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of
Parapsychology

A SCIENTIFIC QUARTERLY DEALING WITH EXTRASENSORY PERCEPTION,
THE PSYCHOKINETIC EFFECT, AND RELATED TOPICS

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The Journal of Parapsychology

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EDITORIALS

PARAPSYCHOLOGY AND THE GOVERNMENT OF MEN

THE CONSCIENTIOUS parapsychologist must often, in times like these, ask himself the question: What does the work I am doing contribute to the ultimate objectives for which most men today are devoting some part—and some men, all—of their efforts, the objective of a better governed world? We think the answer is, "Much!"

Today more than ever before we can see that the welfare and happiness of the world depend on the establishment of a sound *philosophy of government* for mankind, one that efficiently promotes the long-term welfare of the governed. But our philosophy of government depends entirely upon our view of the nature of the governed—not the inherent differences of this group from that, but the character of the species itself. What is man? What is the human nature that must be dealt with by the functions of governing? These questions are just as basic for the practice of government as a knowledge of the properties of his materials is for the engineer or the characteristics of his drugs for the pharmacist.

Government is, in a sense, the engineering of human forces. What view, what belief, what hypothesis of these forces prevails in the minds of those who guide mankind today and will guide it tomorrow? Our leaders will be well supplied with statistical compilations and graphs of the various populations. There will be stacks of data on economic products, on linguistic differences, on the

industries and arts, on the religions, and on many other behavioral features of the peoples concerned. But the final decisions reached, the dispositions made of this boundary and that, the fate of peoples and the happiness of minorities will depend pretty largely on what conception of man, what view of human nature, prevails in the conference room.

Broadly speaking there are two opposing conceptions of man that are current in the world today, conceptions which are in conflict in the minds of thinking people all over the world. Simply stated these two views of man represent him as either a *person* or a *thing*. The "person" view takes human feelings seriously, takes account of a man's aspirations, his pursuit of happiness, his pride. To use the most inclusive word, it is concerned mainly with his *mind*. The other view dispassionately lumps men off as the masses or classes, as manpower (like horsepower), as the youth movement, the farmer vote, the Catholic church, or the Negro; in other words, as things.

We have already referred to this distinction in an earlier editorial in a more definite way, as a modern choice in "centrism." In the days of Copernicus and Galileo, men had to choose between the view of an earth-centered universe (geocentrism) and a sun-centered one (heliocentrism). Today they have to decide instead which is the center of control of the individual's world: his subjective, experiencing *mind*, or his objective, physical *brain*. So we take either the mind-centered view of man and are *psychocentrists*, or the brain-centered one and are *cerebrocentrists*.

The psychocentric view takes the mental life of an individual as the really central part of him, that which we primarily deal with as a society. It is this mind of man that we educate, build our institutions around, and *this is what we govern*. The psychocentrist does not ignore man's physical organism—far from it—but it is *his*, not *he*. The person himself is first of all a mind.

The cerebrocentric view sees the elaborate physical brain as the intricate control center of the individual's world, and the physiological operations of this brain as the real basis of personality. Whatever psychical activity or experience may be, whether a fiction, an epiphenomenon, or a reality of uncertain degree, it is not, in this view, the dominant force in a man. This conception corresponds to the notion of men as things.

As will be obvious, the psychocentric view of man is what has come to be the modern common-sense picture of the human individual. It embodies the traditional religious dualism under which body and mind are more or less distinct systems with mind the regulating and responsible center of the person. But it is not necessarily theological or supernaturalistic. It is the view on which our most useful social institutions are founded (though they may fall short of the idealized possibilities of the view). It is the basis for the concept of moral responsibility, of the volitional and intellectual freedom of the individual, of humanitarianism and social idealism.

The cerebrocentric view, on the other hand, is a modern academic view, a product of the materialistic trend of centuries of scientific research. The studies of the anatomy of the nervous system and its relation to mental functions, of the evolution of the brain and its relation to human behavior, and of personality changes resulting from disease, drugs, hormones, and other physical factors affecting the nervous system have all led to an extremely close tie-up between the physics of the brain and the concomitant behavior of man. The amazingly intricate physical system of the brain seems to the student of these scientific findings to be the real center of the individual's life, perhaps an adequate explanation of it.

It will obviously make a great difference in the type of government as to which of these conceptions of man is accepted as correct. The logical outcome of the cerebrocentric view of man would be the establishment of a technocracy derived from the cerebral laws by which men live and work together most productively. The ultimate development would be the management of society by a group of master human engineers, dispassionately operating the efficiently established controls that would lead to the smoothest exploitation of the physicalistic principles derived from the study of the dynamics of human conduct. Any resemblance between this form of government and the fascist ideal in which the individual's personal world is submerged and lost in the all-inclusive machinery of the state may indeed be more than accidental!

On the other hand, the philosophy of government which stresses the individual's rights and his welfare is of necessity derived from a view of man that places first importance on his personal feelings,

his values as an individual, his will and aspirations. A government which derives its just powers from the consent of the governed is by definition dealing primarily with the minds, not just the votes, the physical forces, or the number of creatures within its domain. Democracy can have arisen only on the basis of the psychocentric way of regarding man; and a successful democracy, one which efficiently uses the principle of acceptance of majority rule by all, involves a great deal more than mere voting. It rests upon that regard for the minority and protection of the weak which follow largely from the social heritage of the Christian tradition and its obviously psychocentric view of the individual.

If it is agreed that any correct view of government depends on the accuracy of our conception of human personality, then the importance of parapsychology is clear; for it is the primary objective of parapsychology to throw light on the nature of man through the medium of its investigations. It has already turned its research upon the fundamental question of what is central in human personality. The evidence derived from the ESP and the PK experiments definitely favors the psychocentric hypothesis and does so in a way that lifts the entire issue out of the speculative realm in which it has hitherto fruitlessly existed.

The connection between these researches and psychocentrism is as follows: As we have pointed out before in these pages, the evidence that the ESP process is not bound up with the mechanical world of space-time relations demonstrates the operation of an extra-mechanical system of causation. It establishes for the world of the mind a nonphysical character which excludes not only brain physics as a completely adequate explanation for mental phenomena, but also physics of any other kind within the scope of what that term signifies to our present knowledge. The proof that the mind is extraphysical in nature does not rest, however, on the ESP work alone; it has received powerful confirmation from many of the PK researches which have especially borne upon this issue. The results obtained from these relevant experiments show almost no indication of those effects which would be required if none but physical forces are at work. There is shown in the work as a whole a clear departure from the analogy of mechanical principles. The researches on PK and ESP do not, of course, speak for the entire system of the

human mind, but they do show that an extraphysical order of mind does exist and that this psychical order has causal efficacy in the physical world. Thus they experimentally substantiate the psychocentric view even if only in relation to the small part of mental life they deal with directly.

We may at least say, then, that a beginning has been made in the counteraction through experimental research of the speculative trend of mechanistic thought which has produced the strong scholastic drift toward cerebrocentric conceptions of man. By sustaining and re-establishing on firm scientific foundations the psychocentric philosophy of the human individual, parapsychology may be—must surely be—turning a dangerous tide. It will in time lead psychology in general to a view of personality which at once rests on sound experimental evidence and at the same time serves the constructive social ideals to which we have arisen in the course of our long cultural evolution.

J. B. R.

THE PRACTICE OF FAKE TELEPATHY

WE ARE today witnessing a revival of an old "stunt," the public imitation of telepathic perception as a vaudeville act. In keeping with things modern, the performance has now been adapted to the radio as well. The reason for taking notice here of these stage performers is the fact that they are misleading some very intelligent people; and we feel a certain responsibility in the matter, for members of the audience at a "telepathy" show credit the claims of a showman much more readily when they know that serious academic research workers have reported the finding of something like the ability demonstrated. Largely because of such researches many people are completely "taken in" and leave the show convinced they have seen a great demonstration of genuine telepathy. Some of these are psychologists; some are ministers who, under the conviction that they have seen a marvelous thing, boldly mention the performance in their sermons as evidence of a spiritual sense in man;

and there are even editors of magazines and publishers who sufficiently endorse the deception to stamp it with the permanence of printer's ink as telepathy—the real thing.

It has always been more or less profitable commercially to fake so-called "psychic phenomena," and when public interest runs high in any type of these paranormal claims, a field is at once opened up for the charlatan. It *is* charlatanism, by definition, for a performer to leave his audience deluded by the claims he makes for his performance. The legitimate magician, of course, mystifies for purposes of entertainment, but he avoids the instilling of false beliefs concerning his demonstration, beliefs that last after the show is over.

It may be argued that in this instance it is an innocent sort of fraud that is being practiced and that after all, telepathy is a well-established capacity. There may even be some small element of real telepathy in the show. Who can prove that there is not? And it *is* a good show!

These are excuses that can plausibly be made for many a hoax. For example, how well they would have applied to Dr. Cook's claim that he "discovered" the North Pole! He lectured to large audiences over the country, winning them over to his claim. It was, however, a fraud, and in time this became generally known. Yet it could have been called, in a certain sense, an innocent fraud. For after all, man *had* "discovered" the Pole. And Cook did give an interesting lecture! The parallel is a close one.

If we inquire into the reactions of the scientist who discovers that he has been taken in by a fake telepathy show, we are likely to find him disillusioned on all claims about telepathy, for he will reason that if he can be so easily fooled, why can't others, including parapsychology experimenters?

The minister who finds that his sermon on the spiritual sense was based on a trickster's claim is not merely ashamed and hurt; he is on guard against, and probably antagonistic thereafter to, reports about the very things he has long wanted to know and understand. And would he ever dare mention the subject of telepathy again in public?

Will editorial policy continue unchanged for the magazine that presents the great telepathist, the master mind-reader, to its readers only to learn in time that the author's claim as a stage telepathist is

on a par with the medicinal value of rattlesnake oil? Has an article about genuine experimental work on telepathy any chance to reach the readers of such magazines thereafter?

The general public is interested in telepathy and in like capacities in a way that is not attributable to mere idle curiosity. This interest relates too closely to our basic desire for an understanding of what the human personality is in the universe for it to be played with and exploited, leaving us eventually disillusioned and cynical as the trick is exposed. Such remarks as these will not, of course, have the effect of stopping the practices under discussion. And there is nothing the research worker can do about this. It lies outside his domain and in the educational realm. Those who write for and who reach the general reader may enlighten the public on the seriousness of these false claims and the wide difference between a show and an experiment.

Discriminating magicians doubtless see in this abuse of the profession a menace to the ethical standards of American magicians. They would not for a moment countenance the performance of a fellow-conjurer who claimed, for example, to be able to change water into wine by the same divine power Christ is reported to have exercised at Cana. They would not approve a magical show that left the audience believing that the performer was a great healer, no matter how clever and entertaining the act. There was a time when telepathy was too doubtful a phenomenon to compel serious concern, but that time is past. An intelligent public has been led to take it seriously, and the subject is no longer a proper one for faking, however well that pays. On this, we believe, thoughtful people everywhere, audience and magicians alike, will readily agree.

J. B. R.

THE PK EFFECT: SPECIAL EVIDENCE FROM HIT PATTERNS

II. QUARTER DISTRIBUTIONS OF THE SET

By J. B. RHINE and BETTY M. HUMPHREY
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ABSTRACT: This report of the quarter distribution, or QD, of the set is very similar to that in the March number on the QD of the page. Both of them are based on a comparison of the results obtained from many independent PK experiments in which the attempt was made to influence the fall of dice by the direct action of the mind. In the earlier study the records of all PK tests were examined, as far as they were found suitable to the purpose, to ascertain the number of hits in the quarters of the record page. The resulting pattern of hits is the quarter distribution, or QD, of the page. In the present report the difference is that a smaller unit of data than the page was used; namely, the set. The QD's of the set compare rather strikingly in form with the corresponding QD's of the page for the same series. Also, the QD's of the set for the analyzable data show the same predominant type of pattern as the comparable QD of the page; that is, the upper left quarter shows the highest rate of scoring, and the lower right the lowest. The difference between the score averages for these two quarters in the set is again highly significant (with odds of a million to one against chance), as it was found to be for the page as a whole.

This work on the QD of the set not only confirms the occurrence of the QD patterning produced by the PK effect, but also offers another basis for the exclusion of the counterhypotheses that are currently being considered in all the PK investigations: bias in the dice, skills in throwing, and errors of a clerical nature. There is some relation indicated between the character of the QD and the number of die-throws in the set. It seems to be clearly shown that the reaction of the subject in producing these hit patterns is a mental response to the structure of the set and is not due to physiological factors such as fatigue nor to any physical variable.—Ed.

INTRODUCTION

IN A FORMER paper we reported the results of a study of the distribution of hits over the quarters of the record page in all PK data eligible for the analysis. The record pages of the 18 suitable series were divided into quarters, and the rate of scoring for each quarter was determined. The survey of these quarter distributions, or QD's, showed a remarkable consistency of hit patterning from series to series. The predominant pattern was that in which the upper left quarter of the page showed the greatest number of hits, and the

lower right quarter the smallest number. The odds against the chance occurrence of such a group of QD's were found to be of the order of a hundred million to one. This extrachance finding is in addition to the significance observed in the original evaluation of the total deviations of the series.

It was the special merit of the QD analyses, however, not merely to add further strength to the case against the chance hypothesis, but in addition to afford an incontestable answer to the other familiar questions which are raised in consideration of the PK experiments. It was immediately evident that these position effects could not conceivably be explained as a consequence of faulty dice, of skilled throwing, or of errors in recording, checking, or handling the records. These patterns, reliably consistent from series to series, had to be explained on psychological grounds. The only hypothesis available for the explanation was PK.

The discovery of such consistent hit patterns on the record pages of widely varying series raised the question of whether the diagonal decline (that is, a decline from the upper left to the lower right quarter) extended also to the smaller subdivisions of the page. Therefore a reanalysis of the records was made in order to secure the QD patterns for the smaller units in those series which were suited to the purpose. For the sake of convenience, in nine of the 18 series used in the earlier QD study, the recording had been done in units smaller than the record page. These "sets" actually represented distinct structural units, real subdivisions in the course of the testing. For example, it was customary, upon completion of a set, to pause for the purpose of scoring; and if there was to be a change in the target face, it was made then. Sets were of uniform size throughout a given series, but varied considerably from one series to another. For example, in one series the set consisted of a block of ten columns of six entries each; in another, three columns of 24 entries each; and in still another, there were six columns of 12 entries each. The example chosen for illustration in Figure 1 uses the record page containing six sets, each made up of three columns of 24 entries each.

Since the purpose of this research was to see how far the diagonal decline effects for the page carried over to the set, it will be advantageous to present the results of the two analyses side by side. The

Subject Lottie H. Gibson Observer R. H. White
 Date Feb. 18, 1937 Witnesses —
 Time 11:00 am
 General conditions Mach. Throw 3 Dice

Use other side for remarks. Total score 54: +17 Avgs. score 4.81
25 33 43 53 63 73

1		2		3		4		5		6		7		8		9		10	
Call	Cond	Call	Cond	Call	Cond	Call	Cond	Call	Cond	Call	Cond	Call	Cond	Call	Cond	Call	Cond	Call	Cond
1	0	1	0	0	1	2	1	1	1	1	0	0	1	1	0				
0	0	2	1	1	2	0	0	0	0	1	0	0	2	0	1	0			
0	1	0	1	1	0	0	1	0	1	0	1	0	1	1	0	0			
0	1	1	2	1	0	0	1	0	1	0	0	1	1	0	1	0			
1	1	1	0	1	0	1	1	0	0	0	1	0	0	1	1	1			
0	1	0	2	1	0	1	0	1	2	0	1	1	0	1	1	1			
0	1	1	0	0	1	0	0	0	1	0	0	2	0	1	1	1			
0	0	0	1	0	0	0	1	0	1	2	0	0	0	2	0	2			
0	1	2	0	0	1	0	0	0	0	0	0	0	2	1	0	1			
0	2	1	1	3	0	0	2	0	0	0	0	1	0	2	0	0			
1	0	0	1	1	1	1	0	1	0	0	0	0	1	0	1	1			
0	0	0	2	0	0	0	0	2	0	0	1	1	0	0	0	1			
1	0	1	1	0	0	1	0	1	0	0	0	0	0	0	2	0			
0	1	0	0	1	0	0	0	0	0	1	2	1	0	1	0	0			
1	1	0	1	0	2	1	1	1	0	1	0	2	1	0	0	0			
1	1	0	0	0	2	2	0	2	0	1	0	0	0	1	1	0			
1	0	1	2	0	1	0	1	0	1	0	1	1	0	0	0	0			
1	0	0	1	0	0	1	1	0	1	1	0	1	1	1	1				
0	1	0	1	2	0	0	0	0	1	1	0	0	0	0	1	0			
1	1	1	1	0	0	0	0	0	1	0	2	0	0	0	1	1			
2	0	0	0	0	1	0	0	1	0	0	0	1	1	0	0	1			
0	1	0	0	0	0	1	0	1	0	1	2	0	1	0	0	0			
1	1	1	0	0	1	1	1	1	0	1	0	0	0	1	1	0			
0	0	0	1	1	0	1	1	0	1	0	0	0	1	1	0	0			
12	15	13	17	15	12	10	14	12	12	13	12	13	9	13	16	13	10		
40		46		36		37		35		39									

FIG. 1.—Sample record sheet from Gibson Machine Series showing the structure of a typical page and set. One hit for every two entries would be expected from chance.

results of the QD of the page will therefore be reproduced in this paper for those series on which the analyses for the QD of the set have also been conducted, thus affording an easy comparison of individual series as well as of general totals.

Of the nine series analyzed in the study of the QD of the set, there were six which had a definite set structure within the page; that is, the page was obviously subdivided into a number of regular sets, and it was indicated on the record sheets that these were real functional units. Three other series showed a page structure with natural subdivisions which were not actually stopping-points but which were so definite that it seemed probable they influenced the subject in the course of the recording. In one of these three, the record page was divided into three sections: top, middle, and bottom. Each section consisted of six columns of 12 entries each. These sections were analyzed separately as equivalents of sets. The recording, however, did not follow the subdivisions but continued down the page, making a long column of 36 entries out of the three short columns.

In the two remaining series the record page had a natural subdivision into upper and lower halves, each half containing complete columns. Thus the subject in his recording went across the upper half of the page, filling out from two to six columns, then dropped to the lower half and did likewise. It seems probable that these two halves affected the subject as separate units, and the analyses reported below were carried out on that theory. These three series in which the set structure was not of the same character as that in the other six will be considered both separately as a special group and together with the other six series.

The procedure of the analysis of the QD of the set is the same as that for the QD of the page, and we shall not repeat either the procedure or the standards which determine the scope of the analysis.

When there were odd numbers of columns in the set, the middle column was invariably omitted, thus making equal numbers of trials for the left and right halves of the QD. For the comparison of page and set QD's, only the block or section of each series which was suitable for the set analysis was reconsidered for the QD of the page. Thus only the records suited to *both* analyses are included here. This affords a close comparison for our present purpose and seems the most legitimate way of approximating similarity of conditions. Because of the deletion of the middle column in sets with odd numbers of columns, and because of deletions necessitated by occasional irregularities in the manner of recording, the number

Table I
GENERAL DATA FOR SERIES USED IN ANALYSES OF THE QD OF THE SET

A. SERIES ANALYZED FOR QD'S OF THE SET											
No.	Series	Ref. No.*	No. Dice per Throw	Target Face	How Thrown	Data Used in QD of Page		Data Used in QD of Set			
						Runs	Dev.	Runs	Dev.	CR	χ^2
1	M.P.R. High-Dice...	6	2	H.D.	Hand	356	+ 221	308	+ 223	7.44	55.35
2	Gibson Machine.....	3	3	1-6	Machine	1,914	+ 219	1,314	+ 144	2.18	4.75
3	M.P.R. Low-Dice....	6	2	L.D.	Hand	340	+ 74	290	+ 35	1.20	1.44
4	Six-by-Six.....	9	6	6	Cup	7,440	+2,371	5,976	+1,932	13.70	187.69
5	Gibson Cup.....	2,4	6	1-6	Cup	5,130	+1,255	5,370	+1,337	10.00	100.00
6	Duke Machine.....	7,8	2	6,3	Machine	248	+ 166	238	+ 155	5.50	30.25
Total Section A.....								$\Sigma\chi^2 = 379.48$ d.f. = 6 P = < .000,001			
B. SERIES ANALYZED FOR QD'S OF OTHER SUBDIVISIONS											
No.	Series	Ref. No.*	No. Dice per Throw	Target Face	How Thrown	Data Used in QD of Page		Data Used in QD of Other Subdivisions			
						Runs	Dev.	Runs	Dev.	CR	χ^2
7	Sixty-Dice "Control"	11	60	6	Cup	2,172	+ 576	2,172	+ 576	6.77	45.83
8	Around-the-Die.....	1	6	1-6	Cup	1,242	+ 641	1,242	+ 641	9.97	99.40
9	Sixty-Dice.....	11	60	6	Cup	2,172	+ 582	2,172	+ 582	6.84	46.79
Total Section B.....								$\Sigma\chi^2 = 192.02$ d.f. = 3 P = < .000,001			
Grand Total.....								$\Sigma\chi^2 = 571.50$ d.f. = 9 P = < .000,001			

*Since the names of some of these series do not appear in the titles of their reports, we list here the numbers by which they can be identified in the references at the end of this paper.

of runs represented in the two QD's for any given series is not always the same.

The doubly checked analyses were conducted by several assistants under the supervision of B.M.H., and a completely independent analysis was conducted by Dr. J. G. Pratt (5) on all but one of the series included in this paper. Thus it can be seen that these data received an unusually thorough rechecking.

It will be convenient for some readers to have in tabular form the essential data for the series which we are discussing. Table 1 lists the main items of information for the nine series used in the study of the QD of the set. For example, the numbers of runs represented in the two QD's—that of the page and that of the set—are given along with their respective total deviations. These are the data which actually form the basis of the QD results about to be presented. They are not to be confused with the larger numbers of runs which appeared in a comparable table in the preceding paper since, as already explained, we are dealing here only with those data in a given series which are common to both analyses. By referring to Table 1 of the earlier QD paper, however, the reader may find more complete figures for the individual series and be able to note what proportion of the original series is represented in the analyses here reported.

The CR's of the individual series are given only for the data used in the QD's of the set. These figures, however, are not much different from those for the QD of the page for the data summarized in this table. It is of passing interest here to note the highly significant CR's and the over-all probability value obtained from their chi-square combination. (The sum of the chi-squares is 571.50 and the probability is less than .000, 001.) The results are highly significant and it is clear that these analyses, to begin with, were not conducted on data that could have been ascribed to chance.

RESULTS OF THE QD ANALYSES

We present below in Figure 2 a graphical picture of the QD's of the set (and of the other subdivisions) paired off against the QD's of the page for the corresponding series. The left graph in each pair represents the four quarters of the page, while that on the right shows the four quarters of the set. The back column represents the

first or upper left quarter, and the front column, the fourth or lower right quarter. Section A contains the QD's of the six series which have distinct sets; Section B gives the QD's of the three series where, in lieu of sets, other natural subdivisions of the record page are regarded as equivalent to set units. Sections C and D present the pooled results for the nine series, with the QD's for the Singles tests pooled separately from those of the High-Dice and Low-Dice tests (see Glossary). These pooled QD's give the best basis for comparison of the results.

Section A. Series Analyzed for QD of the Set.

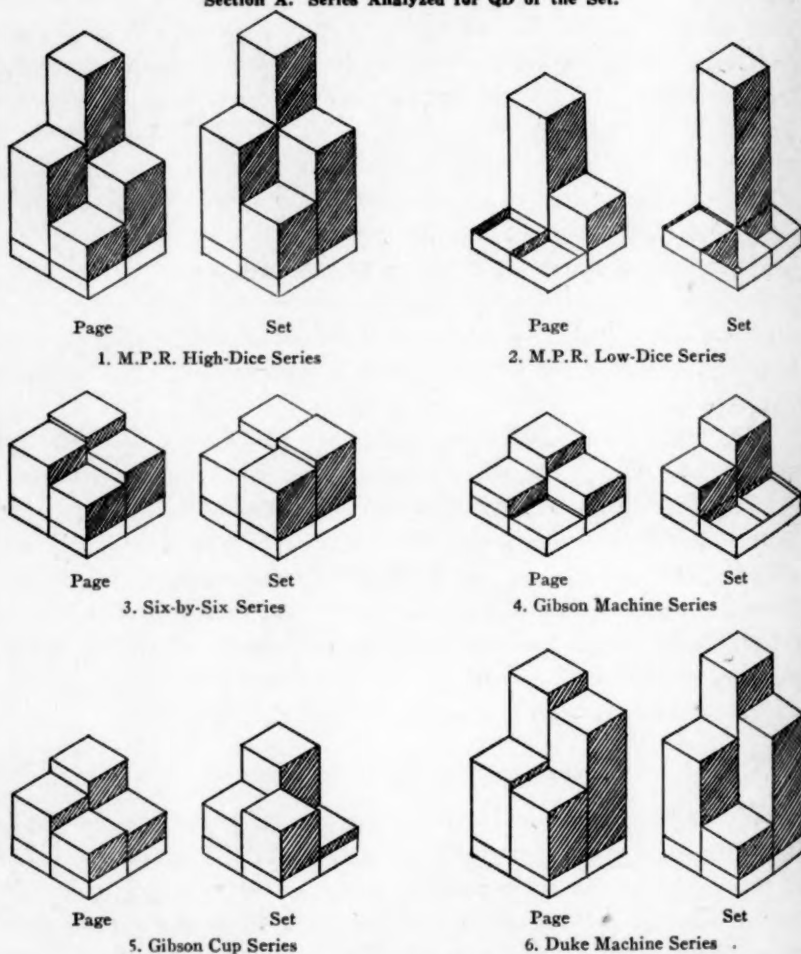
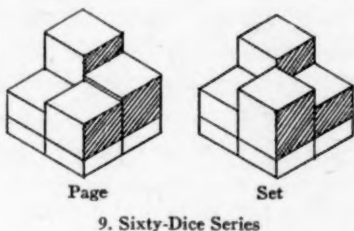
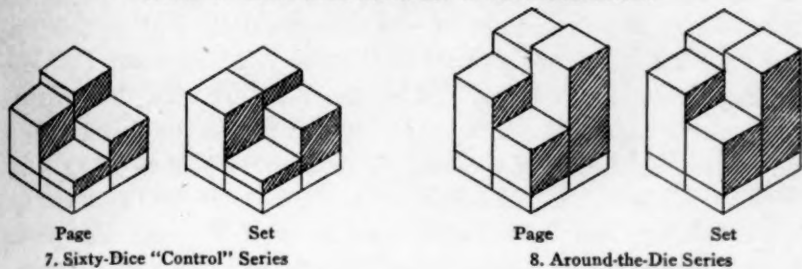


FIG. 2.—QD's of the set compared with the QD's of the page.

Section B. Series Analyzed for QD of Other Subdivisions.



Section C. The QD's of the Page and Set for the Pooled High-Dice and Low-Dice Series.

Section D. The QD's of the Page and Set for All Singles Series Pooled.

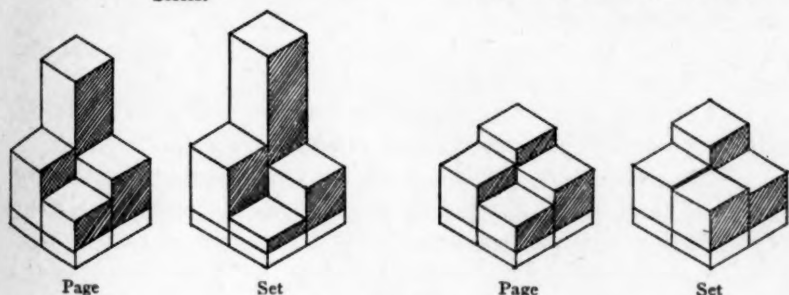


FIG. 2. (Continued)

The numerical data upon which the graphs are based are given in the Appendix together with the CR of the 1-4 difference for each series. The QD's are arbitrarily ranked within each section of Figure 2 and the Appendix table in the order of the magnitude of the CR of the 1-4 difference of the page (that is, the difference between the average scores of the first and fourth quarters).

The main point of interest is the degree to which the "diagonal" declines (upper left to lower right) of the *page* QD's are reflected in the *set* QD's. It is apparent from the graphs, without the aid

of statistical evaluation, that in spite of some exceptions the smaller subdivisions show a distinct repetition of the decline effect found on the page itself. In the pooled QD for the High-Dice and Low-Dice series, the set has a larger CR of the 1-4 difference than has the page (4.91 to 4.28). In the QD of the Singles total the page is ahead of the set in the CR of the 1-4 difference (5.00 to 3.55).

The CR's of the difference for the two total QD's of the set, 4.91 and 3.55, are both highly significant. The odds against the chance occurrence of a combination of two such CR's are a million to one. Similarly, odds against chance of more than a million to one are obtained if we combine the CR's of the 1-4 difference for all the nine individual series. Thus there is no doubt that the QD of the set cannot be accounted for on a chance hypothesis.

Summary of Results

By way of reviewing the statistical findings of the analyses reported in this paper, the following summary is presented:

1. The CR of the 1-4 difference of the pooled QD of the set for the total Singles series is 3.55.
2. The CR of the 1-4 difference of the pooled set QD of the High-Dice and Low-Dice series is 4.91.
3. The odds against the occurrence by chance of a chi-square combination of two such CR's are more than a million to one.
4. The odds against the occurrence by chance of the chi-square combination of the CR's of the 1-4 difference given by the QD's of the set for the Singles series are approximately five thousand to one.
5. A comparable figure for the High-Dice and Low-Dice series combined by the chi-square method is two hundred thousand to one.
6. The comparable figure for the chi-square combination of all nine of the series in which the QD of the set was determined is more than a million to one.

DISCUSSION

Counterhypotheses

We gave in the earlier QD paper full consideration of the counterhypotheses which need to be kept in mind in appraising results bearing upon the PK hypothesis. Almost every detail of the argument would be the same in this report on the QD of the set. We have, so far as the chance hypothesis is concerned, approximately as

good a case from the set analyses as from the page. The same superior order of evidence against the hypotheses of biased dice, skilled throwing, errors in recording, or loss of records is found in the appraisal of the QD's of the set as was found in the QD study of the page.

We have, then, in the results of the analysis of the QD of the set an independent confirmation of the PK hypothesis which represents a triple checking of the original data, a third evaluation which supports the case for PK. First there was the original method of evaluating the records by the use of the critical ratio. These significant values are summarized in Table 1. Then the records were rechecked and analyzed for the QD of the page. Now, in this paper on the QD of the set, they have received their third analysis.

There is not the complete independence between the page and set that would allow a combination or a covariation of the CR's of the two types of QD, but a later report of the QD of the *half-set* will afford this opportunity.

We shall assume, then, that the PK hypothesis is the logical explanation of the significant results described in this and the preceding paper and will proceed to the further discussion on that assumption.

Relationship of the QD to the Structure of the Set

Because the experimental series subjected to the analysis for the QD of the set vary so widely in many important respects, generalization is difficult. It is indeed remarkable that the QD's have shown the significant similarity from series to series that this report has brought out. It is of interest, then, to note what direction the *differences* have taken and to discover, if possible, any connection between such differences and the conditions of the experiment or the recording.

One noteworthy finding encountered in the analysis of the QD of the set is a certain relationship—suggestive, at least, if not conclusive—between the QD pattern in the set and the number of die-throws represented by the set. The four series giving the most typical QD's of the set represented the fewest number of die-throws. In Table 2 the nine series on which the study is based are ranked according to the number of die-throws represented in the set and also according to the approximation of the QD to the pattern we

have come to think of as typical (that is, the QD in which the first quarter is highest and the fourth quarter lowest). To get this latter ordering, all series were ranked as to the number of quarters in their QD which were atypical. All equal ranking series were further differentiated by giving the lowest numerical rank to those with the largest CR of the 1-4 difference.

Table 2
SERIES RANKED ACCORDING TO NUMBER OF DIE-THROWS AND
TYPE OF QD OF THE SET*

Series	Number of Entries	Rank by Number of Entries	Number of Die-Throws	Rank by Number of Die-Throws	Rank as to Typical QD
Sixty-Dice "Control" ..	27-72	6	1,440-4,320	1	5
Sixty-Dice	24	9	1,440	2	8
Six-by-Six	120	1	720	3	9
Around-the-Die	72	3.5	432	4	6
Gibson Cup	60	5	360	5	7
Gibson Machine	72	3.5	216	6	2
Duke Machine	96	2	192	7	4
M.P.R. High-Dice	36	7.5	72	8.5	3
M.P.R. Low-Dice	36	7.5	72	8.5	1

*The probability of getting nine rank differences as large as those shown in the two columns on the right has been computed by Lt. J. A. Greenwood as equal to .022. The method is given in an article entitled "Distributions of Sums of Squares of Rank Differences for Small Numbers of Individuals," by E. G. Olds, *Ann. math. Statist.*, 1938, 9, 133-48.

There appears to be some relationship between the typical set QD and the number of *die-throws* in the set, but not between the set QD and the number of *entries* in the set record. There is thus a strong suggestion of a connection between the QD and the amount of work done by the subject in the test—that is, the number of dice thrown and read; the QD is not a consequence of the number of entries made on the records. To some extent this will, we think, appear understandable, for if a set is long and drawn out, as it must be if there are many dice to be counted and thrown, the tendency is to lose sight of the structure of the set; whereas the faster-moving set with the smaller number of dice is more easily kept in perspective by the subject.

The Character of the QD's for the Individual Sets as Distributed Over the Record Page

It will be of some interest to observe the graphical representation of the different QD's for the individual sets making up the page.

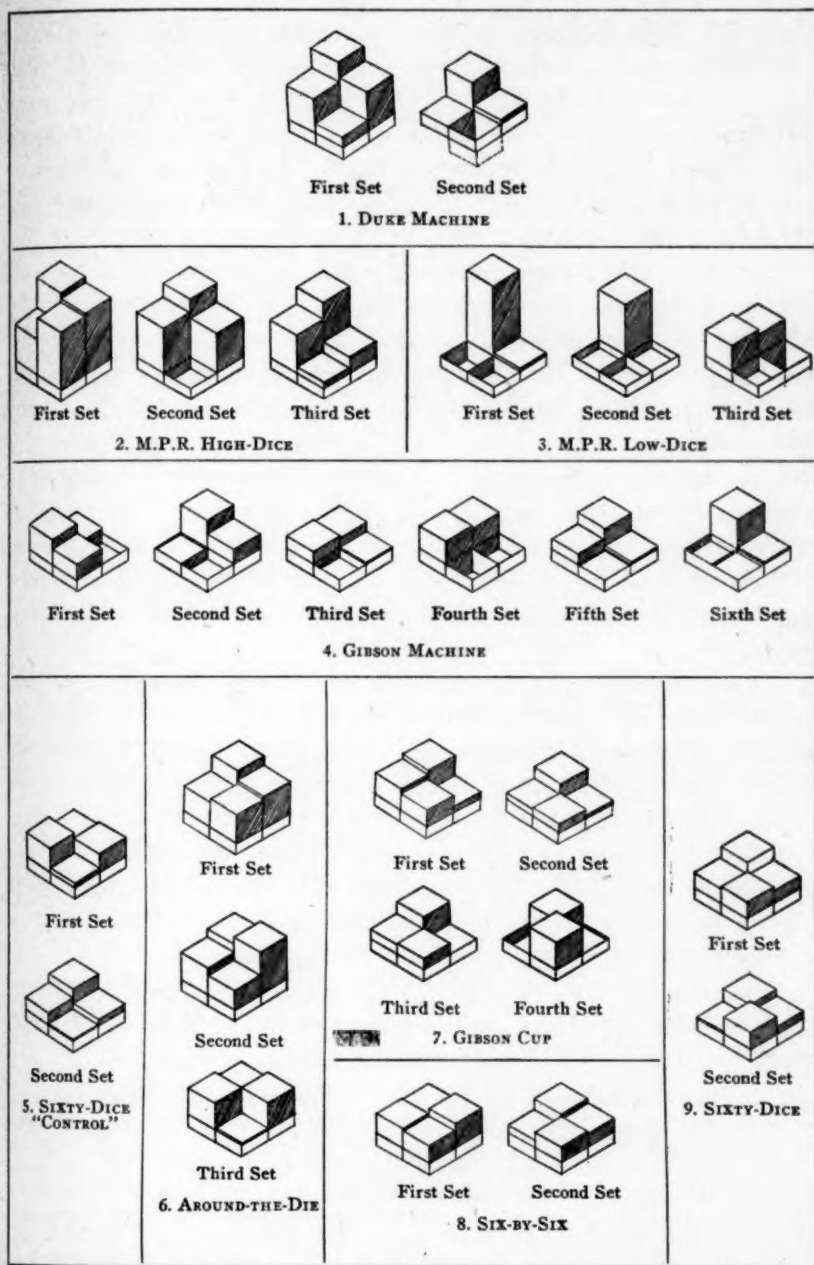


FIG. 3.—QD's of the individual sets on the page for the nine series. The series are ranked according to the consistency ratings given in Table 3.

As will be seen in Figure 3, some series have two, others three, and still others four or more sets on the page. Again we have to point out that because of this and other differences between the series these QD's are not entirely comparable. The structure of the sets themselves varies greatly from series to series. In three of the series, it will be remembered, there were subdivisions of the record page, but no definite sets involved.

Again an interesting relationship seems to have prevailed between the number of die-throws within the set and the character of the QD's of the different sets on the page. The point is that the smaller the set in terms of dice thrown, the more consistently typical are QD's of the sets on the page, so that we can make not only the point of the preceding paragraphs that the pooled sets for the page as a whole were more typical when fewer dice were thrown, but also that they were more *consistently* typical throughout the page in these smaller sets. Table 3 presents the nine series ranked first as to number of entries in the set; second, as to numbers of dice thrown per set; and third, as to consistency¹ of the QD's of the sets on the page.

It will be seen again that the four most consistent series are those with fewest dice thrown. No relation between consistency and the number of entries is apparent. So we may say, as we did above for the set QD's pooled for the page as a whole, that the structure of the QD patterns is not a matter of size of the set on the record page as evidenced by the number of entries, but rather a function of the amount of work done. This relationship can be observed most closely by turning to the graphical representation of the QD's of the individual sets on the page as shown in Figure 3.

We must not attach too great weight to the observed correlations (between the typicalness and consistency of the set QD, on the one hand, and number of die-throws in the set, on the other) since there

¹ In order to obtain a measure of consistency of the sets on the pooled page, each set shown in Figure 3 was given a "score" denoting the degree to which it approximated the typical QD. A set with a "perfect" QD received a score of 3. A set with a 1-4 decline and one quarter atypical received a rating of 2, while one with a 1-4 decline and two atypical quarters was given a 1. Sets with no 1-4 decline received 0. These scores for each set on the pooled record page were added and averaged. The rank order for these averages was then computed and used as the measure of consistency. (When more than one series had the same average rating, the series with the largest average 1-4 difference of the pooled set QD received the lowest numerical rank.)

Table 3

SERIES RANKED ACCORDING TO NUMBER OF DIE-THROWS AND CONSISTENCY OF SET QD'S ON THE PAGE*

Series	Number of Entries	Rank by Number of Entries	Number of Die-Throws	Rank by Number of Die-Throws	Rank in Consistency of Typical QD's
Sixty-Dice "Control" ..	24-72	6	1,440-4,320	1	5
Sixty-Dice	24	9	1,440	2	9
Six-by-Six	120	1	720	3	8
Around-the-Die	72	3.5	432	4	6
Gibson Cup	60	5	360	5	7
Gibson Machine	72	3.5	216	6	4
Duke Machine	96	2	192	7	1
M.P.R. High-Dice	36	7.5	72	8.5	2
M.P.R. Low-Dice	36	7.5	72	8.5	3

*The probability of getting nine rank differences as large as those shown in the two columns on the right has been computed by Lt. J. A. Greenwood as equal to .022. (See footnote to Table 2.)

are other factors that might have contributed somewhat to the figures shown in Tables 2 and 3. For instance, in two of the three series in which there was no planned set structure (the Sixty-Dice and the Sixty-Dice "Control") the largest number of dice were thrown at a time. We think it best, therefore, that the relationship be regarded as suggestive, suggestive at least to the point of warranting an investigation directed specifically toward determining whether an increase in the number of dice thrown in a set works against the formation of typical QD's.

It also happens that the four series which gave the most typical total QD of the set and the most consistent set QD's on the page were series in which the procedure involved the throwing of two or three dice at a time, whereas the other five series involved the throwing of six or more. Hence we might say that there is a strong suggestion that the number of dice per throw has something to do with the typicalness of the QD of the set. But at present the facts we have available suggest rather that the total number of die-throws in the set is the feature to single out for emphasis, for it is in terms of these die-throws that the set is represented in the subject's mind.

A few remarks are warranted on the QD's of the set for the three series which did not have regular set structure but which were included in this study. None of these three showed a typical set QD though that of the Sixty-Dice "Control" is a fair approximation;

and none of the three ranks high in consistency of the set QD's on the page. (Only one of these three ranked high in the page QD.) It would seem from these results that there is quite a difference, then, between definitely marked-off sets (that is, with a regular stopping-point between sets) and subdivisions which only outwardly resemble sets—a difference in the general patterning of hit distribution. But the number of cases is too small and the consistency of data insufficient for more than a bare suggestion of relationship.

GENERAL COMMENTS

The considerable degree of consistency and recurrence of declines in the individual sets on the page rules out the fatigue hypothesis of declines in the PK data. Fatigue could not account for the repeated set declines on the same page, all based on records from the same session. Rather, we must seek the explanation in the subject's tendency to structure his experience of the test situation. This is, we realize, only the beginning of the explanation of the QD patterning.

The persistence of the QD patterns down into the set structure is evidence of the working of a lawful principle that is recognizably psychological and does not lend itself easily to physical interpretation. Indeed, even the finding of a typical QD pattern in the sets with the smaller number of die-throws carries further this same suggestion of psychological principles. We can, we believe, best approximate some understanding of what is happening in terms of psychical rather than physical principles.

On the page, the consistency of the QD's of the sets from series to series and their further correlation with the QD's of the page for the same series all summarize to a far greater impression of encompassing lawfulness than anything else with which we are familiar in the entire parapsychological field. This, then, is a line of inquiry which we must pursue, for behind the order which these pattern effects indicate may lie the governing principles we are seeking as our major objective. The report to come on the QD of the half-set will carry the investigation still further toward this objective.

REFERENCES

1. GATLING, WILLIAM, and RHINE, J. B. The PK effect: Around-the-Die Series. [Awaiting publication.]
2. GIBSON, EDMOND P.; GIBSON, LOTTIE H.; and RHINE, J. B. A large series of PK tests. *J. Parapsychol.*, 1943, 7, 228-37.
3. ———. The PK effect: mechanical throwing of three dice. *J. Parapsychol.*, 1944, 8, 95-109.
4. HUMPHREY, BETTY M., and RHINE, J. B. Position effects in the large Gibson series. *J. Parapsychol.*, 1943, 7, 238-51.
5. PRATT, J. G. A reinvestigation of the quarter distribution of the (PK) page. *J. Parapsychol.*, 1944, 8, 61-63.
6. REEVES, MARGARET PEGRAM, and RHINE, J. B. The PK effect: II. A study in declines. *J. Parapsychol.*, 1943, 7, 76-93.
7. RHINE, J. B. Dice thrown by cup and machine in PK tests. *J. Parapsychol.*, 1943, 7, 207-17.
8. RHINE, J. B., and HUMPHREY, BETTY M. A comparison of two sizes of dice in PK tests. [Awaiting publication.]
9. ———. The PK effect as indicated by score decline. [Awaiting publication.]
10. ———. The PK effect: special evidence from hit patterns. I. Quarter distributions of the page. *J. Parapsychol.*, 1944, 8, 18-60.
11. ———. PK tests: sixty-dice per throw. [Awaiting publication.]

APPENDIX

The following table shows on the left the QD of the page for each series, and on the right, the QD of the set. The number of runs involved and the deviation above or below expectation are stated for each quarter, and the average run score is given so as to afford an easy basis for comparing the various QD's. For the Singles series this average score expectation is 4.00, and for the High-Dice and Low-Dice series it is 5.00. The classification as to singles and combinations is otherwise unimportant in this comparison. Just underneath the square in each case is given the CR of the difference between the average scores of the first and fourth quarters.

COMPARISON OF QD'S OF THE SET WITH QD'S OF THE PAGE

SECTION A. SERIES ANALYZED FOR QD OF THE SET

1. M.P.R. High-Dice Series

Page 356 Runs		Set 308 Runs	
99.5	78.5	77	77
+101.5	+35.5	+88	+55
6.02	5.45	6.14	5.71
99.5	78.5	77	77
+66.5	+17.5	+54	+26
5.67	5.22	5.70	5.34

CR_d(1-4)=3.09

2. M.P.R. Low-Dice Series

Page 340 Runs		Set 290 Runs	
94	76	72.5	72.5
+68	+15	+65.5	-12.5
5.72	5.20	5.90	4.83
94	76	72.5	72.5
-5	-4	-.5	-17.5
4.95	4.95	4.99	4.76

CR_d(1-4)=2.94

Page 340 Runs		Set 290 Runs	
94	76	72.5	72.5
+68	+15	+65.5	-12.5
5.72	5.20	5.90	4.83
94	76	72.5	72.5
-5	-4	-.5	-17.5
4.95	4.95	4.99	4.76

CR_d(1-4)=4.04

3. Six-by-Six Series

Page 7,440 Runs		Set 5,976 Runs	
2286	1434	1551	1437
+833	+433	+523	+537
4.36	4.30	4.34	4.37
2286	1434	1551	1437
+796	+309	+427	+445
4.35	4.22	4.28	4.31

CR_d(1-4)=2.42

4. Gibson Machine Series

Page 1,914 Runs		Set 1,314 Runs	
507	450	328.5	328.5
+112	+64	+113	-6
4.22	4.14	4.34	3.98
507	450	328.5	328.5
+49	-6	+62	-25
4.10	3.99	4.19	3.94

CR_d(1-4)=2.12

Page 1,914 Runs		Set 1,314 Runs	
507	450	328.5	328.5
+112	+64	+113	-6
4.22	4.14	4.34	3.98
507	450	328.5	328.5
+49	-6	+62	-25
4.10	3.99	4.19	3.94

CR_d(1-4)=3.15

5. Gibson Cup Series

Page 5,130 Runs		Set 5,370 Runs	
1500	1462.5	1342.5	1342.5
+505	+263	+568	+62
4.34	4.18	4.42	4.05
1095	1072.5	1342.5	1342.5
+281	+206	+277	+430
4.26	4.19	4.21	4.32

CR_d(1-4)=1.98

6. Duke Machine Series

Page 248 Runs		Set 238 Runs	
77.5	46.5	60	59
+70	+37	+59	+47
4.90	4.80	4.98	4.80
77.5	46.5	60	59
+39	+20	+36	+13
4.50	4.43	4.60	4.22

CR_d(1-4)=1.40

Page 248 Runs		Set 238 Runs	
77.5	46.5	60	59
+70	+37	+59	+47
4.90	4.80	4.98	4.80
77.5	46.5	60	59
+39	+20	+36	+13
4.50	4.43	4.60	4.22

CR_d(1-4)=2.27

SECTION B. SERIES ANALYZED FOR QD OF OTHER SUBDIVISIONS

7. Sixty-Dice "Control" Series

Page 2,172 Runs	
630 +241 4.38	630 +140 4.22
570 +168 4.29	342 +27 4.08

$CR_d(1-4) = 2.48$

Set 2,172 Runs	
600 +206 4.34	486 +135 4.28
600 +203 4.34	486 +32 4.07

$CR_d(1-4) = 2.50$

8. Around-the-Die Series

Page 1,242 Runs	
310.5 +194 4.62	310.5 +206 4.66
310.5 +148 4.48	310.5 +93 4.30

$CR_d(1-4) = 2.22$

Set 1,242 Runs	
310.5 +186 4.60	310.5 +200 4.64
310.5 +156 4.50	310.5 +99 4.32

$CR_d(1-4) = 1.91$

9. Sixty-Dice Series

Page 2,172 Runs	
642 +243 4.38	600 +163 4.27
540 +83 4.15	390 +93 4.24

$CR_d(1-4) = 1.20$

Set 2,172 Runs	
591 +221 4.37	495 +103 4.21
591 +105 4.18	495 +153 4.31

$CR_d(1-4) = .59$

SECTION C. THE QD'S OF THE PAGE AND SET FOR THE POOLED HIGH-DICE AND LOW-DICE SERIES

Page 696 Runs	
193.5 +169.5 5.876	154.5 +50.5 5.327
193.5 +61.5 5.318	154.5 +13.5 5.087

$CR_d(1-4) = 4.28$

Set 598 Runs	
149.5 +153.5 6.027	149.5 +42.5 5.284
149.5 +53.5 5.358	149.5 +8.5 5.057

$CR_d(1-4) = 4.91$

SECTION D. THE QD'S OF THE PAGE AND SET FOR ALL SINGLES SERIES POOLED

Page 20,318 Runs	
5953 +2198 4.369	4933.5 +1306 4.265
5386 +1564 4.290	4045.5 +742 4.183

$CR_d(1-4) = 5.00$

Set 18,484 Runs	
4783.5 +1876 4.392	4458.5 +1078 4.242
4783.5 +1266 4.265	4458.5 +1147 4.257

$CR_d(1-4) = 3.55$

TELEPATHIC SKIN-WRITING

(The Kahl Case)

By DAVID EFRÓN

Washington, D. C.

ED. NOTE: This would appear to be a case of telepathy in which the subject manifested in red outlines on her skin the image received telepathically. The phenomenon is of particular interest because it raises problems in an almost totally unexplored area, that of parapsychical effects on physiological processes.

Dr. Efrón's observations here are, however, but a brief part of a wide study that he has prepared and proposes to publish under the title of "The Telepathic Image." This separate treatment of the Kahl case does not permit the inclusive analytical and theoretical treatment possible in his general study.

Dr. Efrón is a native of Argentina and was formerly an instructor in Psychology at Sarah Lawrence College. He holds a Ph.D. degree in Philosophy from the University of Buenos Aires and a Ph.D. in Sociology from Columbia University.

IN MOST CASES of telepathic communication, whether spontaneous or experimental, the "message" projects itself on the screen of the percipient's consciousness in the form of a visual (hallucinatory) image. From studies by Gilbert Murray, Eugene Osty, and others, we know, however, that in addition to visual language the subconscious perception may also be delivered in the form of an auditory and even an olfactory hallucination.

In the course of my ESP research trip throughout Europe in 1929 and 1930, I came across an unusual subject in whom the telepathic datum manifested itself neither through a visual, auditory, nor olfactory image, but rather by means of a graphic inscription on the skin. This rare subject was Mme. Olga Kahl, who was then living in Paris. Thanks to the cooperation of Dr. Osty, the late director of the Institut Métapsychique International, I was given the opportunity of carrying out a series of experiments with her, the results of which will be summarized in the following pages. Essentially, these results differ little from those obtained one year earlier by Osty himself in the presence of several physicians and physiologists of the University of Paris.

According to information obtained by Osty, the development of Mme. Kahl's faculty took place in the following manner. At the age of nineteen Mme. Kahl lost a pearl necklace which she valued greatly, the circumstance causing her something of an emotional shock. This was followed by a phenomenon whose psychological importance remained unnoticed: on the next morning one of her arms appeared covered by a series of round, reddish spots which presented a certain formal similarity to the pearls of the necklace. The girl interpreted them as a skin eruption. Some time later, after listening to a story about the exploits of an Indian fakir who possessed the power of projecting on his skin a mental or a visual object, she attempted to duplicate the performance. A clover leaf was suggested to her as an object. To everybody's surprise, a leaf form soon appeared impressed in red on one of her forearms. Years later, while witnessing a stage performance in Constantinople in which a dervish was allegedly piercing his cheek with a needle, Mme. Kahl suddenly experienced an intense pain in one of her own cheeks, a pain which was followed by the formation of an internal abscess in the same place. An equally curious incident happened to her in 1925 in Paris. The shock produced by almost choking on a fish bone resulted in the appearance of a fish-bone shape on her throat which lasted for about twenty-four hours in spite of her physician's assurances that the actual bone had long since descended into the stomach.

Mme. Kahl's faculty was first studied scientifically by Dr. Osty in 1927-1928. After several experiments Dr. Osty realized that the case was considerably more complex than the subject herself had been led to believe. He discovered that she was able not only to project on her skin some of the images of her own sensory perception, but *could also translate into dermatographic language information received through a channel which was independent of that of any of the known senses.*

The results of his investigation were published in 1929 in the organ of the Institut as part of a more inclusive study entitled "Ce que la Médecine doit attendre de l'étude expérimentale des propriétés psychiques paranormales de l'Homme."¹ The following excerpts will provide a general idea of the conditions under which the experiments took place:

¹ See pp. 124-36, *Revue Métapsychique*, March-April, 1929.

On October 29, 1927, I asked Mme. Kahl to show me her power of inscribing on her skin something I was thinking about. Mme. Kahl asked me to hold her left wrist while she tried to make my thought appear on the upper side of the same forearm. After about fifteen seconds, during which nothing happened, she rubbed her skin several times. Soon afterwards several red streaks outlined themselves on the background of her skin. After a few seconds they drew a capital *R* occupying approximately two-thirds of the forearm's width in the vicinity of the elbow. A few seconds later a small *o* inscribed itself the same way with no additional rubbing on the part of Mme. Kahl. After half a minute or so, during which nothing else appeared, Mme. Kahl said, "I am too tired. Nothing else will come. You must have thought *Rose*." I had thought *Rosa*. *Ro* remained clearly visible for about one minute, then disappeared in a diffused redness over a large zone of the skin. Everything had taken place under plain light. The only weak point of the experiment was Mme. Kahl's rubbing her skin. "Stimulation of the skin by friction," she told me in substance, "helps the inscription of thought; but it may be done by anybody—by the experimenter or by a third person altogether. It is not necessary when I am in good shape." Subsequent meetings showed me the truth of her statement for some of her experiments yielded incontestable results under entirely controlled conditions.

Dr. D'Espiney, of Lyon, was asked to think of an object. Soon on Mme. Kahl's extended forearm and in plain daylight we observed the formation of the lines which I copied. At the beginning the outline was in a weak red but Mme. Kahl asked one of the ladies who were witnessing the experiment to rub her skin briefly in order to facilitate the occurrence of the phenomenon. The redness of the lines increased but no additional line appeared. Dr. D'Espiney then told us that he had thought of the word *François*. [What had appeared on Mme. Kahl's skin was *Fran*; that is, only part of the message, a phenomenon with which students of telepathy with drawings are quite familiar.]

After about fifteen seconds, as usual, the letter *Y* outlined itself, occupying the entire width of the forearm near the elbow. Probably influenced by this letter, Mme. Kahl said, "Did you think of the name *Yvonne*?" No reply. Soon, over almost the entire length of the forearm, the word *Y lande* traced itself in red, very visible to all of us. The second letter of the word was missing in the dermographic outline but its place was there. [The message had been *Yolande*.]

Mme. Kahl asks Mme. Cunéo to make an experiment. Mme. Cunéo passes into an adjoining room. She returns with a folded piece of paper and gives it to Professor Cunéo who puts it away in one of his pockets. We surround Mme. Kahl under the electric lamp. She asks Mme. Cunéo to place for an instant her [Mme. Cunéo's] hand over her [Mme. Kahl's] extended forearm. As soon as Mme. Cunéo takes her hand away, we see outlining themselves in red, as usual, several letters in the order in which they appear in our drawing. On the piece of paper which Professor Cunéo then unfolds we see that Mme. Cunéo had written *Sabine*. The capital letter *S* had been reproduced in its special form. Two letters of the word were missing but the place of the *i* was there and a bit of the final *e* was foreshadowed.

After a considerable number of experiments Osty drew the following conclusions:

(1) that Mme. Kahl possessed the ability to perceive extrasensorially the mental images of the experimenter, providing they were of a relatively simple character; and

(2) that she was also able to translate these images dermatographically on a part of her skin previously indicated by the experimenter.

Though it was unknown to me at the time, Mr. Theodore Besterman, a research representative of the Society for Psychical Research in London, had, in collaboration with M. René Warcollier, a series of four sittings with Mme. Kahl. Both Mr. Besterman and M. Warcollier obtained a number of demonstrations of Mme. Kahl's dermatographic form of telepathic response. Since these were similar to the examples cited above from Dr. Osty's experiments, I need not describe them in detail. They were sufficiently impressive to the investigators to lead Mr. Besterman to say: "The successes obtained by Mme. Kahl will be seen to be very remarkable"; and also, "It is hoped that the S.P.R. will further investigate this most interesting medium."

These few words do not do justice to the many interesting observations reported by Besterman, some of which do not deal directly with the dermatographic response. The reader's attention is therefore directed to the original report.²

² Besterman, Theodore. Report of a four months' tour of psychical investigation. *Proc. Soc. psych. Res.*, Lond., 1929, 38, 409-80.

When Dr. Osty, the director of the Institut Métapsychique, informed me in Paris of the case of Mme. Kahl, I was naturally very dubious about her claims and even of his report of his own findings concerning them. Fortunately, however, Dr. Osty kindly suggested that I conduct a personal investigation and helped me to make the necessary arrangements. This investigation turned out to be, for me, something of a scientific revelation, for among the various paranormal phenomena I observed in the European laboratories of parapsychology, none interested me any more than Mme. Kahl's demonstrations of dermatographic telepathy.

My own experiments with Mme. Kahl were carried out in the month of August, 1929. The conditions under which they took place and the results obtained were as follows:

EXPERIMENT NO. I

Mme. Kahl invited me to go into either of the two rooms adjoining the one we were meeting in and to write a simple word or draw a simple image, with a pencil she offered me, on a piece of paper of my own. I declined the pencil offer and decided to use my own fountain pen. After closeting myself in one of the rooms and locking the communicating door, I examined the walls and furniture minutely. Fairly confident that nobody could see me, I drew out my paper and pen and got ready for the experiment. As I was about to begin, it occurred to me that it might be a good idea if I threw a glimpse at the room in which Mme. Kahl was waiting. I unlocked the communicating door and approached the subject. She was sitting in the same chair on which I had left her, but in a visible state of excitement. Apparently believing that I was ready, she requested my permission to try, "as a preface," another kind of experiment, saying, "It will help me to put myself in the right state of mind for the skin performance." She offered me a pack of cards on each of which there was inscribed a different little letter. I was supposed to pick one of these letters mentally and to build with it a masculine or feminine name of my liking. While I was engaged in the selection, she was to pass into the second adjoining room and come back with the name I had picked. I pointed out to her that the procedure of the cards lent itself to suspicion and that I would much prefer to pick a name directly without the objective suggestion

of a written letter. Mme. Kahl insisted upon her request, declaring at the same time that she was not trying as yet to demonstrate her telepathic power but merely to "get ready" for the real experiment. At this point I remembered that Osty had warned me of certain "circus preliminaries" the subject was likely to pull on me at the beginning and his advice not to reject them entirely, for, in his opinion, they were the expression of an autosuggestive habit deeply rooted in the mind of the percipient. I therefore yielded to her request but decided to discard whatever result might be obtained under such conditions. Mme Kahl gave me the pack of cards and withdrew into the other room, locking the communicating door. I examined the cards. There seemed to be nothing unusual about them except for the inscribed letters. There were as many cards as there are letters in the French alphabet. I decided to pick a letter without even touching the corresponding card. I picked the letter R, put the pack on the table, and constructed mentally the name *René*. At this very moment I heard Mme. Kahl shouting from the other room, "That's it! You have thought of the name *René*!"

This instantaneous answer disconcerted me a little. The result admitted only one of the two following alternative explanations: (1) chance coincidence, or (2) paranormal perception. Recalling that in one of Osty's experiments Mme. Kahl had also guessed the name *René* (a very common name in France, by the way), I decided to discard the latter possibility.³ Returning from the other room, Mme. Kahl then said, "Everything will be all right now." Her excitement appeared to have increased, and her face was somewhat flushed. She did not seem to be able to keep quiet for a single moment. She sat down on the sofa, got up at once as if moved by an invisible spring, picked up an object, fiddled around with it for a while, laid it to rest, picked it up again, etc. "Everything will go well," she repeated several times as if talking to herself. "I feel that I am well disposed now." I scrutinized each of her movements. She was moving around like a squirrel. Suddenly she asked me whether I had my piece of paper with the message ready. Her restlessness increased visibly when I told her that I hadn't prepared it yet. In a tone which betrayed both anger and annoyance she

³ Later I realized that my result differed greatly from Osty's because in the latter case the word had also projected itself on Mme. Kahl's skin.

warned me not to do that "trick" again, that the lightest setback was likely to block her perception once she was "attuned." The reason struck me as childish, but I considered it wise not to challenge it. She urged me to return at once to my room and come back with the message. I closeted myself again in the room and once more inspected the walls and furniture. Failing to find anything suspicious, I tore out a little sheet of paper from my address book and, under the protection of my coat, drew a vertical *S*. I folded the paper and, holding it in my fist, returned to the meeting room. Mme. Kahl asked me to let her touch it with her fingertips. The request struck me as unworthy of a scientific experiment. She told me voluntarily that in the subsequent experiments not only this condition but also the writing or drawing procedure itself would be eliminated, for neither was really indispensable; that she usually made such a request at the beginning of a séance because it helped set the stage for the appearance of the dermatographic phenomenon. Without understanding the reason invoked, I acceded to the request, deciding once more not to take into account whatever result might be obtained under such circumstances. (It will be seen, however, that the possibility of Mme. Kahl's perceiving sensorially the content of my message, let alone inscribing it mechanically on her skin in my presence, was quite remote.) Opening up my fist a little, I allowed her to skim lightly the surface of the folded paper with her fingertips. She thanked me and suggested that I put it away now in one of my pockets. After that she asked me to let her touch my empty hand for a moment. Then she uncovered her left arm. Getting hold of my empty hand with her left one, she then started rubbing part of her bare left forearm with her free hand and asked me to concentrate mentally on the message. Although the rubbing technique seemed to me highly suspicious, I yielded once more to her request, not without making sure with my free hand that the paper was still in my pocket. After about twenty seconds a blurred, reddish sign appeared on her forearm and rapidly acquired the shape or outline of an oblique *S*. The letter was perfectly visible for about half a minute and then faded away as quickly as it had come up, disappearing finally into a diffused spot of the same color. I examined the spot closely. It presented the appearance of a vaso-

dilatation. I tried to erase it mechanically to no avail. It looked to me as if the sign had melted away, so to speak, under her skin.

The matter was beginning to intrigue me. In spite of the inadequate experimental conditions under which the result had taken place, it was difficult for me to think that I had been the victim of a fraud, that the subject had managed to elude my vigilant watch and to outline, by a dishonest method, on her skin the sign I had chosen. But even granting that her technique had been swifter than my glance, there still remained a factor which appeared to speak in her favor; namely, in order to outline the sign mechanically it was necessary for her to know what the sign was, and I am absolutely certain that the paper had never been removed from my pocket, that during her brief contact with it Mme. Kahl could not have performed any legerdemain, and that at the time I had written on it nobody was with me in the other room. The hypothesis of some invisible mirror trick strikes me as extremely far-fetched because, as has already been pointed out, I made the drawing under the protection of my coat. How, then, had Mme. Kahl been able to acquire the content of my message? The previous experiment with the card no longer permitted me to assume easily that I was confronted once more with a chance coincidence.

EXPERIMENT No. 2

With calculated admiration I congratulated Mme. Kahl for her exploit but asked her, for science' sake, to let me tighten the conditions of our subsequent experiments. Her reply was substantially as follows: that she was grateful for the compliment but that she sensed that I was still harboring doubts about her honesty; that from the very beginning she felt that I had been trying to hide a skeptical attitude; that were it not for the fact that I had come recommended by Osty she would ask me that we interrupt the meeting at once but that she was eager to show me she was not unworthy of scientific inquiry; that the truth of the matter was that her dermographic ability was not dependent on her will; that sometimes when she was "well disposed," the image would appear almost instantaneously without any skin-rubbing, paper-touching, or the use of the paper procedure altogether; that, on the other hand, when she was "depressed," the phenomenon would be slow in appearing or fail to

manifest itself at all; that she was at a loss to understand the need for using those suspicious procedures but that they seemed to help her to get going. She begged me to have a little patience, for she was satisfied that in the following attempts it would be possible to do away with them gradually. "Let us begin with that of contact, shall we?" she suggested. "Instead of touching the paper at sight, I'll touch it under a towel or, if you prefer, under the cover of your own handkerchief." She still asked me, however, to let her rub her skin if necessary, but promised that in the experiment after next it would be I who would do the rubbing. Although somewhat theatrical, her speech could not but appeal to my scientific curiosity. I returned to my room and under the same experimental conditions drew a second sign, the Star of David, on another sheet of my address book. I folded the paper and tried to detect the outline of the picture, holding it up against the light. The result was entirely negative. I returned to the meeting room and, holding the paper tightly in my hand, allowed Mme. Kahl to touch it for a few seconds under a towel. She got hold of my free hand (as in the previous experiment, I put the paper away in one of my vest pockets), and, with closed eyes, she uncovered her right forearm (the change of arms was made at my request) and began to rub it. After about fifteen seconds there appeared, in the vicinity of the elbow, several ill-defined reddish streaks which soon acquired the form of a Star of David. One of the lines of the lower triangle remained unfinished. The sign lasted for about thirty seconds and then disappeared like the *S* in the previous experiment. It was replaced by a less intense reddish spot which I was unable to erase mechanically. Mme. Kahl then opened her eyes and asked whether anything had appeared and whether it showed any resemblance to my drawing. Upon hearing my affirmative reply, she suggested that in the next experiment I myself do the rubbing.

EXPERIMENT No. 3

Following the usual experimental procedure as far as my graphic operation was concerned, I drew the sign of a question mark. Mme. Kahl lightly touched the folded paper, which I was holding this time under my own handkerchief. I put it away in my pocket and began the rubbing on the very spot left by the Star of David. Mme.

Kahl warned me that I was running the risk of spoiling the result because the congestion left by the previous image might blur the new one. I stuck to my choice. After about twenty seconds a blurred yet clearly visible shape outlined itself on (or rather *under*) the spot. It looked like an imperfect vertical S, a circumstance which led me to think that it was merely a second edition of the letter of my first experiment. Mme. Kahl was not inclined to share my belief and asked me to show her the original message. She threw a glance at it and, running toward a table, picked up a little mirror and placed it in front of the dermatographic shape, which appeared, of course, inverted on the reflecting surface.⁴ It was, in effect, a question mark but without the usual dot. Altogether, the shape lasted for about half a minute and disappeared suddenly (faster than the previous ones), leaving in its stead a reddish spot wider than that which had been left by the star.

I then suggested that from now on we do away with the paper altogether. She asked me to be patient once more, saying, "Everything will go well." She suggested in turn that we begin by eliminating the contact between her hand and my paper; that I draw a picture, fold the paper, and, before leaving my room, put it away in my pocket; and, furthermore, that this time *I* do the skin-rubbing on any part of her forearm I should see fit. "I will limit myself," she added, "to holding your hand in mine." The proposal struck me as a fair one.

EXPERIMENT NO. 4

Inasmuch as the subject had suggested a picture, I deliberately picked the word *Meyerson* (the last name of the eminent philosopher whom I had visited in the morning of the same day). Hiding the folded paper in my pocket, I returned to the meeting room. In view of the fact that the spots left by the two previous images had invaded a large part of the right forearm, I reverted to the left one. Mme. Kahl told me at this point that the rubbing procedure need not be restricted to the forearms; that once production was well under way, the phenomenon might occur on any part of her body, particularly the chest; and that as soon as the arms became too con-

⁴ The inversion of images (like their fragmentation or formal dissociation) is, it will be recalled, a rather frequent characteristic of "visual" telepathic perception.

gested, she would gladly offer her chest for the subsequent experiments.

For about a minute I rubbed the entire surface of the forearm gently while at the same time I concentrated on the message. However, the seconds passed by and no dermographic outline made itself apparent. My incipient conviction began to falter. Could it be, I asked myself, that in the previous experiments I had been the victim of a neat trick? Finally, after almost two minutes of doubting expectancy, two ill-defined shapes appeared on the forearm. Mme. Kahl asked me to continue with the rubbing, for she was certain, she said, that the image would soon become clearer. I obeyed in a doubting mood, for I knew that the word I had written was composed of eight letters, whereas in the belated outline before me there was hardly raw material for more than two of them. After about ten more seconds the shapes became clearer and I saw two letters emerging, a capital *E* and a small *m*: *Em*. Mme. Kahl asked me whether I had written a name—perhaps *Émile*, *Emmanuel*? I removed the paper from my pocket and showed it to her. She agreed that the similarity was very doubtful but pointed out that the syllable on the skin was also found in the message, although inverted.

EXPERIMENT No. 5

The conditions here were the same as in No. 4. By a process of mental association I had the impulse of writing this time the last name of another French philosopher (*Bergson*) whom I was supposed to see next day. However, the fear that the same association might be formed in Mme. Kahl's mind made me discard the choice. I wrote instead his first name, *Henri*.

Mme. Kahl asked me whether I would like to try the chest now. I declined, declaring that I would prefer to reserve that place for the experiments without paper. I began to rub the same forearm (on which, by the way, the false syllable had disappeared as usual). She urged me to concentrate on the message, adding that in her opinion its appearance on her skin depended probably more on me than on herself. My reply was to make sure with my free hand that the paper had not been removed from my pocket. After about thirty seconds the entire space which I had been rubbing covered itself with lines under my perplexed observation. Little by little the lines organized themselves into a singularly vivid and intensely

red word in spite of the congestion left by the previous images. First there appeared a capital *H*, then a small *e*. I continued with the rubbing, expecting to see the *n* emerge, but to my surprise a small *r* appeared in its place, followed immediately by a small *i*. I assumed that the outline was completed, but the invisible dermatographer disconcerted me again. Near the *i* there appeared an ill-defined sign which could be taken for a small *e* or else for an inexact repetition of the final *i*. For almost an entire minute the image was perfectly visible—*Heri*. It lacked only the intervening *n* to reproduce the original in its entirety. The relationship between message and dermatographic outline was obvious and the experimental conditions under which the latter were obtained elicited a rather strong feeling in my mind that I was witnessing a most extraordinary form of human behavior—the skin perception of another person's mental experience via a channel extraneous to any of the known senses. However, my conviction was not absolute because my message had been written on a piece of paper, and although my reason refused to accept the possibility that somebody might have perceived it normally under my own coat, a scientific imperative forced me to accept this possibility tentatively until Mme. Kahl proved to me that she was also able to grasp telepathically and project on her skin an imaginary (that is, nonwritten or nondrawn) message.

Once more I requested of Mme. Kahl that we do away with my writing or drawing, assuring her that a positive result under such conditions would be the *coup de grâce* to my incredulity. Mme. Kahl's answer reawakened my doubts again. She begged me to believe her when she said that she was not ready as yet to do so; that she didn't know why but that was the way she felt about it; that she would like to make one more experiment with a written or drawn message, but that if the result was positive she thought that we could then do away with the paper altogether. With Job-like patience I returned to my room.

EXPERIMENT No. 6

The experiment I am about to describe was, it will be seen, the crucial one of the entire series, and in my opinion it gave retroactively a probatory value to the preceding ones. In spite of Mme. Kahl's desire I took it upon myself to do away *now* with the paper

(without letting her know, of course). I was going to utilize a so-called purely mental message. If she failed, I was going to put an end to our meeting. If she succeeded, I felt it would be an incontestable proof of her dermatographic ability. I chose the following sign: two vertical lines linked by a circle.

I returned into the presence of Mme. Kahl, not without fearing that she might "guess" my unconfessed decision. Fortunately that did not happen in spite of the fact that I asked her to let me use the upper part of her chest this time. I began the friction, concentrating at the same time on my mental image. I had the feeling that, if it came at all, the outline would take a long time to appear. To my amazement, I saw it emerge almost instantaneously in the center of the chest: a circle *traversed* by a straight line! "What do you see, Madame?" I asked her, fearing that I was the victim of a hallucination. "A little circle cut by a line," she answered. "Is that what you drew?" she asked me in turn. When I told her about my trick, she was overtaken by visible anger and annoyance. I was accused of taking advantage of her good faith, of upsetting her peace of mind, of insulting her, of lying, and what not. I tried to calm her down with words of apology and praise but they only seemed to increase her resentment. I did not regret having taken independent action, but how was I going to get back into her good graces? My desire to repeat the experiment under the same conditions was overpowering, and I decided to risk a heroic remedy.

EXPERIMENT No. 7

"Madame, how about trying the same trick together now?" I asked sheepishly. "Think of something!" she shot back at me. "Ready!" I replied. "All right," she said. "You may begin now the rubbing, but slowly and gently because my skin is now very sensitive." Hardly had I begun the operation when an intensely red form appeared on her chest as if it had been projected from the inside of her thorax by an invisible cinematographic machine. It was strikingly similar to the image I had constructed mentally, a rectangle with its diagonals. The outline lasted for about half a minute; then it faded away like the others, increasing the vasodilatation of the skin. "Is that what you were thinking?" she asked me. "Exactly, Mme. Kahl," I said. "You have defeated me fairly. I congratulate you."

Both the chest and the forearms of the subject were covered with congested spots which were threatening to invade the throat also. This brought back to my mind a description made by Osty in his report:

After a productive séance, the vasodilatation of the skin extends itself way beyond the places of inscription. The forearms become uniformly red, and also the chest if it has been used. Wide reddish discs also appear sometimes on the cheeks and the chin and may remain for as long as twenty-four hours. These aftermaths, together with the fatigue inherent in the production of this kind of phenomena, explain why, in spite of her desire to lend herself to study, Mme. Kahl betrays a reluctance to participate in this type of work.⁵

Mme. Kahl told me that sometimes she was forced to remain in seclusion for a day or two until her skin went back to normal, for the disappearance of the red spots was as independent of her will as their appearance was.

EXPERIMENT No. 8

As I was getting ready to take leave, Mme. Kahl suddenly told me to pick any small object from one of the tables. Not in the least suspecting what she had in mind, I cut a little flower from a large bouquet which was resting in a vase. She told me to hold it up between the electric light (night was approaching) and her forearm, so that its shadow would project itself on the skin. I obeyed, keeping the object at a distance of about thirty centimetres from the skin. After a few seconds, she told me to take it away. On the place previously occupied by the shadow there was now a dermographic outline (somewhat blurred by the vasodilatation produced by the preceding experiments, but sufficiently visible) reproducing three of the flower's petals. Apparently it was a case of cutaneous projection, by conscious autosuggestion, of an objective stimulus similar to those of the necklace and the fishbone described by Osty.

EXPERIMENT No. 9

"Pick another object," Mme. Kahl said, beating me to the thought. I chose one of several cups resting on one of the tables. The same operation was performed, but on the other forearm. After about twenty seconds I removed the object. However, contrary to

⁵ *Op. cit.*, p. 136.

expectation, no outline appeared on the shadowed spot. Mme. Kahl requested me to rub lightly to facilitate the performance, suggesting at the same time that the existing congestion might be blocking it. I obeyed, and almost instantaneously the shape of a cup outlined itself on her skin.

My conclusions are:

(1) Mme. Kahl possesses the power of perceiving extrasensorially an imaginary word or picture conceived by another individual.

(2) She possesses also the power of translating the perceived datum into dermatographic language by means of an unknown process of capillary vasomotility.

(3) The perception of the message is always subconscious in her. Rarely is the dermatographic inscription accompanied by mental or visual (hallucinatory) information. Mme. Kahl does not know what she has perceived until she has read it herself, like a mere spectator, on her own skin.⁶

(4) To get her two-fold faculty going, it is necessary for Mme. Kahl to place herself in a psychophysiological state which escapes her conscious control.

The phenomenon of skin telepathy (or of telepathic stigmata) raises a number of important questions for the neurologist and the parapsychologist. The following three appear to be of primary interest:

(1) Does this phenomenon suggest the existence of an as yet undiscovered central cerebral pathway of vasomotor innervation (for we know that the control of capillary circulation is sympathetic, not cortical)? If not,

(2) Does it suggest, on the other hand, the existence of something like a subcortical "intelligence"? And

(3) Does it, like the PK effect, recently reported in numerous articles in this *JOURNAL*, tend to bridge the gap between telepathic and telekinetic behavior?

⁶ The same observation was made by Osty: "More often than not, the inscription takes place without being preceded or accompanied by visual information." *Op. cit.*, p. 135.

THE PK EFFECT: EARLY SINGLES TESTS

By J. B. RHINE

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ABSTRACT: This paper reports the analysis of some tests in dice-throwing carried out very early in the development of the PK research. In different series, two and six dice were thrown at a time with the objective of volitionally influencing the dice to fall with a given face turned up. The experiments themselves were too early to have profited from the development of later methods and safeguards and their value in this report hinges rather on the analyses, carried out many years later, on the distribution of hits on the record page. It was discovered that, entirely unknown to the experimenter at the time, the hits on the record page showed a distinct pattern which conforms closely to the hit distribution pattern found to prevail in the records of other comparable PK experiments. The outstanding finding is that of the quarter distribution, or QD, of the record page. It was found that the first, or upper left, quarter of the record page showed by far the largest number of hits, and the lower right quarter the fewest. The two series covered by this report have closely comparable QD's. Moreover, the difference between the first and fourth quarters is independently significant. Nothing in the experimental conditions could have produced this unanticipated QD effect, neither the character of the dice, the manner of throwing them, nor even slight errors in recording. It is of interest to note, too, that the scoring as a whole significantly exceeded chance expectation and gave almost exactly the same rate when six dice were thrown at a time as when two were used. In addition to the QD's other position effects were obtained which agree with those discovered in other studies reported in these pages. As a result of the analysis for position effects this experiment was raised in the value of its contribution to a very high level.—Ed.

DURING the spring of 1934 Mr. Frank Smith¹ (hereinafter referred to as F.S.), who was then about to graduate from Duke University, became familiar with the PK tests which were being conducted at Duke at that time. He was a subject in some of these tests and after a time expressed an interest in conducting experiments of his own. Some plans were drawn up for the investigation of the PK hypothesis, and from the fall of 1934 until October, 1935, F.S. continued with these experiments, working at them from time to time as opportunity occurred. The work was begun at Duke University and continued at New Haven when, in the course of the school year, F.S. went to Yale University to attend the School of Forestry.

¹ Now Lieutenant Smith, U.S.N.R.

This work, like most of the researches that were conducted on the PK problem at so early a date, is definitely of pioneer character. There were at the time no thoroughly established routines, no carefully worked out canons of experimental design for the PK research. A number of the points of technical nicety which have come into practice since that time were not then ready for consideration. The exploratory trend of that early stage of inquiry was to branch out, to vary the experiments, to get as many people as possible to repeat them, and then to watch the progressive accumulation of data for indications of the proper step to take next.

There would indeed be little point in making a report of these experiments if the results could be explained by faulty dice, skilled throwing, or other loose experimental conditions. Actually, the more adequate controls on these issues lie, not in the experimental design but rather in the subsequent analyses of the data conducted long after the experiments themselves. The analyses to be reported below have revealed significant differences in the patterning of hits, and these significant differences afford excellent controls. Therefore, in this research as in others of that early period, the analyses which were made with other purposes in mind have enabled us to salvage the experimental results from the discard.

In 1942 certain position effects were discovered in the records of some of the PK researches as they were being rechecked and prepared for publication. For example, the scoring rate was found to decline with progress of the PK test through the record page. Accordingly, it was decided to apply the analyses for such effects to all the available research data *regardless of the precautionary conditions under which they were obtained*. The reasoning is simple: If, many years after the experiments have been conducted, the results are subjected to an analysis for position effects such as could not have been anticipated at the time of the experiment, the question of the adequacy of the experimental precautions becomes irrelevant. If, in the analysis, position patterning is found that is not ascribable to chance, it does not matter, for example, whether or not the dice were thrown from a cup or by hand; nor, in fact, whether the dice themselves were perfect or imperfect. Presumably, no kind of irregularity of the dice would vary so as to give peculiar distributions of success in the run or in the sequence of runs on the page. Therefore,

under the direction of Miss Betty M. Humphrey of this laboratory, F.S.'s complete records were studied for position effects. These analyses and their findings represent a substantial part of the present report.

The principal departure in F.S.'s experiment from the previous work lies in the throwing of the dice for a single target face instead of for combinations of faces. At the time F.S. began in September, 1934, all the earlier investigations had been carried out with high dice, low dice, sevens, and doubles as targets. But in this work by F.S. the dice were thrown for a single face, mainly the six-face. The objective was to influence the dice so as to make them fall with the specified face turned up. There was some hope that with this simpler objective of a single target face, more striking results would be obtained. Certainly by analogy with more familiar processes, the mere task of keeping a single specified target face in mind should be easier than concentrating on a combination of faces, whether it be doubles, sevens, high dice, or low dice; and the physical task of controlling a single die would logically be expected to be less difficult than dealing with a greater number.

PROCEDURES AND CONDITIONS

The experimental work reported here was all carried out by F.S. He kept careful and complete records of all tests conducted and turned them over to J.B.R. at the end of each series.

The work was divided into two series. Series I began on September 7, 1934, and ended on December 10; Series II was begun on February 2, 1935, and ended on October 6. While no definite limits to the experiment were drawn at the outset, no question arises on which the actual number of runs has any important bearing. In any case, F.S. was quite unaware of the significance of the results when he terminated the experiment. His expressed objective, in addition to his desire to test the PK hypothesis, was to discover some of the conditions affecting his success in the tests. For the most part, therefore, he was his own subject; that is, he threw the dice and made the readings and records himself. In the first series, however, an additional subject contributed about one-sixth of the experimental work done.

In Series I there were three pairs of dice used, and in Series II there were four groups of six dice each. In both series the pairs or

F. SMITH									
"62"									
OCT. 14, 1934									
7:35 P.M.									
SESSION 8									
6-6	5-1	6-5	6-2	2-1	1-1	6-5	4-1	6-3	3-1
6-5	6-3	1-1	4-2	4-1	5-5	4-3	4-1	5-1	4-3
6-1	6-6	4-4	6-4	4-3	2-1	2-1	2-1	5-4	4-2
6-3	2-1	6-4	6-5	5-2	6-4	4-3	3-2	6-1	6-2
3-3	4-2	6-2	5-4	3-3	5-3	2-1	4-3	5-3	6-3
5-2	5-4	6-1	4-2	6-3	6-5	3-1	6-1	6-3	5-2
5-4	4-1	5-1	6-3	5-1	6-4	2-1	4-3	5-4	6-2
6-4	6-2	6-3	5-3	4-2	5-4	6-1	3-2	6-3	5-1
2-1	4-2	4-1	6-3	6-4	3-2	4-3	6-3	2-1	4-4
6-2	2-1	3-2	1-1	4-3	6-3	6-5	1-1	5-4	6-4
3-1	5-1	4-2	5-4	3-2	5-3	3-2	5-3	3-1	6-4
6-3	6-6	5-2	4-1	5-5	5-4	6-4	6-6	6-2	4-3
8	6	5	5	2	4	4	4	5	5

F. SMITH									
"63"									
SESSION 8 cont.									
2-1	6-6	6-1	3-3	6-1	3-2	3-2	5-3	5-4	6-3
6-5	6-2	4-1	5-5	4-1	5-1	6-2	4-1	5-4	6-1
6-2	5-4	4-2	6-2	6-2	6-1	6-4	3-1	4-3	6-5
2-1	2-1	6-1	5-4	5-4	6-2	6-1	3-3	5-5	6-4
6-6	5-3	6-4	6-4	5-2	6-4	6-5	6-2	5-5	5-1
2-1	2-1	5-1	6-1	4-2	5-1	2-2	4-1	3-1	4-2
6-2	3-1	6-5	6-4	4-1	6-3	4-1	3-3	5-4	5-5
5-1	6-1	5-3	4-3	6-1	6-1	6-2	5-4	6-3	4-1
5-4	6-5	6-5	4-3	2-1	4-1	6-3	4-3	6-5	4-1
6-1	6-6	5-5	5-1	4-2	3-2	6-4	5-4	5-4	3-1
6-4	4-2	2-1	2-1	3-2	6-6	3-2	4-4	5-1	4-1
6-2	1-1	5-3	6-5	1-1	3-2	1-1	6-6	6-2	5-4
8	7	5	5	3	7	7	3	3	4

Series I

Series II

Feb. 17									
"6"									
SESSION 2									
6 dice per throw									
10-11:20 A.M.									
6-3	4-2	4-2	6-3	5-4	6-4	5-3	4-2		
6-2	4-1	5-3	6-5	6-5	4-3	6-2	5-1		
5-1	5-4	3-2	4-2	6-3	4-4	3-2	3-1		
6-5	4-3	6-6	6-4	6-4	4-3	6-1	5-1		
5-2	2-1	6-5	6-4	2-1	6-3	6-6	4-2		
3-2	3-1	6-4	6-5	3-3	6-1	6-2	1-1		
6-3	6-1	3-1	6-1	6-3	6-1	3-4	6-1		
5-1	6-3	4-3	4-1	6-5	5-1	6-2	4-2		
5-2	5-5	5-5	4-1	5-4	4-4	5-1	5-3		
1-1	6-3	5-4	6-4	2-1	6-5	6-3	2-1		
6-3	4-3	5-1	6-4	3-1	4-1	6-1	4-2		
5-2	5-4	5-2	6-5	3-3	1-1	5-3	5-5		
5	3	4	9	5	5	9	1		

FIG. 1.—Illustrations of the record sheets used in Series I and II.

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groups of dice differed from each other in size or color or both. The comparison of the effect of size, however, was an incidental feature of the experiment. The dice were all of the common commercial variety, made of plastic material, and there was no attempt made to run a control series with a view to checking on them. The only effort made at controlling the throwing so as to avoid any undue exercise of skill in the manipulation of the dice was that they were always shaken in cupped hands before they were thrown and were bounced against a backwall as a matter of routine.

The chief difference between the two series lies in the fact that Series I was conducted with the throwing of two dice at a time, whereas in Series II there were six, the six dice being entered on the record sheet as three pairs. (This recording created no problem since a single die face was target.)

F.S. did his recording in columns of 12 double entries each, such an entry representing the reading of a pair of dice. Series I was recorded on letter size paper whose blank pages had been marked off by the experimenter, whereas Series II was recorded in a bound composition book with ruled pages. In Series I, the record page was so divided that each column had four segments of three double entries each. The book of the second series was not so segmented and this point is regarded as of some importance. The marking-off was done simply as a convenience, since in the first series the pages were not ruled and some such segmentation was needed to make the recording easy. In the second series the composition book was ruled and this segmentation was not needed. (See Fig. 1 for the two types of pages.)

RESULTS

The Case Against Chance

In the two series pooled there were, altogether, 629 runs, each run consisting of 12 throws of a pair of dice, or 24 single die-throws. (The results are given in Table 1, which, like all the tables for this report, can be found at the end of the paper.) The total of 2,717 hits, representing an average of 4.32 hits per run, gives 201 hits above expectation. The SD is ± 45.77 , and the CR is 4.39, which is, of course, quite significant. For that matter, each series taken alone is significant, the first giving a CR of 3.56 and the second, 2.56. The case against the chance hypothesis is therefore doubly decisive.

It is interesting to observe how closely the average scores for the two series approximate each other: 4.33 and 4.31. This is especially noteworthy in the light of the one important difference in experimental conditions that prevails between the two series; namely, the difference in the numbers of dice per throw. In Series I two dice were thrown at a time, while in Series II there were six.

Other Counterhypotheses and the Decline Effect

Such significant results as these, however, could conceivably be produced by distortion of the dice or by skilled manipulation in throwing them. That such is not the case is brought out by the analyses for position effects which have already become familiar through their frequent repetition in the preceding PK reports.

In one analysis for position effects, the record page is divided into four parts in order to determine the number of hits in each quarter. In the case of Series I of F.S.'s experiment, however, the pages are really double, there being a complete full page unit in each half, upper and lower; accordingly, the half page, instead of the full record sheet, is subdivided into quarters. In other words, each half-sheet in Series I is equivalent to a full page in Series II and will hereafter be called a page.

All pages were included in the quarter distribution (QD) analysis that were homogeneous as to target face, the type of dice used, the subject, and the time of the session. Unless there was a change in these aspects, the page was divided evenly into four quarters and the hits were counted. If the number of runs was odd, the middle run was omitted. If there was a break in the homogeneity of the page, the sampling ruling (which had been laid down at the start) required that the beginning of the page be included as far as the runs were homogeneous. Otherwise, since it was possible that the break might have been due to poor initial scoring, improper selection of results could occur. This procedure is standard for the QD analysis. The aim was to provide a strictly comparable basis throughout the page areas (quarters) examined, both as to statistical and psychological viewpoints. The results, given as they are in terms of deviation of the average run score for each quarter, are comparable even though the total trials are unequal for the quarters. A graphical comparison is shown in Figure 2 giving the QD for the

two series separately and pooled. The data on which the graphs are based are given in Table 2 at the end of the paper.

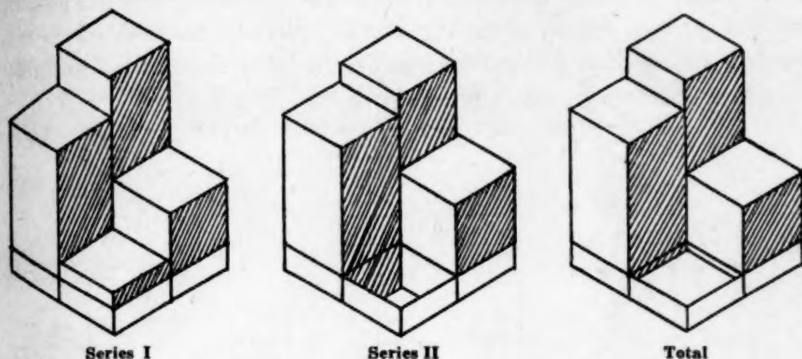


FIG. 2.—Quarter distribution of hits on the record page.

It will be seen that in all three QD's there is not only a general horizontal decline but also a vertical one and, as a consequence, a strongly marked diagonal decline from the first quarter to the fourth. This, as has been indicated in a number of earlier reports, is the most typical QD effect, with the first quarter highest and the fourth lowest in average score deviation. The two F.S. series show what seems to be a remarkable degree of similarity. And when the two QD's are combined by pooling, there is a significant CR of the difference of 2.63 between the first and fourth quarters.²

The fact that the analysis for position effects gives significant results is adequate ground for rejecting the counterhypotheses of imperfect dice and skilled throwing. The experiment thus affords material for further consideration.

Further Position Effects

Three-Run Sequence. There are other position effects which, like the QD's already described, have an importance entirely aside from their bearing on the counterhypotheses, for they afford new evidence of how the PK process operates and they broaden the basis of relevant fact. One of these position effects was found in the comparison of the average scores for the first three runs on the page

² This evaluation is further confirmed statistically by the arc sine method suggested for application here by Lt. Greenwood (2). By this method the difference has a CR of 2.53.

for the two series separately and for the two together. (See Fig. 3 and Table 3.) In Series I there is a marked decline over the first three runs; in Series II, a sharp decline from the first to the second with a partial recovery on the third. When the two series are pooled, the decline is based on a larger block of data and is probably more representative. At any rate, it is more regular.

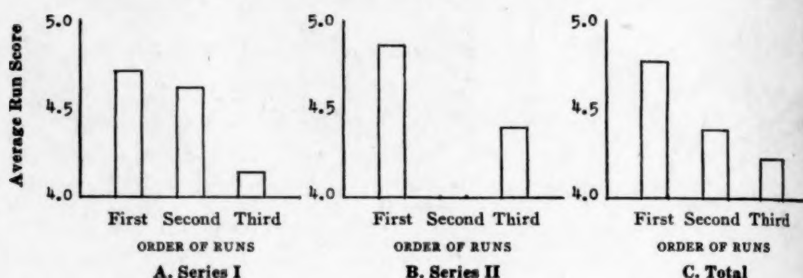


FIG. 3.—Deviations of average scores for the first three runs on the record page.

From the three-run declines reported in the first PK paper (7), in that by Reeves and Rhine (6), and that by Hilton and Rhine (4), such a decline would be expected. In the Humphrey and Rhine analysis of the large Gibson series (5) a horizontal decline was found both in the set and on the page, and the McDougall One-Die Series (8) showed a big decline from the first to the second run on the page (in spite of an *incline* across the page). Even the Gibson and Rhine report (1) showed a comparable horizontal decline from left to right half of the page, which was as close a comparison as the structure of the record page would allow. The Hilton, Baer, and Rhine (3) report remains the one exception.

Double Decline. One of the most interesting decline effects that have been encountered is that of the so-called "double decline" in the vertical distribution of hits in the column. This decline has been found in a number of the earlier investigations, particularly in the two Hilton researches and in the data comprising the earliest PK report.³ In all cases where it was found, it was in series in which there was also segmentation of the runs, made by lines drawn at short intervals on the record page so as to break the record column

³ It was discovered, however, after the first PK report was published, and was mentioned in a footnote in the Hilton, Baer, and Rhine paper.

into four segments of three entries each. We have mentioned that F.S. segmented the records in his first series but not in the second, where he used a lined notebook. As will be seen in Fig. 4, Series I, like earlier "segmented" series mentioned, shows a very marked double decline; that is, a decline in the upper half of the column and a recovery and decline in the lower half. (See also Table 4.) There is only a slight reflection of this effect in Series II.⁴

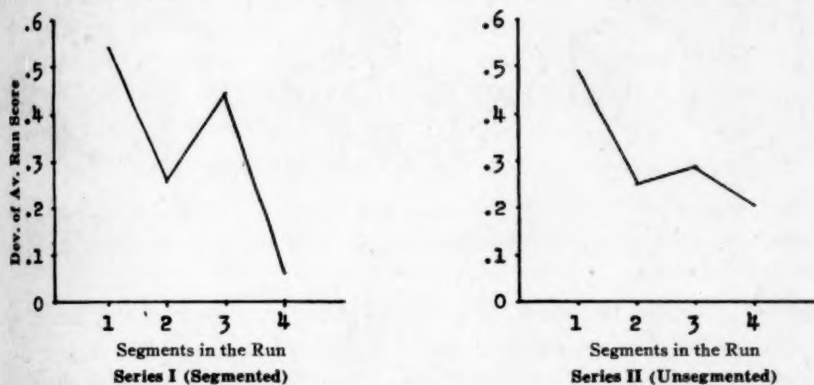


FIG. 4.—Deviations of average run scores by segments in the vertical distribution.

The double decline suggests, of course, the propriety of checking up on the "double quarter distribution"; for if there is a *double decline* in the column, the half-page should be the unit for quartering instead of the page. (This has already been done in the Hilton, Baer, and Rhine and the Hilton and Rhine researches, both of which were recorded in segmented columns. As a result of the analysis for a double QD, patterns have been obtained which are much more typical than those for the whole page.) The first series of the present report has therefore been checked separately for the QD of the upper and lower halves of the page. (See Table 5.) These QD's are graphically presented in Figure 5 together with the combination of the two. The data included are solely the work of F.S. Sixty runs by another subject were not included here; they did not

⁴ Incidentally, the run in Series II may have been segmented by the technique of throwing. Since there were six dice thrown at a time, making three successive entries per throw, the effect was to divide the column into four segments as the lines in Series I had done. It is not unlikely that the degree of double decline shown may be the result of this bunching of the entries into segments, but this is only a suggestion.

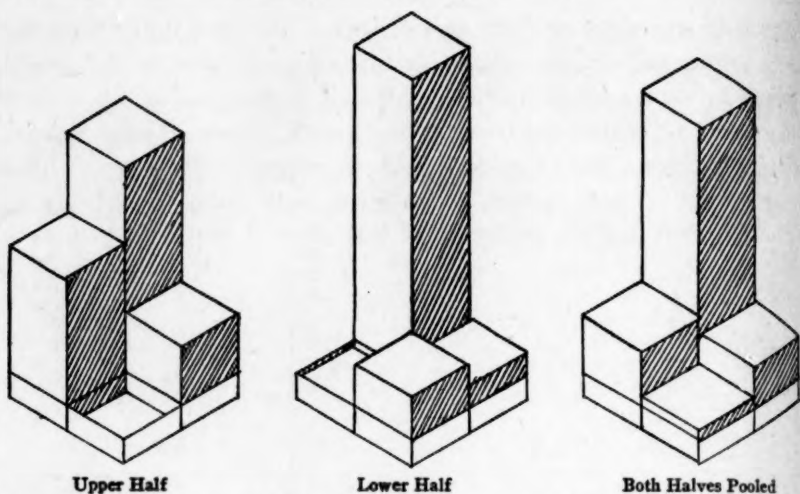


FIG. 5.—Double quarter distribution of hits on upper and lower halves of the page in Series I.

show a double decline.⁵ For the present purpose this exclusion is permissible, for in this instance the general issue of PK is not involved. The aim is to discover whether the double quarter decline is like the typical page QD, and it very obviously is. (Compare the third QD in Fig. 5 with the first QD in Fig. 2.) The double quarter decline is even more typical, at least as judged by the significant CR of the difference (2.80) between the first and fourth quarters in the pooled section. This extension of the position effect into subdivisions of the page is further evidence of lawfulness in the PK data.

Chronological Distribution. For the sake of having a record of the various types of scoring effects in the series, we are including in Table 6 the results of still another analysis; namely, a chronological distribution of hits. The results are shown in the form of average scores for the subject for the temporal subdivisions of the series. These subdivisions are formed by dividing the whole series chronologically into thirds as nearly as is possible without breaking into a session. Series I apparently started off low and improved

⁵ In the two Hilton series also, it was only Hilton himself who showed the double decline. It is interesting to reflect that the one responsible for the particular record page structure may be the only one affected by it in the way indicated by the double decline. Other subjects may of course be relatively unaware of the lines and may "structure" the column as a whole instead of by segments.

during the second section, with a slight decline toward the end. Series II started off high and dropped considerably in the second period, with a slight rise toward the end. When pooled, they show an approximately even distribution in time.

DISCUSSION

The results of the F.S. experiments and the analyses of the data of this report leave no doubt of the presence of some effective principle other than chance. The results obtained are not attributable to accidental factors, and we have been unable to find a reasonable hypothesis, aside from that of PK, to supply the causal explanation required.

There is no physical defect of the dice that could conceivably have caused the position effects that were obtained by the QD analyses of the records as presented in Table 2. The hit distributions were found to be so patterned that neither faulty dice nor tricks nor skills in throwing would seem to explain them. We cannot easily suppose that recording errors occurred in sufficient number and in such a way as to produce the extrachance scores and the patterning of the QD's. The equally improbable hypothesis that loss of records or selection of data might have produced the significant CR's is met by the same type of evidence. Selection of data for significant CR's would not, as such, produce typical decline effects like those found in the analyses. Beyond this, all that can be said is that the records are available to fellow-students for rechecking and study from the various possible critical viewpoints that remain. Our own assurance in the matter is based upon the fact that the results have been completely rechecked and that the methods of analysis constitute a continuous check against possible errors.

It seems logical, therefore, to conclude that the F.S. experiments represent evidence of the PK effect, evidence which, at least with our present knowledge, we can explain in no other way. And once again we repeat that this is but one of a long sequence of confirmatory researches helping in the establishment of the PK hypothesis.

There is also the remarkable recurrence of position effects. The continuous appearance of the QD and other patterns does more to lend a systematic and lawful aspect to the work than any number of mere independent and isolated confirmations. We proceed, then,

to the discussion of other findings with confidence that we are dealing here with a genuine example of the PK effect.

Number of Dice per Throw

One of the most interesting comparisons to be made in dealing with results of the F.S. experiments is that concerned with the number of dice thrown at a time. In Series I there were two dice per throw, and in Series II there were six. Yet Table 1 reveals that there is a difference of only .02 between the average scores of the two series. Whatever it was that worked its effect upon the fall of the dice and so influenced them that significantly high scores were obtained in both series, it did not seem to matter whether the force was exerted upon two dice or upon six. Neither one of these results is reasonably attributable to chance and their close similarity is an impressive datum. It is not the first instance of this kind that we have encountered in these experiments. An approximately similar result was reported by Gibson and Rhine (1), and the comparisons of 6, 12, and 24 dice per throw in the Frick series (10) gave results which are in line. Other comparisons of numbers of dice per throw have appeared in print, and the evidence is increasingly strong that within the limits tested the number per throw does not show any effect on the scoring.

Now if any directed *physical* force is exerted upon a moving body so as slightly to influence its course of action, and the weakness of the force is the limiting factor, the multiplication of the number of the bodies to be influenced lowers the average effect per body if nothing else is varied. If physical principles govern the effect, we should expect a decline of *rate* of success in the PK tests when we increase the number of dice per throw. Therefore the results suggest that nonphysical principles are in effect here.

Comparison of Dice of Different Sizes

In the first series⁶ a short section was devoted to a comparison of the scores with three sizes of dice, which we shall designate *large*, *medium*, and *small* and which measured $\frac{3}{4}$, $\frac{1}{2}$, and $\frac{3}{8}$ in. respectively. The dice were essentially similar in other respects. The results are not conclusive, mainly because the numbers of runs for

⁶ In Series II the number of runs offering a comparison of the different sizes of dice was too small to justify consideration here.

the different sizes were too disparate. (For what they are worth, however, the data are presented in Table 7.) The smallest size gave the highest average, but the number of runs was relatively small. The next highest score average was from the large dice, though it was little better than the average for the medium.

Comments on the Position Effects

Since the pattern of hit distributions on the record page, found in F.S.'s experimental data, represents only a small section of the total accumulation of such effects, it would be out of place to attempt to present here a full discussion of what the findings might signify. This has already been done in an earlier report (9) based on a comprehensive survey of all available data. Consequently, only a few remarks concerning salient points are required to suggest what is of special importance in the particular work of this paper.

According to our present viewpoint, the feature that is most worthy of explanation in the F.S. decline effect is the close similarity between the QD's of Series I and II. What makes for such close similarity? Doubtless the fact that the same subject did most of the work is quite important. This was the case in other instances in which such similarities have been found. For example, it was so in the Reeves series which showed a striking likeness between the high dice and low dice though the report was issued before the QD's were determined. The similarity of the double QD's in Hilton's work for the two series bearing his name (3, 4) is another comparable case of the persistence of the QD pattern in the work of the same subject over a considerable length of time and number of runs. Somewhat similar patterns were shown, too, in the work of Gibson's main subject and by Frick in his two sixty-dice series, but none of these comparisons is more striking than the similarity represented in F.S.'s two series. All these comparisons are graphically illustrated in the general paper on the QD of the page already mentioned.

These facts suggest that the position effect has a foundation in the personal trait-system of the individual. Such individual patterns as F.S.'s double QD, like Hilton's, are particularly indicative of peculiar orientation in the individual to the page structure. If we can find a clear-cut relation between any such recurrent patterning and the reaction of the personality of the subject to a given test

situation, it should introduce a new stage of understanding into the PK investigation. We must not look, of course, for an *individual* trait associated with the position effects since their occurrence has been so widespread. In the McDougall One-Die Series closely similar QD's were given by several different subjects working together as a group, and yet producing a peculiar type of QD pattern. It will remain for future research to discover how general are the conditions which produce such effects in the PK tests and in other psychological data.

CONCLUDING REMARKS

In the two series of PK experiments conducted by F.S., the results are extrachance in character. Each series is independently significant and together they give a CR of 4.39.

It is in the analyses of the QD's of the page, however, that we find the most far-reaching evidence bearing upon the PK hypothesis, for the diagonal decline given in this QD is so marked that the difference between the first and fourth quarters is significant. The two methods of evaluating it give 2.63 and 2.53. Chance is ruled out, and this QD evidence is equally effective in excluding the possibility that faulty dice, recording errors, skill in throwing, loss of records, or the like can account for the results. The conclusion reached is that the F.S. experiments confirm the numerous earlier reports favoring the PK hypothesis.

The outstanding comparison of conditions involved in these two series is that of the number of dice per throw. In the first series, two dice were thrown at a time and in the second, six. Yet both averaged approximately the same, which adds to the cumulative evidence that number of dice per throw is not determinative of success in PK tests.

Table I
TOTAL RESULTS OF BOTH SERIES

	Runs	Average Score	Total Hits	Deviation	SD	CR
Series I . .	399	4.33	1,726	+130	±36.47	3.56
Series II . .	230	4.31	991	+ 71	±27.69	2.56
Total . . .	629*	4.32	2,717	+201	±45.77	4.39

*All but 97 runs were for the six-face as target. These 97 were for the one-, two-, and four-faces and averaged 4.28 hits per run.

Table 2

QUARTER DISTRIBUTION OF HITS ON THE RECORD PAGE IN TERMS OF DEVIATIONS OF AVERAGE SCORES

Series I 368 runs	Series II 203 runs	Series I and II Pooled 571 runs												
<table border="1"> <tr><td>+ .58</td><td>+ .22</td></tr> <tr><td>+ .45</td><td>+ .05</td></tr> </table>	+ .58	+ .22	+ .45	+ .05	<table border="1"> <tr><td>+ .50</td><td>+ .26</td></tr> <tr><td>+ .44</td><td>- .16</td></tr> </table>	+ .50	+ .26	+ .44	- .16	<table border="1"> <tr><td>+ .55</td><td>+ .23</td></tr> <tr><td>+ .45</td><td>- .02</td></tr> </table>	+ .55	+ .23	+ .45	- .02
+ .58	+ .22													
+ .45	+ .05													
+ .50	+ .26													
+ .44	- .16													
+ .55	+ .23													
+ .45	- .02													
$CR_{d(1-4)}=1.97$	$CR_{d(1-4)}=1.78$	$CR_{d(1-4)}=2.63$												

Table 3

AVERAGE SCORES FOR THE FIRST THREE RUNS ON THE RECORD PAGE

Order of Run	Series I		Series II		Series I and II Pooled	
	Number of Runs	Average Score	Number of Runs	Average Score	Number of Runs	Average Score
1st.....	51	4.71	35	4.86	86	4.77
2nd.....	51	4.63	35	4.00	86	4.37
3rd.....	51	4.14	30	4.40	81	4.23

Table 4

DEVIATIONS BY SEGMENTS IN VERTICAL DISTRIBUTION

Segment	Series I Segmented Page	Series II Unsegmented Page
	Deviation	Deviation
1.....	+54	+28
2.....	+26	+15
3.....	+44	+16
4.....	+ 6	+12
	1+3:2+4=98:32	1+3:2+4=44:27

Table 5

DOUBLE QUARTER DISTRIBUTION IN SERIES I IN TERMS OF DEVIATIONS OF AVERAGE SCORES

Top Half 154 runs	Bottom Half 154 runs	Both Halves Pooled 308 runs												
<table style="width: 100%; text-align: center;"> <tr><td style="padding: 2px 10px;">+.71</td><td style="padding: 2px 10px;">+.19</td></tr> <tr><td style="padding: 2px 10px;">+.44</td><td style="padding: 2px 10px;">-.06</td></tr> </table>	+.71	+.19	+.44	-.06	<table style="width: 100%; text-align: center;"> <tr><td style="padding: 2px 10px;">+1.02</td><td style="padding: 2px 10px;">+.08</td></tr> <tr><td style="padding: 2px 10px;">-.02</td><td style="padding: 2px 10px;">+.14</td></tr> </table>	+1.02	+.08	-.02	+.14	<table style="width: 100%; text-align: center;"> <tr><td style="padding: 2px 10px;">+.87</td><td style="padding: 2px 10px;">+.14</td></tr> <tr><td style="padding: 2px 10px;">+.21</td><td style="padding: 2px 10px;">+.04</td></tr> </table>	+.87	+.14	+.21	+.04
+.71	+.19													
+.44	-.06													
+1.02	+.08													
-.02	+.14													
+.87	+.14													
+.21	+.04													

CR_d(1-4)=2.80

Table 6

CHRONOLOGICAL DISTRIBUTION OF SUCCESS

Temporal Period	Series I			Series II			Total		
	Runs	Deviation	Av. Score	Runs	Deviation	Av. Score	Runs	Deviation	Av. Score
1.....	143	+37	4.26	71	+29	4.41	214	+66	4.31
2.....	100	+37	4.37	74	+17	4.23	174	+54	4.31
3.....	96	+34	4.35	85	+25	4.29	181	+59	4.33

Table 7

COMPARISON OF THREE SIZES OF DICE IN SERIES I

Dice	Number of Runs	Deviation	Average Score
Large.....	30	+13	4.43
Medium.....	93	+37	4.40
Small.....	13	+12	4.92

REFERENCES

1. GIBSON, EDMOND P., and RHINE, J. B. The PK effect: III. Some introductory series. *J. Parapsychol.*, 1943, 7, 118-34.
2. GREENWOOD, J. A. On the evaluation of differences of success ratios from binomial populations. *J. Parapsychol.*, 1943, 7, 277-80.
3. HILTON, JR., HOMER; BAER, GEORGE; and RHINE, J. B. A comparison of three sizes of dice in PK tests. *J. Parapsychol.*, 1943, 7, 172-90.
4. HILTON, JR., HOMER, and RHINE, J. B. A second comparison of three sizes of dice in PK tests. *J. Parapsychol.*, 1943, 7, 191-206.
5. HUMPHREY, BETTY M., and RHINE, J. B. Position effects in the large Gibson series. *J. Parapsychol.*, 1943, 7, 238-51.
6. REEVES, MARGARET P., and RHINE, J. B. The PK effect: II. A study in declines. *J. Parapsychol.*, 1943, 7, 76-95.
7. RHINE, LOUISA E., and RHINE, J. B. The psychokinetic effect: I. The first experiment. *J. Parapsychol.*, 1943, 7, 20-43.
8. RHINE, J. B., and HUMPHREY, BETTY M. The PK effect: the McDougall One-Die Series. *J. Parapsychol.*, 1943, 7, 252-63.
9. ———. The PK effect: special evidence from hit patterns. I. Quarter distributions of the page. *J. Parapsychol.*, 1944, 8, 18-60.
10. ———. PK tests with six, twelve, and twenty-four dice per throw. *J. Parapsychol.*, 1944, 8, 139-57.

MINOR ARTICLES AND NOTES

PK TESTS OF A LARGE POPULATION

By CARROLL BLUE NASH
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ABSTRACT: The use of dice-throwing as a test for psychokinesis was devised independently by Dr. Nash six years after it was first put into use at Duke University, and was employed in this experiment without knowledge of its prior use. The experiment is unique in that it deals with a large population, there being 113 subjects. Partly because of the very small number of runs per subject, the results are merely suggestive, but they offer some interesting points which are in accord with the previously established characteristics of psychokinesis. For example, the use of six dice per roll gave larger score averages than one die per roll, the latter resulting in a negative deviation. Although there was an interval of one month between the two sections of the experiment, a chronological decline in score average occurred. The distribution of hits in the short runs of the one-die throwing showed terminal salience, the standing-out of the ends in scoring rate.

Dr. Nash is Assistant Professor of Biology at American University, Washington, D. C.—Ed.

THE EXPERIMENT was conducted in November and December of 1940 to test the efficacy of dice-throwing as a method of demonstrating telekinesis. The author was unaware of similar experiments, which had been conducted at Duke University as early as 1934, until their publication which began in 1943; and, hence, the corresponding method herein reported was independently derived.¹ The reader's judgment of the adequacy of the experimental evidence of dice-throwing as proof of the psychokinetic hypothesis can be better based on publications that have previously appeared in this

¹ Just prior to the beginning of this experiment I corresponded with Dr. J. B. Rhine and proposed the use of dice-throwing as a test of the hypothesis that the mind can affect matter. Dr. Rhine wisely withheld any mention of the work with dice at Duke to allow my suggestions to develop independently. But he encouraged me to proceed and made a number of suggestions, such as the use of a special dice cup, an equal number of throws for each face of the die, and the use of a large number of subjects. However, except for the adoption of these suggestions, the experiment was carried out according to my own design.

JOURNAL; however, the results of this experiment have bearing on the hypothesis of the existence of human ability to exert a motor control over matter without the use of any known means of contact. In particular, the results disclose some of the characteristics of psychokinesis as expressed by a random sample of over one hundred individuals.

The subjects, students at the University of Arizona, were engaged through no volition of their own, but because they were students in a course in general zoology under the instruction of the author. They were asked to attempt to roll specified faces of the dice uppermost and were not otherwise informed as to the object of the experiment. Throughout the experiment the dice were thrown from a quart-sized cylindrical container lined with corrugated rubber strips. Each die was approximately $7/16$ of an inch in diameter and $1\ 1/2$ grams in weight.

The 113 subjects were divided into two groups, one of 49 subjects and one of 64. Each subject participated in two sets which were about one month apart. In a set the subject rolled six "runs," each run² consisting of six rolls of one die or one roll of six dice, making a total of 36 die-throws per subject. For each of the six runs, one of the six faces of the die was specified, the number of the designated face corresponding in every case with the chronological number of the run in the set. Thus the one-face was called for on the subject's first run, the two-face on the second run, and so on through the sixth and last run of the set, for which the six-face of the die was specified.

In his first set, each of the 49 subjects rolled one die at a time so that a run consisted of six rolls of one die. In the second set, these 49 subjects each rolled six dice at a time so that the run consisted of one roll of six dice. Each of the remaining 64 subjects, in both of his sets, rolled six dice at a time, the procedure used in the second set of the aforementioned 49-Subject Group.

As is shown in Table 1, the average set score of the One-Die Series, which consists of the first set of the 49-Subject Group, is 5.69. This score is considerably below the chance expectancy value of 6 and suggests a negative attitude on the part of the subjects. This may have been due to the sluggishness of the procedure involved

²This use of the word "run" is not the same as that given in the Glossary.—Ed.

Table 1

AVERAGE SET SCORES BY GROUPS AND SERIES

		Dice per Roll	Sets	Devi- ation	Average Set Score	CR	CR _d
49-Subject Group	1st Set	1	49	-15	5.69	0.96	1.08
	2nd Set	6	49	+ 9	6.18	0.58	
64-Subject Group	1st Set	6	64	+30	6.47	1.68	0.60
	2nd Set	6	64	+15	6.23	0.84	
One-Die Series		1	49	-15	5.69	0.96	1.67
Six-Dice Series		6	177	+54	6.31	1.82	

with one die and to a lack of confidence which might result from the infrequency of the appearance of the target face when only one die was rolled at a time. While the previously reported work on psychokinesis contains only one record of a negative deviation with one die (4), this and other reports (5, 8) show a lower score with one die than with two dice per roll.

As shown in Table 1, the average set score of the Six-Dice Series, which is composed of the second set of the 49-Subject Group and the two sets of the 64-Subject Group, is 6.31 with a positive deviation of 54. On the basis of the previously mentioned higher scores obtained with two dice per roll than with one die and the higher score obtained with six dice per roll than with two dice (3), it would be expected that six dice per roll would afford a higher score than one die. The scores of the One-Die and Six-Dice Series of this experiment are in conformity with this deduction.

When the 49-Subject Group was changed to six dice per roll on their second set, their average set score rose from 5.69 to 6.18 (Table 1). The average set score of those subjects rolling six dice on both sets (that is, the 64-Subject Group) dropped from 6.47 to 6.23 on their second set. If a similar decline between sets was active in the conversion of the 49 subjects from one die to six dice, the rise in their score was made against its opposing action and would otherwise have been even higher. That the decline was active in the 49-Subject Group is suggested by the fact that the average score of

6.18 for their second set, although above the chance expectancy value, is lower than the average score of either set of the 64-Subject Group (Table 1). Similar chronological declines have been previously reported (2, 6, 7, 9, 10). In this instance the decline between the two sets occurred in spite of the interval of one month between them, which might otherwise be presumed to be of sufficient length to permit complete recovery.

A negative correlation exists between the scores of the two sets in the case of the individuals in the 49-Subject Group, those who changed from one die to six dice per roll on their second set. The coefficient of correlation is $-.183$ with a probability of $.10$. The negative correlation suggests that the greater the extent to which psychokinesis is expressed by the individual in producing a negative score under unfavorable conditions (one die per roll), the greater is the extent to which it is expressed by the same individual in producing a positive score under favorable conditions (six dice per roll). Similar results were reported with a single individual (3) who produced a significant negative deviation under unfavorable conditions of darkness and a significant positive deviation under ordinary conditions of light.

In the 64-Subject Group, those subjects throwing six dice per roll on both sets, the correlation coefficient between the scores of the two sets of the individual is $+.197$, with a probability of $.07$. The positive correlation suggests that the degree of psychokinetic expression by the individuals of this group tended to be maintained. Of the 31 individuals in this group who obtained more than six hits in their first set, 19 also acquired more than six hits in their second set, while 10 fell below the chance expectancy value in their second set.

While previously reported work has almost consistently demonstrated the existence of individual characteristics in regard to distribution of hits, there is no significant correlation in the 64-Subject Group between the individual's scores on the corresponding runs of his two sets. The coefficient of correlation is $-.034$ with a probability of $.25$. While there is also no significant correlation in the 49-Subject Group between the individual's scores on the corresponding runs of his two sets, this may be accounted for by the fact that the same dice were not used for the two sets. The lack of correla-

tion in the 64-Subject Group, however, cannot be attributed to this factor, as the same dice were used for both sets. It is believed to be mainly due, instead, to the fact that the two sets were made under different psychological situations, as is discussed later.

Since the six faces of the die were used as target an equal number of times during the running of the set, irregularities in the dice are precluded as causative factors in the deviations from chance expectancy of the set scores. Such irregularities, however, must be considered in a comparison of the relative effectiveness of the six die faces and also in a comparison of the scores of the six runs of the set, since for each run a die face was specified that was the same as the chronological number of the run. A control series of 3,204 runs, approximately three times the size of the Six-Dice Series, is used to check on any such irregularities. The control series was made by the author and his wife without conscious effort on their part to control the falling of the six dice, which were thrown from a cup as in the running of the experiment. The One-Die Series is omitted in these comparisons since it is not known which one of the six dice that were later employed in the Six-Dice Series was used in it, and hence a control is impossible to obtain.

As shown in Table 2, the results of the Control Series favor the higher faces of the die, the critical ratio of the difference between the average set scores of the three higher and the three lower faces being 3.56. On the possibility that the difference is due mainly to the indentations of the spots on the dice which cause the higher numbered faces to be lighter in weight and hence more apt to appear uppermost, an attempted correction³ is made for this factor in the deviations from chance expectancy of the run scores which are listed in Table 2.

The deviations of the six runs are listed separately for the first and second sets, since, as has been previously mentioned, the psycho-

³The correction was made for this factor in the deviations from chance expectancy of the run scores in the following manner: The total deviation from chance expectancy of each of the six runs of the control series is multiplied by the total number of runs in the section of the experiment under consideration (for example, 384 in the case of the first set of the Six-Dice Series) and divided by 3,204, the total number of runs in the Control Series. The resultant product is algebraically subtracted from the total deviation from chance expectancy of the comparable run in the experimental group, and the nearest whole number to this sum is listed as the corrected run score in Table 2.

Table 2

RUN SCORE DEVIATIONS ON FACES, SIX-DICE SERIES

Group	Runs	Run and Die Face No. 1	Run and Die Face No. 2	Run and Die Face No. 3	Run and Die Face No. 4	Run and Die Face No. 5	Run and Die Face No. 6	1st Half of Set 3 Lower Die Faces	2nd Half of Set 3 Upper Die Faces	CR _d
Control	3,204	-58	-18	-16	+30	+54	+ 8	-92	+92	3.56
1st Set Uncorrected . .	384	- 7	+ 8	- 6	+14	+17	+ 4	- 5	+35	2.24
1st Set Corrected	384	0	+10	- 4	+10	+10	+ 3	+ 6	+23	0.95
2nd Set Uncorrected . .	678	- 3	- 9	+ 9	+11	+ 2	+14	- 3	+27	1.26
2nd Set Corrected	678	+ 9	- 5	+12	+ 5	- 9	+12	+16	+ 8	0.34

logical situation for the subject was somewhat different. In the first set the subject was not informed of its length, and was asked to roll for ones, then for twos, and so on for the six faces of the die. His attention, therefore, was directed to the number of the die face rather than to the position of the run within the set. In the second set, however, the subject had the previous experience and knew how many runs he would roll. His attention in the second set was given to the order of the run as well as to the number of the die face. The incline (Table 2) between the first and second halves of the first set, in which the attention of the subject was directed to the number of the die face, suggests a preference for the higher faces of the die, a preference which has also been suggested in previous reports (1, 2, 3, 10).

Table 3

DISTRIBUTION OF HITS IN THE RUN, ONE-DIE SERIES

Trial	1st	2nd	3rd	4th	5th	6th	Total
Hits	54	44	43	42	44	52	279
Deviation	+ 5	- 5	- 6	- 7	- 5	+ 3	- 15

Only the One-Die Series can be analyzed in respect to distribution of hits within the run, since in the Six-Dice Series a run consists of a single roll of six dice. The results, listed in Table 3, show a drop after the first throw with salience again on the last throw, an example of the terminal salience familiar in certain PK as well as in ESP researches. These characteristics appear even though the deviation is negative.

REFERENCES

1. GIBSON, EDMOND P.; GIBSON, LOTTIE H.; and RHINE, J. B. A large series of PK tests. *J. Parapsychol.*, 1943, 7, 228-37.
2. ———. The PK effect: mechanical throwing of three dice. *J. Parapsychol.*, 1944, 8, 95-109.
3. GIBSON, EDMOND P., and RHINE, J. B. The PK effect: III. Some introductory series. *J. Parapsychol.*, 1943, 7, 118-34.
4. HILTON, JR., HOMER; BAER, GEORGE; and RHINE, J. B. A comparison of three sizes of dice in PK tests. *J. Parapsychol.*, 1943, 7, 172-90.
5. HILTON, JR., HOMER, and RHINE, J. B. A second comparison of three sizes of dice in PK tests. *J. Parapsychol.*, 1943, 7, 191-206.
6. HUMPHREY, BETTY M., and RHINE, J. B. Position effects in the large Gibson series. *J. Parapsychol.*, 1943, 7, 238-51.
7. REEVES, MARGARET PEGRAM, and RHINE, J. B. The PK effect: II. A study in declines. *J. Parapsychol.*, 1943, 7, 76-93.
8. RHINE, J. B. Dice thrown by cup and machine in PK tests. *J. Parapsychol.*, 1943, 7, 207-17.
9. RHINE, J. B., and HUMPHREY, BETTY M. The PK effect: the McDougall One-Die Series. *J. Parapsychol.*, 1943, 7, 252-63.
10. ———. PK tests with six, twelve, and twenty-four dice per throw. *J. Parapsychol.*, 1944, 8, 139-57.

A NOTE ON NEGATIVE DEVIATION

By S. G. SOAL
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ED. NOTE: Mr. Soal here offers an ingenious and plausible explanation for the negative deviation (total hits below chance) found by Miss Betty Humphrey in a certain section of the Soal and Goldney data on precognitive telepathy tests. (See Dr. J. G. Pratt's review of this work in the March, 1944, issue of the *JOURNAL*, pp. 3-17.) It will be recalled that the main discovery of the Soal and Goldney work was the displacement of hits from the real target card to the one that followed or the one that preceded it. This success in hitting the following card is the basis for the conclusion that precognitive telepathy was demonstrated in the experiment. The negative deviation which Mr. Soal now discusses was found in the work of the subject with one of the two main telepathic senders (agents).

His explanation, reduced to nontechnical terms, is this: the subject wanted to hit precognitively—that is, on the card to follow—and wanted to miss the target. So when the subject made a precognitive hit he subconsciously knew this and deliberately changed to another symbol to keep from hitting the card when it became the target in the next trial. This avoidance caused the negative deviation of the target hits.

Mr. Soal is a college teacher of mathematics in England and a member of the Council of the Society for Psychical Research in London.

ON PAGES 192 and 193 of my paper, "Fresh Light on Card-guessing—Some New Effects,"¹ I examined an interesting case of below-chance scoring obtained by the subject, B.S., on (-2) post-cognitive guesses in the year 1936, and I advanced certain tentative psychological explanations to account for it. In the more recent work with B.S. reported in "Experiments in Precognitive Telepathy,"² this particular effect appears to be absent, but Miss Betty Humphrey of the Parapsychology Laboratory at Duke University has drawn my attention to a negative effect³ which runs consistently through the whole of B.S.'s work in cooperation with the agent J.A.L. This assumes the form of a highly significant tendency of the subject

¹ *Proc. Soc. psych. Res., Lond.*, 1940-41, **46**, 152-98.

² *Ibid.*, 1943, **47**, 21-150.

³ See article entitled "Soal and Goldney's Precognitive Telepathy Experiments," *J. Amer. Soc. psych. Res.*, 1944, **38**, 139-59.

to score *below* chance on the "actual" or "target" card, and it appears to admit of a paranormal explanation. In 1936, B.S., working largely though not exclusively with the agent J.AL., obtained a slight but quite insignificant *positive* deviation on the actual or (o) presentations; and with the agents R.E. and G.A. in 1941 he obtained likewise an unimportant *positive* deviation. It is very surprising therefore to note this *negative* deviation with the agent J.AL. during the years 1942-1943. The tendency to score below chance expectation on the target card occurs not only in the experiments carried out at "normal" rate but likewise in those at "rapid" tempo.

If the reader turns to the list of scores for sittings 31-40 in "Experiments in Precognitive Telepathy," he will find under the columns headed (o) ample evidence of the tendency to score below expectation with J.AL. Omitting the experiment on August 7, 1942, at which no agent was present, the experiment with ESP cards on August 26, 1942, and three columns in which nonrandom sequences of presentations were employed, we have, under the (o) heading, 69 columns of 25 presentations equivalent to 1,725 trials. The expected number of correct hits is $1/5 \times 1725 = 345$ whereas the observed number is only 281. There is thus a *deficiency* on the actual card of 64 hits, the equivalent of 3.85 standard deviations. Of the 69 columns, 23 were guessed at rapid rate and the remaining 46 columns at normal rate. The columns at normal rate exhibit significant (+1) or (-1) displacements (or both), and those at rapid tempo, significant (+2) or (-2) displacements (or both).

Now, it is well known that most subjects tend to change their guess from one symbol to another more frequently than would occur in a random sequence of the digits 1-5 compiled, say, from mathematical tables. In a truly random series of $n + 1$ presentations we should expect on an average $(4/5)n$ changes of guess. In what follows in experiments at normal rate a "change of guess" will be understood to mean a change of symbol in passing from any one guess to the next, but in the rapid experiments it will be taken to mean a change of symbol from any one guess to the *next but one*. By the term "precognitive hit" I mean a (+1) hit in columns guessed at normal rate, but a (+2) hit in columns guessed at rapid rate. In order to make the most of our material, (+1) and (+2) hits will be lumped together in the ensuing discussion.

If the subject scores a (+1) precognitive hit at normal rate or a (+2) precognitive hit at rapid rate and follows this by a change of guess, he will clearly get the actual card *wrong*; that is, the card which corresponds contemporaneously to his changed guess. If, therefore, a person scored significant (+1) or (+2) hits and changed his guess more frequently than if he were guessing randomly, this in itself would tend to generate a below-chance score on the actual card, and no further explanation might be necessary.

Now, after the 1,633 precognitive trials B.S. changed his guess 1,361 times, whereas in a random sequence the expected number of changes is 1,306.4. B.S. therefore shows a highly significant tendency to change guess.

We must next examine how he distributes these changes of guess following (a) precognitive successes and (b) precognitive failures. This may be shown by the following contingency table.

(1,633 PRECOGNITIVE TRIALS)

	Number of precognitive guesses correct	Number of precognitive guesses incorrect	Totals
Cases followed by change of guess.....	425	936	1,361
Cases followed by <i>no</i> change of guess.....	54	218	272
Totals.....	479	1,154	1,633

After making Yates's correction we find for this table $\chi^2 = 13.6$ (a highly significant result). An inspection of this table shows quite clearly that B.S.'s changes of guess are not distributed randomly but occur most frequently after he has scored a precognitive success. In fact after the 1,154 precognitive failures he changes his guess 936 times which is not significantly different from the 923 changes to be expected in a random sequence. On the other hand after the 479 successful precognitive trials he changes guess no fewer than 425 times as against the 383.2 expected in a random distribution.

Now considering the actual card successes which follow precognitive successes, we should, if the changes of guess were distributed randomly over the whole work, expect to count

$$479 - \left(\frac{1361}{1633} \times 479 \right) = 79.8$$

hits on (o) trials whereas actually there are only 54. Thus there is a deficiency equal to 25.8, the equivalent of about 2.9 standard deviations.

It is easy to suggest a motive for this change of guess after a successful precognitive hit. We may assume that the *subconscious* mind of the subject knows when it has "got through" a successful precognitive hit on a given (+1) or (+2) card. It also knows that at the next guess (or next but one) if it does not change its guess it will score a hit on the actual card. But it is probably anxious to *avoid* scoring direct hits and is aiming generally at precognitive or postcognitive successes. Quite naturally, therefore, it tries a change of symbol after a successful precognitive hit.

The observed number of actual or (o) successes which follow precognitive failures is 201 as compared with an expected number, $1/5 \times 1154 = 230.8$. This gives a deficiency of 29.8 or the equivalent of about 2.2 standard deviations. This negative deviation is not very significant, but if it is genuine we might account for it by an explanation similar to the one put forward on page 193 of "Fresh Light on Card Guessing." We might suppose that after a precognitive failure the *correct* card image is present in the percipient's subconscious mind but has not succeeded in getting over the threshold. At his next guess this correct image continues to worry the subject, who, in order to exorcise it, avoids this particular symbol and chooses one of the remaining four.

The total number of observed successes on the actual (o) presentations is $54 + 201 = 255$. It will be seen that this total differs by 26 from the grand total of 281 actual card successes quoted at the commencement of this note. The difference is accounted for by noting that an actual hit which heads a column at normal rate or which occupies places 1 or 2 in a column guessed at rapid rate cannot be included in the above analysis since such hits do not follow precognitive trials. It is, however, interesting to observe that on the 92 such (o) trials we obtain 26 successes as compared with an expectation of 18.4. This group therefore shows no tendency to negative deviation, as might be expected since it is not influenced by the psychological mechanisms described above.

The more general question presents itself: Are negative deviations on the actual card always accompanied by the phenomenon of displacement, or do there exist cases of negative scoring which exhibit no displacement? It is important for us to know the answer to this query, and I much hope that those experimenters who have obtained below-chance scores will re-examine their records for possible displacement effects.

LETTERS AND COMMENTS

October 20, 1944

Sir:

We have read the interesting article in the September JOURNAL in which Miss Betty M. Humphrey and Dr. J. B. Rhine claim to have discovered certain declines in scoring in connection with our report on recent experiments in precognitive telepathy (*Proc. Soc. psych. Res.*, Lond., Part 167, December, 1943). We welcome the invitation to offer a few comments on this long and painstaking paper and to indicate a few points on which we disagree with the writers' conclusions.

In the first place, it seems quite clear that in their estimation of the significance of the difference of two mean scores the authors make use of the theoretical variance which corresponds to

$$p = \frac{1}{5}, \quad q = \frac{4}{5}$$

and which equals 4 for 25 trials. But owing to the high level of scoring on (+1) guesses, the value of p considerably exceeds $1/5$. Indeed, we show in Appendix G of our report that for Group 1 agents, using prepared random numbers, $p = 0.295$, and this makes the *expected* variance for 25 (+1) trials equal to 5.20 instead of 4. The average value of the *observed* variance is even higher; it is 5.69. For the random numbers work with the agent R.E. alone (normal rate), the observed variance for 25 trials is 5.80. Again, in the "Counters" experiments at normal rate with the same agent, the *observed* variance is as high as 8.36 for 25 trials while the *expected* variance from the observed mean is 5.02.

In estimating the significance of a difference of the means of two groups of data, it surely would have been more correct to have utilized the *observed* variances S_1^2 and S_2^2 of the separate groups, and to have employed the formula

$$\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}$$

instead of

$$4\left(\frac{1}{n_1} + \frac{1}{n_2}\right)$$

for the variance of the difference of the two means. We are clearly no longer concerned with the value $p = 1/5$ when discussing results which exhibit a high degree of ESP functioning. It is the *observed* variability about the observed means which is of fundamental importance.

We have had no time in which to make complete re-evaluations of the mass of data discussed by the authors, but we think we are safe in stating that the "chronological" decline from period 1 to period 3 (with $CR_d = 6.55$ as given in Table 1) would still remain highly significant even if observed variances were substituted for the theoretical. We think it important to point out that this highly significant decline is to be attributed chiefly to the low scoring in period 3 of the Counters experiments. For the earlier P.R.N. (or "Numbers") experiments, the emended critical ratio would be considerably less than the value 1.61 cited in Table 1. Now period 3 of the Counters experiments (at normal rate) is confined entirely to the results obtained on the dates 6/13/41 and 1/3/42. On the first of these dates the chance results obtained may have been due to the fact that on this date we used for the first time "associated words" instead of animal pictures or initial letters, *without informing the subject that there was any change*. On the date 1/3/42 we made alternating suggestions throughout the session to the effect that the subject should try for successes on the target and for (+1) scores. As we pointed out on page 55 of our report, the subject began on this day with promising (+1) scores, but his scoring collapsed completely as soon as we started making disturbing suggestions. In the circumstances therefore we feel that the decline in (+1) scoring from period 1 to period 3, for which the authors cite odds of ten million to one, may not be due to any general decline in ESP functioning but may be merely due to interference with the normal experimental conditions on the dates mentioned (6/13/41 and 1/3/42).

As regards the "sessions" declines and the "first to last page"

declines (Table 3C, Pooled Data), we have had no time in which to re-evaluate the data by substituting the observed variances in place of 4; but a rough estimate appears to suggest that the page effect would probably be just significant, and the sessions effects perhaps barely significant.

It is rather surprising that the authors make no reference to the distribution of the 1,755 (+1) hits for Group 1 agents in the 24 places of the scoring column (Appendix D of our report). This table does not seem to indicate any significant decline in (+1) scoring from the first half to the last half of the column but, on the contrary, a slight incline which, however, is without significance.

In reply to a query (p. 190) by the authors we should add that sometimes the subject knew that he was guessing the *last* sheet of a session and sometimes he did not know. We kept no record of the occasions when he was informed on this matter.

S. G. SOAL

K. M. GOLDNEY

COMMENTS ON THE SOAL AND GOLDNEY LETTER

We are glad to have the comments of Soal and Goldney on our report of the position effects which we found in their data on precognitive telepathy. We regard their criticism of our findings as an interesting reaction in itself, for if these declines had been anticipated by the experimenters, they would have lost at least some of their evidential significance.

The three points of disagreement stated by Soal and Goldney invite further discussion, especially since these differences are, to our minds, somewhat less real and serious than they might at first appear.

1. We wish to point out that the objection to our use of the theoretical variance instead of the observed variance is a technical point which, we understand, reduces to a matter of the purpose of the investigator. We are concerned to find true differences in scoring which, owing to the structure of the experiment, can be attributed only to ESP. The question set by Soal and Goldney is whether, given two levels of ESP scoring, there is a true decline.

In using the theoretical variance we assume only that, on the null

hypothesis, a properly conducted ESP experiment produces a population of scores closely approximating the theoretical expectation. This has been amply verified in many empirical studies.

Even though the method recommended by Soal and Goldney is the customary one for dealing with differences in populations whose parameters are unknown, it nevertheless makes the assumption of a statistical population having the characteristics estimated in the data. This may not be a valid assumption about ESP test data. At any rate, there is opposing it the fact that ESP continues to manifest itself experimentally in a sporadic, erratic, and unstable way, a fact which shows we are not yet getting comparable samples from a stable population.

There are other practical grounds on which we would not agree that use of the observed variance is the "more correct," but let us rather note that in the present instance the question is academic. Both methods give virtually the same conclusions.

2. The most important question raised by Soal and Goldney concerns the chronological decline. They suggest other explanations for the drop obtained in the scoring for the (+1) results with sender R.E. using counters. The best way to cope with this difference between Soal and Goldney and ourselves is, we think, simply to leave out without further discussion the sessions for the decline of which they offer other explanations. Leaving these out of the chronological analysis we would still have the first and second chronological subdivisions which show a decline with a CR of the difference of 3.60. We reproduce these figures below:

(+1) DATA

Temporal Subdivision	Runs	Dev.	Aver. Score	CR _d
First	17.28	+83.6	9.84	3.60
Second	19.20	+47.0	7.45	

Or if these be rearranged into three chronological subdivisions, there is a decline of scoring from the first to the third subdivision that gives a just significant difference of 2.40.

(+1) DATA

Temporal Subdivision	Runs	Dev.	Aver. Score	CR _d (1-3)
First	11.52	+51.4	9.46	2.40
Second	13.44	+40.4	8.01	
Third	11.52	+28.4	7.47	

In short, the general effect is the same though somewhat less striking.

3. The omission to which Soal and Goldney refer in their next to the last paragraph concerning the hit distribution in the scoring column was, we think, covered by the statements on page 189 in our paper: "Since the original record pages were not themselves published, we do not have the data for the study of position effects in the column (or run) and in the segment of the column, but these are being supplied by the authors upon request and will be analyzed for position effects in due time." Again, on page 201, we go on to say: "The consideration of this absence of significant position effects is likely to be more meaningful when the analyses are made of the distributions of hits within the run or column and within the segments of the run. For one thing, we do not know whether B.S. reacted to the run as a unit or whether he found the page of 50 trials a more definite structural unit. We shall leave further discussion of the point until such analyses have been made." In correspondence with Mr. Soal we have been trying to secure copies of the score records. Thus far we have obtained a part of these and are awaiting the remainder for analysis and report. The data supplied by Soal and Goldney in their Appendix D are not sufficient for our purposes. Whether or not any further position effects of interest and significance will be found will depend upon the analyses yet to be made (on the distribution of hits in the segment and the run) upon the complete records. However, even the absence of such effects would be equally important, especially if related conditions were discovered.

While, then, the discussion of our paper by Soal and Goldney has been illuminating and has somewhat corrected the chronological distribution, the conclusions we reached remain substantially the same as originally stated: namely, that the Soal and Goldney data show both session and chronological declines sufficiently striking to have given significant differences.

BETTY M. HUMPHREY
J. B. RHINE

GLOSSARY

In order to avoid constant redefining of commonly recurring terms in papers appearing in this JOURNAL, the following definitions are submitted for convenient reference. Words defined elsewhere in the glossary are italicized in the text of the definitions.

*For a simple description of those terms marked by an asterisk, as they apply to the ESP test data, see Chapter VIII and the Appendix of *A Handbook for Testing Extra-Sensory Perception* by C. E. Stuart and J. G. Pratt. A mimeographed copy of the relevant pages will be sent on request to subscribers who do not have the book mentioned. Further explanation may be found in any elementary statistical text.

AGENT: In tests for *telepathy*, the person whose mental states are to be apprehended by the *percipient*. In *GESP* tests, the person who looks at the *stimulus object*.

AVERAGE SCORE: Average number of *hits per run*.

BM (BLIND MATCHING): The technique in which the *subject matches a deck of ESP cards to five key cards* which are laid out face-down before him in an unknown order. Unless otherwise stated, the order is also unknown to the experimenter.

BT (BEFORE TOUCHING): The technique in which the top card of the face-down *deck is called* and, after being called, is laid aside for *checking* at the end of the *run*. Each card in the *deck* is treated in the same way.

CALL v.: To attempt to identify a *target* or *stimulus object* (or mental state of an *agent* in *telepathy*).

CALL n.: The *response* described above; also the resulting selection.

CHANCE:* The complex of undefined causal factors irrelevant to the purpose at hand.

CHANCE EXPECTATION = MEAN CHANCE EXPECTATION: The most likely *score* if only *chance* obtains.

CHANCE AVERAGE: *Mean chance expectation* in terms of *average per run*.

CHECK: To determine a *score* after the completion of a *run* by comparing the order of the *subject's calls* with the order of cards in the *deck*.

CHI-SQUARE: A sum of quantities each of which is a *deviation squared* divided by an expected value. Also a sum of the squares of *CR's*. (Occasionally the square of a simple CR may be used as chi-square.)

- CLAIRVOYANCE:** *Extrasensory perception* of objective events as distinguished from *telepathic* perception (of the mental or subjective events of another person).
- COVARIATION:** Correlation evaluated in terms of theoretical means and *standard deviations*.
- CR (CRITICAL RATIO):*** A measure to determine whether or not the observed *deviation* is *significantly* greater than the expected random fluctuation about the *average*. The CR is obtained by dividing the observed *deviation* by the *standard deviation*. (The *probability* of a given CR may be obtained by consulting tables of the probability integral, such as Pearson's.)
- CR OF THE DIFFERENCE:** The observed difference between the *score averages* of two samples of data divided by the *standard deviation of the difference*. (Where the samples to be compared are of equal number of runs, the difference between total *hits* may be divided by the *SD* of the total number of *runs* of both samples.)
- DECK:** Twenty-five *ESP cards*, five of each suit.
- DEVIATION:*** The amount an observed number of *hits* or an *average score* varies from the *mean chance expectation* or *chance average*. A *deviation* may be total (for a series of *runs*) or average (per *run*).
- DIE-THROW:** The throwing or mechanical release of a single die regardless of the number thrown at the same time.
- DT (DOWN THROUGH):** The technique in which the cards are called down through the *deck* before any are removed or *checked*.
- EMPIRICAL CONTROL:** An experiment which wholly or partially follows the main experiment with the exception that the conditions are designed to exclude the possibility of *ESP*.
- ESP (EXTRASENSORY PERCEPTION):** Response to an external event (perception) not presented to any known sense.
- ESP CARDS:** Cards, each bearing one of the following five symbols: star, circle, three parallel wavy lines (called "waves"), square, plus.
- ESP SYMBOLS:** See plate opposite page 1, this JOURNAL, Vol. 1, March, 1937.
- ESP TESTS:** A considerable number of techniques come under this heading which are conveniently represented by initials, the principal ones being: *BT, DT, PT, GESP, BM, OM, STM*.
- EXPECTATION;** see CHANCE.
- EXTRACHANCE:** Not due to *chance* alone.
- FREE MATERIAL:** *Stimulus objects* that are not limited to a known number of categories.

- GESP (GENERAL EXTRASENSORY PERCEPTION):** A technique designed to test the occurrence of *extrasensory perception*, permitting either *telepathy* or *clairvoyance* or both to operate.
- HIGH-DICE TESTS:** Tests of *PK* in which the aim of the *subject* is to try to influence a pair of dice to fall with the two upper faces totaling eight or above.
- HIT:** The correct correspondence of a *subject's call* or response with a *stimulus card* or *object*.
- HIT FREQUENCY DISTRIBUTION:** The grouping of the total *hits* in a *series* of *runs* with respect to their original position in the *run*.
- KEY CARD:** One of the five cards (where there are five suits) against which the cards of the test *deck* (i.e., *target cards*) in the *matching* tests (*OM*, *BM*, *STM*, etc.) are *matched*.
- LOW-DICE TESTS:** Tests of *PK* in which the aim of the *subject* is to try to influence a pair of dice to fall with the two upper faces totaling six or below.
- MATCHING:** A form of *calling* in which a *target card* is placed opposite the *key card* which the *subject* selects to identify it. Also, in the evaluation of *free material*, the act of a judge in identifying a given response with a *stimulus object*.
- MEAN CHANCE EXPECTATION;** see **CHANCE**.
- OM (OPEN MATCHING):** The technique in which a *subject matches* a *deck* of *ESP cards* to five *key cards* which are face-up before him.
- P (PROBABILITY):*** A mathematical estimate of the expected relative frequency of a given event if chance alone were operative.
- PARAPSYCHOLOGY:** A division of psychology dealing with the paranormal—those psychical effects which appear not to fall within the scope of what is at present normal and recognized law.
- PERCIPIENT:** The person who makes the *calls* in a test situation.
- PK (PSYCHOKINESIS):** The direct influence exerted on a physical system by a *subject* without any known intermediate energy or instrumentation.
- RESPONSE:** The act of the *subject* in attempting to identify the *stimulus object*.
- RSR (RUN SALIENCE RATIO):** A measure of *salience* within the *run*.
- RUN:** A succession of *trials*, usually the *calling* of a *deck* of 25 *ESP cards* or symbols. In *PK tests*, 24 single *die-throws* regardless of the number of dice thrown at the same time.

- SALIENCE:** The relation of rate of success in the end *segments* of the *run* to that of the middle *segments*; also the relation of the rate of success in the end *trials* of the *segment* to that of the middle *trials*.
- TERMINAL SALIENCE:** A higher rate of *deviation* in the end *segments* of the *run* (or in the end *trials* of the *segment*) than in the middle *segments* (or *trials*).
- MIDDLE SALIENCE:** A higher rate of *deviation* in the middle *segments* of the *run* (or in the middle *trials* of the *segment*) than in the end *segments* (or *trials*).
- SCORE:** The number of hits made in one *run*.
- TOTAL SCORE:** *Score* of any number of *runs*.
- AVERAGE SCORE:** *Total score* divided by number of *runs*.
- SCREEN:** An opaque barrier used between the *subject* and the card or *agent*. The main types of screens are illustrated in this JOURNAL on their first introduction in print.
- SD (STANDARD DEVIATION):*** The theoretical root mean square of the *deviations*. It is obtained from the formula \sqrt{npq} , in which n is the number of single *trials*, p the *probability* of success per *trial*, and q the *probability* of failure. (For *ESP cards*, $SD = 2 \sqrt{\text{no. of runs.}}$)
- SD OF THE DIFFERENCE:** For both *ESP cards* and *PK tests* using dice, the *SD* of the difference is equal to $\sigma_s \sqrt{1/R_1 + 1/R_2}$, where σ_s is the *SD* of a single *run* and R_1 and R_2 are the number of *runs* in the respective samples compared. This gives the *SD* of the difference for *run score averages*.
- SEGMENT:** One of the five consecutive sets of five *calls* in a *run* of 25 *trials*. The first five *calls* would constitute the first *segment*; the second five, the second, etc.
- SERIES:** Several *runs* that are grouped in accordance with a stated principle.
- SEVENS TESTS:** Tests of *PK* in which the aim of the *subject* is to try to influence a pair of dice to fall with the two upper faces totaling seven.
- SIGNIFICANCE:*** A numerical result is significant when it equals or surpasses some criterion of degree of chance improbability. Common criteria are: a probability value of .01 or less, or a *deviation* in the expected direction such that the *critical ratio* is 2.5 or greater.
- SINGLES TESTS:** Tests of *PK* in which the aim of the *subject* is to try to influence dice to fall with a specified face up.
- SR (SALIENCE RATIO):** A measure of the relation of the rate of success in the end *segments* of the *run* (or in the end *trials* of the *segment*) and that of the middle *segments* (or *trials*). (For details of the manner of obtaining SR's, see Vol. 5, pp. 193-195.)

SSR (SEGMENTAL SALIENCE RATIO): A measure of *salience* within the *segments* of the *run*.

STIMULUS OBJECT: The *ESP card* or drawing or other object, some identifying characteristic of which is to be apprehended by the *subject*.

STM (SCREENED TOUCH MATCHING): The technique in which the *subject* makes his *call* by pointing to one of five positions or exposed *symbols* under a special *screen*. The experimenter places the *target card* so designated in the position pointed to. The *screen* blocks all vision by the *subject* of the *cards* and their manipulation by the experimenter.

SUBJECT: The person who is experimented upon. Most commonly the *percipient* in *ESP*, though also the *agent* in *telepathy*.

TARGET: In *ESP tests*, the *stimulus object*. In *PK tests*, the faces of the die (or combination of faces) which the *subject* attempts to bring up in the act of throwing.

TARGET CARD: The *card* which the *percipient* is attempting to perceive (i.e., to identify or otherwise indicate a knowledge of).

TARGET DECK: The *deck* of cards the order of which the *subject* is attempting to identify.

TARGET FACE: The face on the die which the *subject* tries to turn up as a consequence of direct mental action.

TELEPATHY: *Extrasensory perception* of the mental activities of another person. It does not include the *clairvoyant* perception of objective events.

TRIAL: A single attempt to identify a *stimulus object*.

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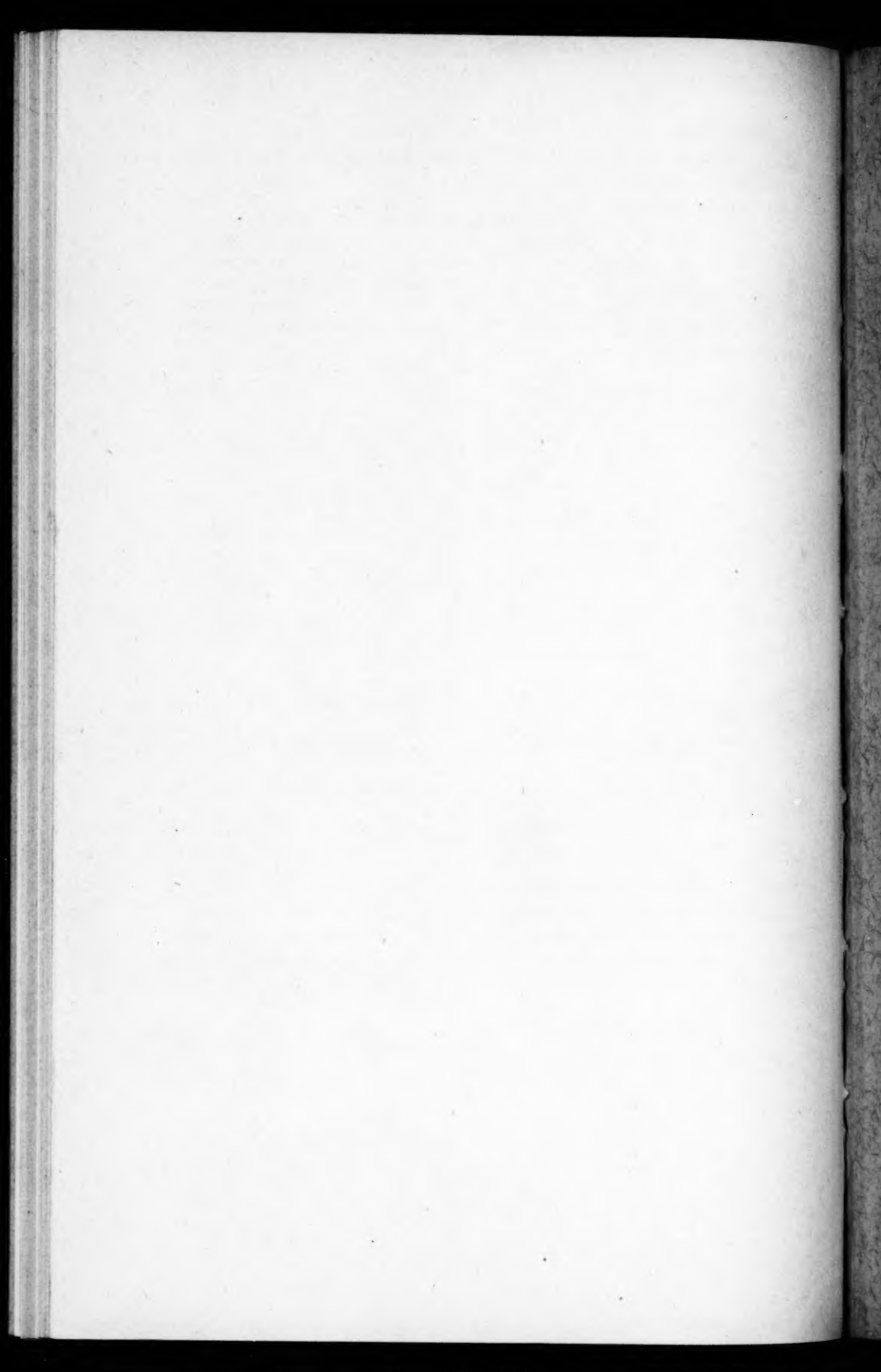
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THE PARAPSYCHOLOGY LABORATORY OF DUKE UNIVERSITY

The Parapsychology Laboratory is a branch of the Department of Psychology of Duke University. Its beginnings date from 1930 when its research program was launched by members of that department under the sponsorship of Professor William McDougall and with the favorable interest of the President of the University—at that time, Dr. William Preston Few. The first report of the work done was issued in book form in 1934 under the title *Extra-Sensory Perception*; in 1937, the *Journal of Parapsychology* was established; and in 1940, five members of the Laboratory staff collaborated to publish *Extra-Sensory Perception After Sixty Years* which summarized not only the work of the Laboratory but similar research, past and present, in other places as well.

Problems of Research. The main topic of investigation has been extra-sensory perception in its various phases—telepathy, clairvoyance, and precognition. Other work has been planned, and to some extent undertaken; but the main objective has been to arrive first at a fair understanding of extra-sensory perception itself before turning definitely to other problems of parapsychology. However, an experimental staff is being trained and methods developed for a broad and inclusive program which awaits only the time and the necessary financial assistance for its execution.

Financial Support. The Laboratory is supported jointly by Duke University and by a small group of donors who have thus far desired to remain anonymous. The Prince Memorial Fund, established in 1934, provided two fellowships in Parapsychology at Duke over a five-year period. In 1935, the William McDougall Research Fund was created at the University with a special committee, appointed by the major contributor and approved by President Few, to administer it. This is called the Parapsychology Research Committee and is self-perpetuating. In order to insure that the purposes of the contributors will always be respected, the Committee has been given the legal authority to constitute itself a board of trust, independent of the University should the need ever arise.

Thus far, the Laboratory has had no permanent endowment and has been maintained by current contributions. This situation has resulted in a lack of long-term security and has worked definitely against the planning of large undertakings. It has also occasioned the serious loss of valuable, trained personnel.

In the judgment of this Committee, it is highly important that, either by will or gift, grants be made of sufficient size to establish an endowment that would guarantee not only the permanence but the stabilization of the research program of the Parapsychology Laboratory.

(Signed) ALICE M. BALDWIN, *Dean, Woman's College, Duke University*
(Chairman)

HORNELL HART, *Professor of Sociology, Duke University*

O. K. MERRITT, *President, Renfro Hosiery Mills*

J. B. RHINE, *Professor of Psychology, Duke University*

The Parapsychology Research Committee, Duke University

