchesi's DT tests of himself as subject. 200 runs; deviation = + 279.

this segmental curve and that given by Dr. Marchesi in his distance tests is noteworthy. In both, the first four points give a U, and the fifth point drops.

Although these are not statistical matters, they go far to reassure the critical reader on the question of the soundness of the experiment. There remains only the hypothesis that the most exposed cards, at the top and bottom of the deck, may have been identified by memory or visual perception. This question has been examined through the hit-frequency distribution in the run.

The following distribution was found for the 25 trials of the run: 57, 56, 42, 62, 52; 46, 50, 46, 60, 56; 49, 33, 51, 50, 44; 54, 41, 51, 51, 45; 51, 51, 49, 57, 75. From this it can be seen that the first trial is not particularly outstanding. The second trial is only one point below it and the fourth is five above it. It is only three points above the average for the first segment. In fact, the first trial could be reduced to the average for the first five without affecting noticeably the shape of the curve in Figure 2. The twenty-fifth trial has the highest frequency in the run, but, even so, the last place in the segment (see Figure 2) is not the highest. Furthermore, the run-distribution would still give a distinctly U-shaped curve, even if the twenty-fifth trial were reduced to the average of the other four trials in the last segment. These observations suffice to show that the shape of the curves in Figure 2 is not dependent appreciably upon the first and twenty-fifth trials, and accordingly it cannot be supposed that accidental observation of the top and bottom cards of the deck determined the nature of the distribution.

Therefore, it seems justifiable to add this series to the growing list of DT investigations (as well as PDT investigations still in manuscript form) that have yielded U-curves as well as interesting, if not significant, SR's and SR relations.

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