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White Paper

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PSI COMMUNICATIONS EXPERIMENTS

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INTRODUCTION

One potentially important aspect of psi phenomena is that no methods exist currently for shielding or jamming the psi "signal". The implications of this are quite apparent--namely, that a psychoenegetic method of communication may be impervious to countermeasures and may represent, therefore, a truly secure channel for message-sending. Traditionally, the major impediments to deploying a psi communications system have centered on the difficulties inherent in receiving highly analytical information (e.g., code numbers) accurately and reliably. From a basic research perspective it is believed, at present, that degredation of psychoenergetic reception of analytical information may be at least in part attributable to:

- The *analytical* nature of the information, which has traditionally been a difficult area to address
- Delay in presentation of feedback to the percipient
- Displacement phenomena occurring as a result of requiring the percipient to perform multiple tasking with *global* (as opposed to *trial-by-trial*) feedback.

The aim of this white paper is to explore how these problems in psi communication might be addressed by research, with the ultimate aim, if successful, of conceptually replicating Czech researcher Milan Ryzl's experiments, in which five three-digit numbers were correctly identified by subject Pavel Stepanek (cf. Appendix A). The area of psychoenergetic message-sending is not being addressed currently by any of SRI's clients, and given the relative dirth of information we would like to propose a shift in emphasis towards foreign experimental replication by initiating a careful investigation of the Ryzl experiment.

Of the three fundamental "problem areas" ennumerated above, the analytical nature of the information is, perhaps, the easiest to address in communications experiments--i.e., the psychological biases inherent in the reception of numbers can be

circumvented by translating the target number into binary.* Ryzl accomplished this by allotting a certain sequence of 10 white or green colored cards to the target three-digit number--a translation that was accomplished by using an unspecified, non-standard coding technique. We have ennumerated in Phase III of this paper, below, our own proposed procedures for encoding a three-digit number, which is a relatively straightforward base ten to octal to binary translation procedure, resulting in the equal probability of expecting a one or a zero in any given position.

It should be noted that we are reasonably encouraged with regard to our ability to ascertain binary numbers accurately, after having completed a pilot study with one subject who achieved a hit rate of 76% over 100 trials in a computerized "coin flip" experiment that uses sequential sampling techniques for enhancement. While this is by no means a definitive study in the acquisition of binary bits, it is a very preliminary indication that analytical information such as code numbers can be translated into binary and successfully discerned on a trial-by-trial feedback basis.

If major impediments to the successful deployment of an operational psi communications system are to be anticipated, therefore, they will most likely occur in the delay of feedback to the percipient and in the global nature of the feedback. Traditionally, feedback in our experiments has been administered immediately and on a trial-by-trial basis, and deviations from this protocol have not been studied in a systematic fashion. Given the fact that psychoenergetic acquisition of a three-digit number by its very design entails (1) *multiple tasking* without feedback (i.e., the percipient must be able to discern three numbers encoded into binary without intermediate feedback); and (2) *delayed feedback* because of the multiple tasking aspect, these variables must be explored systematically.

Phase I of this proposed program, therefore, will undertake to examine the effects of increasingly delayed feedback on trial-by-trial psychoenergetic performance in a computerized binary choice task. Assuming the successful completion of this initial segment of the study, Phase II will undertake to examine whether delayed feedback causes degradation of the correct psychoenergetic acquisition of more than one task or event. If Phases I and II are completed successfully, Phase III will be implemented. In Phase III we have outlined a series of computerized statistical procedures aimed at enhancing the psi signal. The described

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* By "psychological bias" we mean that if, for example, a percipient's "lucky number" were seven, this type of bias might be apt to interfere with psychoenergetic acquisition of the actual target number.

procedures should be greatly more efficient than those implemented by Ryzl, and they should also be dependable enough to enable the attainment of results commensurate to those cited in the Ryzl experiment. Figure 1 provides an overview of the three phases in the proposed program.

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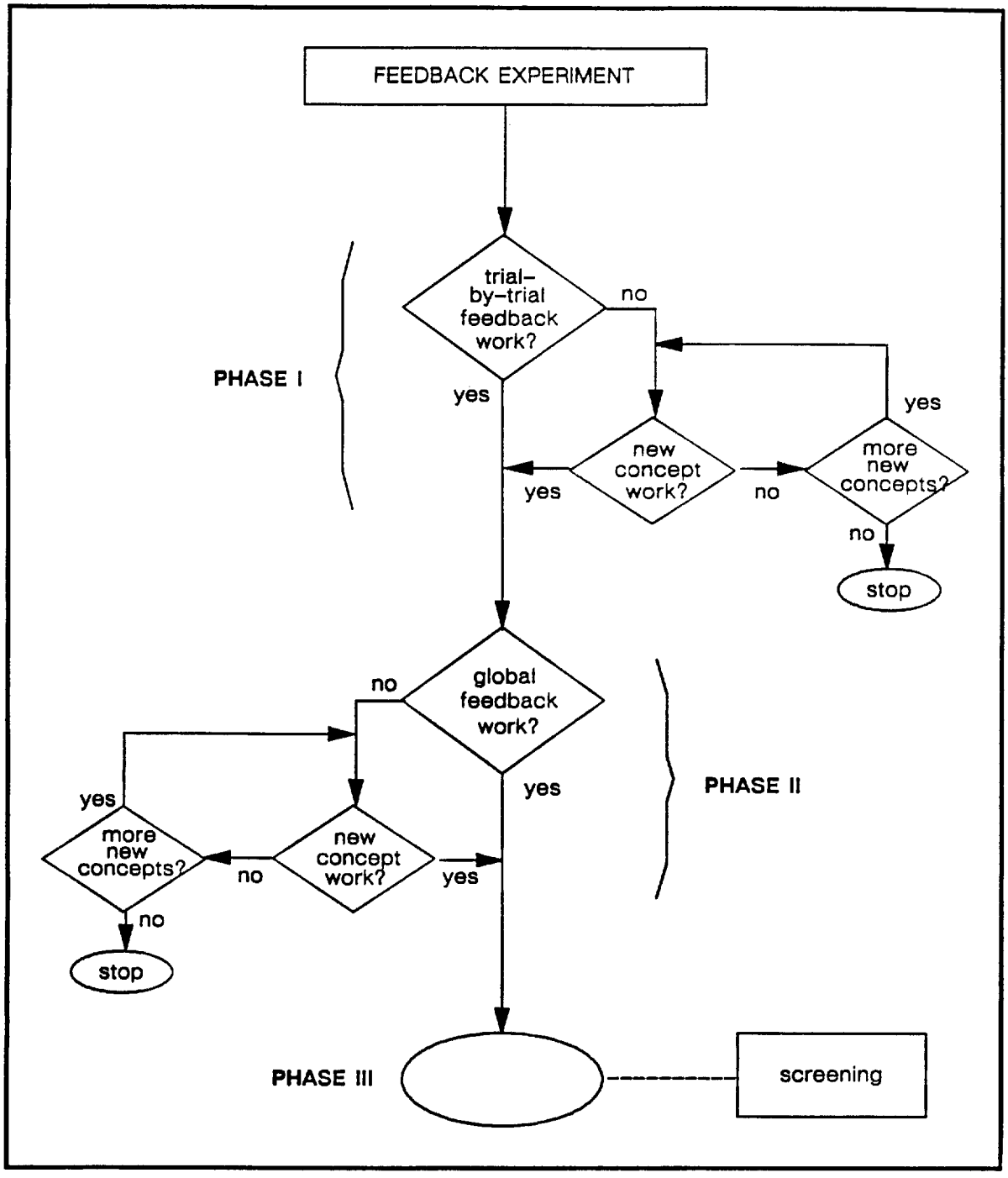

FIGURE 1 FLOW CHART DEPICTING RESEARCH PATHS FOR DEPLOYMENT OF PSI MESSAGE-SENDING CAPABILITY

PHASE I

Phase I will examine the effects of increasingly delayed feedback on performance. The proposed experiments will be performed using a computerized binary search program *(b.search)*, which can easily be linked to a "real world" coin flip task and requires no extensive evaluation. Feedback will be provided on a trial-by-trial basis according to the following schedule:

(1) Twenty-five binary choice trials with immediate feedback

(2) Twenty-five binary choice trials with feedback delayed in each case by one hour.

(3) Twenty-five binary choice trials with feedback delayed in each case by two hours.

(4) Twenty-five binary choice trials with feedback delayed in each case by four hours.

(5) Twenty-five binary choice trials with feedback delayed in each case by 24 hours .*

If degradation in functioning does not occur as a result of increasingly delayed feedback, then the global feedback experiments proposed in Phase II can be initiated.

If degradation of performance does occur, then the decay rate should be identifiable, and it should be possible to determine whether the decay rate is subject-specific or universal. In any case, to ameliorate this situation, Phase I proposes that a new technique known as *bracketing*, which has been hitherto untested, be applied in order to provide closure for experiments in which degradation of performance has occurred because of feedback delay. Specifically, *bracketing* refers to the performance of identical experiments with immediate feedback directly before and after the delayed feedback experiment, in the same manner as "on-line" check experiments have been employed previously in remote viewing. The hypothesis under consideration is that these bracketing experiments may serve to provide

* We have chosen 25 trials in each condition, because at the observed hit rate of 75%, 25 trials are sufficient to demonstrate significance.

space/time anchors for the subject, thereby defining a discrete location in space and time for reception of the delayed feedback information. This experimental series will also yield information, incidentally, concerning the veracity of the "on-line check," prior claims being that on-line checks with known targets can accurately provide calibration for those experiments in which feedback is delayed or nonexistent (a typical situation). If bracketing is unable to address the delayed feedback signal attenuation problem, then other new concepts (presently uknown, but perhaps focussing on making the feedback more of an "event") will have to be applied successfully before the Phase II series of global feedback experiments can be initiated.*

*It is logical to assume that if trial-by-trial delayed feedback experiments fail, global feedback experiments will also fail, because they entail delayed feedback by definition.

PHASE II

Phase II proposes a systematic investigation of whether degradation in psychoenergetic functioning will occur as a result of requiring the percipient to ascertain increasingly greater numbers of bits, without intermediate feedback, in accordance with the feedback delay schedule outlined in Phase I. For example, the next step in a logical progression following the successful completion of Phase I would be to perform a series of experiments in which the subject was required to determine *two* bits *without intermediate feedback*, according to a schedule in which feedback was immediate, initially, and then increasingly delayed by one, two, four, and 24 hours. Assuming no degradation in functioning, such a schedule of experiments would be carried out for increasingly greater numbers of bits (three, four, five, etc.), with the ultimate aim of maintaining a 76% hit rate on 18 bits with global feedback delayed by 24 hours.* If no degradation in performance occurs, then a replication of the Ryzl experiment can be implemented using the statistical enhancement techniques outlined in the Phase III protocols.

As stated previously in Phase I, if degradation does occur, then the decay-rate should, again, be identifiable, as well as its subject specificity or universality. If the bracketing concept proved to be a successful Phase I solution, then it would be warranted to test its efficacy in ameliorating potential displacement phenomena encountered in the various Phase II global feedback series. If bracketing proves to be ineffectual in remedying problems encountered in either Phase I or Phase II, then other techniques will have to be identified prior to successful deployment of the Phase III operational experiments.

*We have chosen 18 bits for reasons outlined in Phase III below.

PHASE III

Deployment of Phase III is predicated upon the successful completion of Phases I and II and assumes that at least one percipient has demonstrated a stable, statistically enhanced 76% hit rate over 18 bits, for which global feedback has been delayed by 24 hours. A prototype conceptual replication of the Ryzl experiment will proceed initially with the transmission of a series of three-digit numbers according to the protocols oulined below.

A. Encoding of the Three-Digit Number

To avoid the difficulties described previously that are inherent in discerning analytical information, the target three-digit number will be converted from base ten to its octal equivalent and then into binary. The following example demonstrates how a three-digit number would be converted using this protocol:

$$349_{10} = 535_{8} = 101\ 011\ 101_{2}$$

B. Complement Targeting Procedure

Once the three-digit number has been converted into binary, its complement will also be generated--e.g., in the case of 101 011 101 cited above, its complement would be 010 100 010. This creates a total of 18 bits, which can then be randomized. For a single pass, a percipient's task would be to determine a one or zero in each of the 18 positions using the computer program *b.search*. If we assume that the percipient's "raw" hit rate on single button pushes is 57% (as observed in our pilot experiment), *b.search* will enhance this effect to 76% using sequential sampling techniques.

C. Majority Vote Procedure

The next requirement will be for the percipient to make five such passes using *b.search* on the 18 bits, resulting in majority vote of five for each of the bits. Again, if we assume an initial 57% raw hit rate and an enhancement to 76% through sequential sampling, a majority vote of five on each bit will further enhance confidence to 90% certainty that the bit has been correctly ascertained.

D. Complement Targeting Statistical Enhancement

The concept of complement targeting was one that was implemented by Ryzl, himself. In his experimental series, Ryzl coded his three-digit numbers into a series of 10 white and green cards. For each such series of 10 cards, he generated 10 additional cards that were the complements to the original ten. These 20 cards plus an additional 10 randomly chosen "control" cards were randomized and presented to subject Stepanek for 50 passes. Using a complex series of criteria, Ryzl determined that a judgment on a given "bit" was not assured until both the card *and its complement* had been ascertained independently as being complementary to each other over a significant number of passes.

The majority vote procedure outlined above produces 90% certainty on 18 bits without even accounting for the complementary relationships of the bits. It is logical to assume, therefore, that if a *complementary* relationship between two associated bits is also determined independently, then this new information must somehow further enhance the 90% confidence level.*

Ryzl's experiment, by his own admission, is extremely inefficient as a message sending system. By using modern information theory, it is likely that we will be able to improve the efficiency by a factor of two or more.

* We are currently investigating how to prove this assumption mathematically.

DISCUSSION (U)

The applications-oriented research proposed in this paper has been aimed ultimately at a statistically streamlined, conceptual replication of Milan Ryzl's work with subject Pavel Stepanek. Given the encouraging beginning we have made in a pilot series with one subject, to whom trial-by-trial feedback was administered on a binary choice task, it is important to determine how such functioning is maintained in the global, delayed feedback arena that is typical of the world in general. Some of the parameters that might be uncovered in the course of the proposed research program may also have important implications for other areas of psychoenergetic applications such as remote viewing.

Should the Ryzl experiment be able to be replicated in the proposed fashion, the implications for a secure and reliable psi comunications system are apparent

Appendix A

THE MILAN RYZL EXPERIMENT

A MODEL OF PARAPSYCHOLOGICAL COMMUNICATION[1]

By Milan Ryzl

Recently the application of extrasensory perception (ESP) as a means of communication has been discussed more and more. However, the numerous popular articles have not been counterbalanced by an equal number of scientific publications, and it is impossible to decide whether the reason is the sensational exaggeration of relatively scarce material, or whether, for strategic reasons, some of the more recent scientific findings have been suppressed.

Because of the potential importance of the problem it will be interesting to see how the question is being solved in the scientific literature which is accessible. The characteristics of ESP are such that the faculty is predestined to serve as a device for gaining information which is normally inaccessible (6, 17, 18)—whether simply that of objective events in the outer world in general or the interception of coded messages in particular. However, the absolute reliability of ESP has not yet been achieved experimentally; the experimenter cannot as yet rely absolutely on the correctness of the responses secured in experiments.

To appraise the degree of reliability of ESP for obtaining information in practice, it is not its occasional spontaneous manifestations that must be examined, but results of controlled experimentation. The latter do not give such dramatically striking results, it is true; but they are more suitable for the exact evaluation necessary for the application of ESP in conveying information. For this, it would be necessary to be able to tell before the check-up of results, and maybe even without it, whether the ESP response was correct.

Unfortunately, experimental results in ESP tests have not been nearly as reliable as sensory perception. The eye or the camera very quickly picks up a great deal of information, and radio and TV signals will transmit a considerable amount in a short time unit. Errors and inaccuracies in these areas have been reduced to such an extent that they can be disregarded in this comparison.

On the other hand, ESP in simple card-calling tests is so much less reliable that it results in only a slight deviation from mean chance expectation. More than that, subjects prove to be very unstable in their ability to demonstrate ESP, their performance being subject to considerable fluctuation—even to the temporary disappearance of ESP, or to its manifestation as psi-missing. If ESP were a technical contrivance for getting information, it would have to be regarded today as very inefficient.

And yet, even a slight deviation above chance does represent the acquisition of information. In order to make practical application of it, it is necessary only:

(1) To secure stable performance in a subject, or to be able to recognize those times when he is actually using his ESP ability.

(2) To so concentrate the amount of information picked up in ESP tests that the knowledge looked for can be deduced with a degree of reliability fixed in advance.

A third condition should be that this be possible without undue cost. In the present study, however, economic aspects will not be taken into account, but only the possible practical application of ESP.

Historical Survey

The first accessible published report of an experiment in which the method employed made it possible to gain an item of information that could be used practically is the report by Foster (4). In this experiment a question was asked which could be answered either by *yes* or *no*. The subjects were given a mixed pack of black (meaning *yes*) and red (meaning *no*) cards in opaque envelopes, and were asked to sort them onto black or red "target areas," the black area indicating *true* and the red area *false*. When the correct answer to a given question (which the subject was to discover by ESP) was *yes*, black cards should have been found on the black area and red cards on the red area. If the correct answer to the question was *no*, an association of unlike colors would be the

[1] This paper is an adaptation of an article by Dr. Ryzl which appeared in a Czechoslovakian technical journal, *Sdelovaci Technika* (*Communication Technique*), Vol. 12 (1964), No. 8, pp. 299-302.

proper response. Unfortunately, in this experiment (in which the subjects were Indian children), no ESP was shown.

In most laboratory tests so far, card-calling or card-matching tests (with cards enclosed in opaque covers) have been used. In order to employ this method to gain specific information, it is necessary first to work out a code arrangement for translating the desired information into a certain sequence of cards. The ESP result (if ESP occurred) must then be decoded to obtain the desired knowledge.

Such a procedure was the basis for a suggestion made by W. H. Clark (2) to forecast the temperature. Clark suggested that the subject call the order of a pack of ESP cards which would be cut on a future day according to the temperature reading in a given newspaper on that day. By a method Clark suggested, high scoring on target series assigned to a certain temperature could be used as a basis for prediction.

Since ESP, as so far observed in the laboratory, has been too imperfect, it would be necessary for practical usage somehow to concentrate the information carried in every call. To do this, there would have to be a large number of independent calls on every target. These results could then be statistically evaluated, and the unreliability of individual calls thus compensated for.

G. W. Fisk and D. J. West (3) used this procedure in an experiment in which different subjects called the same card and the majority call was considered the call for that target. They failed in their objective, however, for insufficient evidence of ESP was secured.

This "repeated-guessing" technique was also used by R. H. Thouless (16). In addition to checking the "majority vote," as Fisk and West had done, Thouless introduced what he called an "index of preference," by which he proposed to compensate for the fact that subjects prefer certain symbols and have unequal numbers of calls for the various targets. In another article, C. Scott (12) solved some statistical problems raised by Thouless' method.

The repeated-guessing technique was also used by me in experiments with Miss J. K. (8). It proved to yield an increase

in the reliability of ESP calls. However, since the work with this subject was interrupted (for family reasons), it was impossible to develop the method further and to prove that the successful result was repeatable.

Because of the instability of ESP performance, it is necessary to find a way to determine in advance whether ESP is occurring in a given experiment and also to what extent. The subject's introspective statements have not proven to be reliable (7). The first experimenter who was concerned with finding a way to estimate the degree of reliability of ESP responses prior to the check-up was C. E. Stuart (13). Later, R. J. Cadoret (1) adapted a motor form of expressing ESP somewhat similar to that of dowsing. He tried to measure the reliability of ESP responses by having the subject make two parallel sets of calls, using one of them as an "index series" to be checked in advance. It was assumed that the level of scoring on the unchecked series would be similar to that on the checked. The subject was unaware which series would be used as the index. Slightly significant scores were obtained.

Another method for the same purpose was designed by R. Taetzsch (14), who proposed the use of dual-aspect targets; for instance, playing cards, both value and color (5). In such tests, one aspect would be evaluated as an index series, the other as the experimental series. Dual-aspect targets have also been used in a recent experiment by Dr. Schmeidler (11), who also has aimed at finding out the most reliable forms of ESP manifestation. She emphasizes the comparison of various methods of evaluation, either by appraising both aspects together or either aspect separately.

An original contribution is a psi communication system designed (but never put into practice) by Taetzsch (15). It is a device to convey information between two points in space or time with a degree of reliability fixed in advance. As corroborated in a paper including the relevant calculations, it is possible to use even an imperfect ESP faculty to deduce reliable information by the selection of one of two possibilities (white-black, yes-no, etc.). The subject is to make his call by pressing down on one of two buttons. The repeated-guessing technique is used and the result is worked out by a computer on the basis of a program put into it previously.

This program ensures the required reliability of information obtained. The machine thus determines the number of calls necessary to arrive at a reliable result according to the degree of ESP shown. It does not give an answer until this degree of reliability has been attained. The proposed system also allows for psi-missing by the random insertion of index calls between the regular calls. The index calls are to serve as an empirical check as to whether, in the given series, ESP is being expressed in a positive or a negative manner.

It can be seen, then, that parapsychologists have given considerable attention to the problem of finding a way to make ESP practically applicable. It seems that the difficulty has mainly been the fact that no way has been found to make the ESP performance so perfect and constant that lawful control can be obtained. This is the impression one would get from the studies generally accessible in the scientific press. It has been only in the experiments with the subject P.S., concerning whose ESP faculties the author reported previously (9, 10), that a sufficiently stable ESP response was attained to warrant an attempt at the reliable conveyance of information by ESP with a real hope of success.

Experimental Set-Up for Subject P.S.

The general objective of the experiment, carried out in 1962, was the identification by ESP of five numbers of three digits each. Each of these numbers was to be transmitted as an independent experimental unit. However, the object of the experiment was not actually to attain a practically applicable use of ESP to convey information (this could not yet be done, given the present state of affairs) but to furnish experimental proof that such application of ESP is possible in principle—that information can be conveyed by ESP with the required degree of exactness and reliability. At the time of planning this experimental series, P.S. was giving reliable results in distinguishing two colors (white-green) on cards enclosed in opaque covers, and therefore this technique was adapted to the task of identifying a number by ESP.

By means of an arbitrary system, the designated number was coded into a certain sequence of the colors of cards. The covers, with the cards inside, were submitted to the subject for identification repeatedly until an adequate number of calls were accumulated. The data, treated analytically, gave a reliable indication of the color of the uppermost side of the card before actual checking. By means of the code, the number could be identified.

More specifically, the experiment proper was carried out thus: First of all, a code was worked out by which a certain sequence of 10 (white or green) colors was allotted to each one of the three-digit numbers ranging from 000 up to 999. Then an assistant drew a number by lot. By means of the code, he then transformed it into a sequence of 10 colors. He next took 10 opaque covers made of stiff cardboard and marked on the reverse side with capital letters A, B. . . . . K; and into these he put the white-green cards (measuring 105 x 150 mm.) in such a way that the sequence of colors indicated by the target number were uppermost in the cover. The covers, or "envelopes," were then sealed shut.

To these 10 covers the assistant then added another 10 sealed covers marked on the back with small letters a, b. . . . . k, which contained cards placed just the opposite to those marked with capital letters. The purpose of this second set was a double one. First, it represented a parallel, independent test of the same fact as the basic set and could thus be a check on its correctness. Second, this set ensured an equal distribution of target cards. In point of fact, the chosen code for some numbers resulted in an unequally balanced sequence of colors so that if the subject should show a preference for calling one color over the other, a distortion could have resulted.

After taking from the assistant the 20 envelopes representing the selected number, the experimenter added to them another 10 envelopes of the same appearance, marked on the back 1, 2. . . . . 10. These contained randomly selected white-green cards prepared by the experimenter, who kept a record of their order. They were to be checked after the cards had all been called the required number of times, and presumably would indicate the quality of ESP which had operated in the series.

All 30 of the envelopes were of the same external appearance; they differed only in the markings on the back, and these were hidden from the subject's sight throughout the experiment. It was decided beforehand that if the cards with the numbers should show insufficient evidence of ESP, the entire series would be cancelled. It proved unnecessary to do this, for the ESP result was sufficiently stable throughout the experiment to give the desired reliability.

After preparing the targets, the experimenter thoroughly shuffled all the envelopes and gave them to the subject to identify the color uppermost in them. The subject did so, the conditions excluding all known possibility of sensory perception. The experimenter kept a record of the subject's call on each individual card as it was presented to him. Then the experimenter again shuffled the envelopes thoroughly and again handed them to the subject to be identified. This procedure was repeated 50 times so that a total of 50 calls was made on each envelope. Thorough shuffling between series ensured that there was a different order each time and that the index targets were randomly mixed with the experimental ones.

These 50 individual calls on each of the 30 covers gave 1500 calls altogether. The 500 index calls were checked first to get an idea of the amount of ESP to be expected on the others. When this proved to be sufficient, the evaluation of the experiment proper was made.

The evaluation of the two sets of experimental calls of 500 each was based on a method which had been worked out earlier in connection with previous experiments with the same subject. The criteria were so chosen that if they were met they would give strong promise that the content of the envelopes could be reliably foretold. The procedure was as follows:

The total of 50 calls on envelopes with capital letters and 50 on corresponding envelopes marked with small letters were evaluated separately from two points of view. First, the ratio of white to green calls on each envelope was computed. This was called "Total Score" (See Fig. 1. The total number of white calls is always given on the left and the total green calls on the right of the column.) Then the consistency of the preference for one color or the other on a certain envelope was checked. The 50 calls on each card were

Cover No.	Basic Series: Total Score W-G	Basic Series: Ratio of Outstanding Scores W-G	Basic Series: Conclusion (if reached)	1st Revision: Total Score W-G	1st Revision: Ratio of Outstanding Scores W-G	1st Revision: Conclusion (if reached)	2nd Revision: Total Score W-G	2nd Revision: Ratio of Outstanding Scores W-G	2nd Revision: Conclusion (if reached)	3rd Revision: Total Score W-G	3rd Revision: Ratio of Outstanding Scores W-G	3rd Revision: Conclusion (if reached)	Final Statement	Target
1	33—17	1—0												W
2	15—35	0—2												G
3	23—27	1—1												W
4	25—25	0—0												G
5	16—34	0—1												G
6	25—25	0—0												W
7	27—23	1—1												G
8	27—23	0—0												W
9	32—18	0—0												W
10	22—28	0—0												G
1a				26—24	1—0									G
2a				31—19	1—0									W
3a				29—21	1—0									W
4a				31—19	1—0									W
5a				19—31	1—1									G
6a				26—24	0—0									G
7a				32—18	1—0									G
8a				27—23	1—0									W
9a				33—17	2—0									W
1b							26—24	1—0						W
2b							15—35	0—2						G
3b							12—38	0—3						G
4b							19—31	0—1						W
1c										14—36	0—2			G
2c										19—31	0—0			G
3c										37—13	2—0			W
A	18—32	0—1		19—31	0—1	s	18—32	0—1	s	14—36	0—2	G	G	G
B	34—16	2—1	w	31—19	1—0	W							W	W
C	35—15	2—0		40—10	3—0	w?	36—14	1—0	W				W	W
D	29—21	1—0		34—16	2—0	w?	31—18	2—0	w	43— 7	4—0	W	W	W
E	33—17	2—1		33—17	2—0	w?	30—20	1—0		45— 5	5—0	W	W	W
F	27—23	0—0		8—42	0—4	G							G	G
G	29—21	0—0		46— 4	4—0	W							W	G
H	15—35	0—2	G										G	G
I	21—29	0—3		8—42	0—4	G							G	G
K	39—11	3—0	w	36—14	3—0	W							W	W
a	27—23	0—0		29—21	2—0		22—28	0—1		27—23	1—0			W
b	17—33	0—1		7—43	0—3	G								G
c	32—18	2—0		31—19	1—0		28—22	0—0						G
d	27—23	0—0		24—26	1—1		16—34	0—2		22—28	0—0			G
e	30—20	1—0		39—11	3—0		21—29	0—0		25—25	0—1			G
f	34—16	1—0		40—10	2—0	W								W
g	26—24	0—1		28—32	0—0									W
h	45— 5	5—0	W											W
i	28—22	0—0		37—13	2—0									G
k	23—27	0—0		18—32	0—3									G

Fig. 1. An example of the data from which one of the three-digit numbers (in this case 242) was identified. Under the heading "Basic Series" is the ratio of colors (or "total score") guessed for each envelope, and beside it, the results of the five 10-number groups (called "Ratio of Outstanding Scores" in the text). In the "Conclusion" columns, a capital letter means that the criteria for indication were met; a small letter, that they were nearly met. The revision columns from left to right show the gradual elimination of those cards which have met the specified criteria of certitude until, at the bottom of the Final Statement column, all ten large lettered envelopes are seen to match the correct target arrangement which represents the selected three-digit number.

divided into five consecutive groups of 10 calls each. The ratio of white and green calls was evaluated in each of these five groups separately. But only those groups were counted in which the calls of one color predominated considerably over those of the other, at least to the extent of 8-2, 9-1, or 10-0. These were called "Outstanding Scores." (See "Ratio of Outstanding Scores" in Fig. 1

On the left is the number of outstanding scores in which white calls predominated, and on the right, the number in which green calls predominated.) The judgment as to the actual color of the card in the envelope was drawn after the results on the envelopes marked with capitals had been compared with their opposites marked with small letters.

The definite conclusion as to the color of the card in an envelope was not drawn until all of the following conditions had been fulfilled at the same time. These criteria were:

1. The ratio of colors guessed on a given (capital or small lettered) envelope was 35-15 or greater. (Ratios closer to the chance expectation of 25-25 were considered undecided.)

2. The ratio of "outstanding scores" (8-2 and better in each group of 10 calls) pointed clearly in the same direction. Hence the preponderance was on the same side as the majority data, namely, at least 3-0 (or better still 4-1, 4-0, or 5-0). That is, out of five groups of ten calls a ratio of 8-2 or 9-1 or 10-0 appeared at least three times (3-0).

3. The results of Points 1 and 2 were borne out by the agreement of the *opposite* cards (small or capital lettered, depending on Point 1) on which there had to be a majority score no lower than 30-20 and a simultaneous indication in the same direction based on the ratios of "outstanding scores" at a rate of at least 1-0, or better (2-0, 3-1, etc.).

4. In case Point 3 was not fulfilled, as when the result on the opposite card was not sufficiently convincing, it was decided to require a more decisive result in the main set of calls to offset this:

a. On Point 1 there must be a score of at least 40-10 or better.

b. On Point 2 there must be a ratio of "outstanding scores" of the order of either 4-0 or 5-0.

When the first basic series of 50 calls on each envelope had been evaluated, those envelopes which met the above criteria were removed from the pack. The remaining ones which did not meet the criteria were mixed with a corresponding number of numbered index envelopes. They were thoroughly shuffled and given the subject again as in a new experiment.

At each similar repetition series, 50 calls were made on each envelope and the result evaluated as before. Those envelopes which again did not meet the criteria were put through the same process until they did reach the criteria.

When all 10 colors indicating the given number had thus been reliably identified, the number was deduced by the original code. Then the result was compared with the assistant's record of the target number.

Altogether, five independent series were carried out in this manner and five three-digit numbers were thus identified without a single mistake. Figure 1 shows an example of the result from which one of these three-digit numbers was identified. It shows also the way in which the information about the content of the individual envelopes was determined in the successive experimental series until all could be correctly identified.

Discussion

The basic objective of the experiment was to show the possibility of identifying targets by ESP with a precision which could be specified before the check-up. The objective was attained.

A problem remains concerning the efficiency of the method. For the time being, the procedure is uneconomical and cumbersome as compared with other means of communication. Altogether, five three-digit numbers were transmitted; but to do this, it was necessary to make 19,350 single color-calls (of which 11,978 were hits and 7,372 were misses). The average speed on the whole was about 400 calls per hour so that the mere accumulation of the data took some 50 hours (with two persons participating). To this we must also add the time necessary for evaluation of results.

It must be admitted, however, that this great consumption of experimental time was due partly to the fact that the empirically chosen criteria were very strict so as to meet the requirement of extreme reliability in the identifications. But in some cases of application it would be sufficient to use a statistically expressed reliability of identification, which would make the criteria less stringent and reduce the number of necessary calls (given the same level of ESP performance of the subject). Numerous ways of saving us

from making superfluous calls and of attaining the required reliability of identification more economically are afforded by applying communication theory.

The application of some method of automatically recognizing the point at which identification could be possible would also considerably reduce the time involved. It can be seen from Figure 1 that the calls on quite a number of envelopes exceeded what was necessary to identify them (e.g., targets H, h in the Basic Series, or targets F, f in the First Revision Series).

To find a way to determine the point when further calls would be unnecessary, as Taetzsch has suggested for his case, would save at least several scores of calls.

Conclusion

This experiment is proof that ESP as a means of communication can be practically applied. The present technique may not be suitable, for it was carried out only as a short-distance experiment. In actual usage, long-distance communication would be called for, especially in situations in which radio communication is impossible. For long distances, of course, further research aimed at securing a sufficient stability of ESP performance under long-distance conditions will be necessary.

This experiment had several useful features: First was the repeated-guessing technique for concentrating information. By this method the necessary data could be accumulated by only one subject, rather than many.

In addition to this, the use of the index trials served as an indicator of ESP. Exclusive of them, the two parallel series, which checked and complemented each other, added another advantage. Because of them it was possible to get a good idea in the course of the experiment of the extent to which the majority votes on corresponding covers tended to favor opposite sides.

Even though the technique permitted this preliminary estimation of trends, it did not open any avenues by which the subject could have gotten sensory cues. The index cards and the test cards were so randomized that no reasoning on his part could have been of benefit.

Finally, not the simple majority vote but an outstanding majority was used; and in cases when such a majority was not secured, the calling was repeated until it was. Consistency of calling in addition to an adequate majority was a useful auxiliary criterion.

The criteria were set empirically, and these were reached in the experiment. It well may be that economy of procedure can be improved with the addition of revisions in line with the theory of probability and of information theory.

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