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SRI International

15 November 1979

EXECUTIVE SUMMARY

PROPOSED GRILL FLAME PROTOCOL: TASK II (S)

PROPOSED SRI INTERNATIONAL PROTOCOL FOR RESEARCH ON REMOTE PERTURBATION TECHNIQUES (S)

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CONTENTS (U)

(S) REMOTE PERTURBATION TECHNIQUES: PROJECT DESCRIPTION AND EXPERIMENTAL PROTOCOL (U)

A. Background (U)

(S) There have been many reported accounts of phenomena variously known as telekinesis, psychokinesis, teleportation, etc. Most of these accounts are clearly derived from carefully staged tricks which are revealed whenever they are studied under controlled and well recorded conditions. There are a few, however, which describe serious research by reputable investigators. Included among these are experiments in which the subject attempts to perturb, by mental processes alone, the outcome of an otherwise random event. This kind of remote perturbation experiment is appealing in that it involves no subjective interpretation--the results may be expressed entirely in probabilistic terms. Reference 2 contains a summary description of these experiments. As an overall evaluation of this data base, it is unlikely that the apparent RP effect is simply an artifact of selected reporting by the laboratories involved; even if one were to assume that there were ten unreported nonsignificant experiments for each reported significant one, the entire expanded data base would still show significant effects with odds against chance of better than 2000:1.

(S) There are, however, two characteristics of this data base which pose problems. First, the effects are rarely stable with one individual's RP effort, the quoted results being averages over a number of individuals. Secondly, the physical environment of the random event sources and associated electronics was not discussed in any detail for any of the experiments, so it is possible that some of the effects may be the result of normal and possibly subtle electronic interference.

B. Scientific Merit (U)

(S) Scientists have been slow to admit that such phenomena as RP may be consistent with the formalism of established science. The interpretation of quantum physics is flexible enough to encompass a number of seeming paradoxes and some scientists have suggested quantum mechanisms to explain RP without violating the basic conservation theorems of physics. Mattuck[1] describes one such mechanism and shows that effects on a macroscopic scale are consistent with the theory. While these hypotheses do not prove the existence of RP phenomena, when coupled with the findings discussed in Reference 2 they do strongly indicate that further research is appropriate.

C. Objective (U)

(S) This experiment is designed to replicate the type of experiments described in Reference 2 under more rigorously controlled conditions in order to evaluate the claims of having demonstrated the RP phenomenon.

D. Plan (U)

(S) Expressed in simplest terms, the experiment may be described as follows:

(1) (S) A truly random sequence of 0s and 1s (binary sequence) is generated by processing and sampling the behavior of a noise source or random event generator (REG).

(2) (S) The RP participant is instructed to bias the composition of the sequence in favor of 1s or 0s by exercising mental processes.

(3) (S) Feedback is provided the participant, so that he can instantaneously be aware of the degree to which he is succeeding.

(4) (S) The associated computer equipment simultaneously carries out a statistical analysis of the sequence of digits until it can be deemed perturbed (biased as instructed) or not whereupon the trial (or test) is ended.

(S) The testing phase of the experiment consists of a large number of such tests by each participant.

(S) The basic elements of the experiment are:

a. (S) Sources of Randomness: Two sources for genuinely random binary sequences are to be employed as well as one pseudo-random binary sequence generator. The radioactive decay of prometheum 147 (^{147}PR), occurs by the emission of beta particles which are readily detected. The other random event generator is an electronic noise diode which is subject to avalanche discharge which is also easily detected electronically. The theory of both these devices and the distribution of random events (β-emission or avalanche discharge) is well understood and has been well verified experimentally.[3,4] The random events are Poisson distributed in time. Each time a random event occurs, it will trigger a change in a flip-flop device--from one to zero or from zero to one depending upon the state upon detection of the random event. The flip-flop device thus randomly switches back and forth between zero and one with the occurrence of random events. This device is sampled periodically (at intervals much longer than the average event rate) to produce the desired random binary sequence.

(S) In addition, a pseudo-random binary sequence will also be utilized as needed. This differs from a random sequence in that, although the numbers appear to be random, they are actually calculated by the computer from a starting number or "seed" and thus for any given seed are deterministic. If the RP phenomenon should exist, a great deal can be determined about the nature of the phenomenon by the difference to which truly random and deterministic events are affected by it.

b. (S) Analysis Capability: The random (or pseudo-random) binary sequence must be statistically analyzed in order to determine if it is actually random or is biased. Computational capability is also used to

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govern the sampling process described above, to drive the displays and to catalog and store certain results of the tests. The analysis is carried out in real time in order to provide effective feedback to the RP participant.

c. (S) Feedback Display: In order that the RP participant can benefit from almost instantaneous feedback, he will be provided with a color video display driven by the output from the statistical analysis of the binary sequence. A variety of preprogrammed displays will be made available including simple clock motion or "race-car" displacement as indicators of perturbation as well as more technical ones such as the progress of the sequential analysis (see Reference 2). An auditory feedback channel will also be provided wherein the frequency or intensity of a tone (or complex waveform) varies to indicate perturbation. The participant is expected to choose the particular feedback mode which he feels is most effective.

(S) It has been tacitly assumed that any RP effect would act upon the random event generator. This assumption will be checked by recording the incidence of random events, the resulting binary sequence, and the output of the statistical analysis on magnetic disc storage for subsequent stage-to-stage analysis. The analysis of this for consistency along with the recorded output of the feedback channel (video or audio tape) will isolate the source of any perturbation as being in the random source, the computer equipment or the display equipment.

(S) We intend to address the two problems with previous experiments by first focusing our attention upon a limited number (eight or less) of participants who have shown previous expertise as remote viewers. By using experienced remote viewers, it is anticipated that we should be able to observe an effect within this limited number, rather than having to average over large numbers of individuals as in the data base experiments.

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Also, by using more sensitive analysis techniques than have been used previously, even a small effect can be stabilized.

(S) Secondly, to assure ourselves that the noise sources are sufficiently free of even subtle (but normal) electronic nonrandomness, we intend to use the most rigorous construction and design techniques possible (battery power, optically coupled signals, etc.) to isolate the sources from normal environmental influences. Furthermore, the noise sources will be chosen for their internal simplicity[3] and thus may be amenable to realistic mathematical modelling. Using the models, we are able to calculate by Monte Carlo techniques a noise source's dependence on various external and internal physical parameters.

(S) The experiment will be conducted in two phases. Phase I consists of the assembly and checkout of the apparatus and exhaustive validation testing. During the validation testing the entire system will be exercised over a wide range of environmental and testing conditions to assume the randomness of the binary sequence and the proper functioning of the computer and displays. Appendix A provides further information on the validation testing procedures.

(S) Phase II consists of the actual RP participant testing. There are three primary independent variables that may be varied during the course of the investigation. Two of them, the random source (beta decay, noise diode, pseudo random) and the mode of feedback have been discussed. The third, and prime independent variable is the presence or absence of an RP participant. The final measure of significance of the experiment is essentially whether a consistent difference can be discerned in the randomness of the binary sequence when the apparatus is operating with and without an RP participant. The dependent variable, provided by the statistical analysis of the binary sequence, is a quantitative measure of the degree to which the composition of the sequence differs from what would be expected

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by chance. (Details of the statistical analysis are provided in Reference 2). For individual trials, the criterion for success will be that the odds against chance expectation be greater than 20:1. The first four months of the investigation will be used as a pilot period during which participants will familiarize themselves with the experiment and explore various techniques in a learning mode. This period will also be used to optimize the device parameters.

(S) During the final two months of the investigation, each participant will be asked to contribute 100 trials. The following is a typical succession of events during an RP trial session:

- The participant and experimenter will discuss the program status to date. If the participant feels that set or circumstance are unfavorable to his participation, the session will be postponed.
- The variables or other changes in the experiment will be described to the participant to whatever extent desired.
- The participant will select whatever mode of feedback he prefers for the trials in the forthcoming session.
- The participant initiates successive trials at his own pace at the instant of his choosing until the (nominally) 30-minute session is concluded or sooner if the participant wishes.
- The participant is then debriefed. He is told of the outcomes of the trials, the statistical significance or lack thereof and given the answers to any other questions concerning the session or his cumulative performance.

(U) At no time will any participant be exposed to radiation or be instrumented for monitoring of any physiological function--even by remote sensors. No drugs, hypnosis, special sensory or proprioceptive stimuli, liminal, or subliminal, electrical, or electromagnetic, will be used.

(U) After a participant has contributed one hundred trials, we will determine the number of trials that had odds against chance expectation of

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greater than 20:1. If this total number of runs is greater than ten (the number required by exact binomial calculation to meet odds against chance of greater than 20:1) then we will declare that participant to have a significant result. To assess whether the entire investigation is significant, we shall combine the results of all participants using standard statistical procedures.[5]

(S) One primary consideration in the planning of the experiment is assuring the credibility of the findings. If positive results are reported, critics will challenge virtually every aspect of the test and data analysis. The following measures are being taken to reduce the vulnerability of the experiment to attack.

a. (S) Safeguards Against Deception: At no time will the RP participant have access to the equipment room in which the computer and random source hardware is kept. All raw data are recorded, back up copies made and stored each day in a secure GSA approved safe after each session. Generally, the last safeguard is to examine the results of the completely separate experiment to be executed by the contracting agency.

b. (S) Validity of Data Sample: All data taken in Phase II will be saved and made available for further analysis if the data analysis techniques should be questioned. No data will be discarded. If any part of the data taken subsequent to the four-month pilot period is not included in the combined statistical assessment, it will be so identified. Any circumstances during experimentation which are out of the ordinary will be recorded.

c. (S) Validity of Analysis Methodology: After Phase I validation of the functioning of the apparatus, the entire system will be exercised using artificially biased binary sequences (Monte Carlo testing) to the extent that the probability of errors of the first and second kind

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are accurately known. These probabilities can also be calculated probabilistically to provide an independent check. Basically we are testing the hypothesis that the binary sequence is composed of 50% zeros and 50% ones. An "error of the second kind" consists of rejecting this hypothesis when it is true; an "error of the first kind" consists of accepting the hypothesis when it is false. The previously cited criteria for each trial of judging the sequence to be perturbed if the odds against its occurrence by chance are greater than 20:1 correspond to a probability of error of the first kind of 0.05.

d. (S) Influence of Uncontrolled Parameters: It can be hypothesized that such uncontrolled factors as solar storms, cosmic radiation, the phases of the moon, etc., may affect the experiment. In some cases, the threshold values at which the level of the parameter might be significant can be determined. In general, however, we rely on two safeguards to minimize any effect due to uncontrolled parameters. During validation testing and before and after trial sessions, the experimental apparatus will be exercised and any anomalous behavior recorded. Second, the chief independent variable--presence or absence of RP participant--should be uncorrelated with the uncontrolled parameters, hence a clear dependence of any measured RP effect upon presence of a participant can be attributed to the participant. In other words, it would be highly improbable that any uncontrolled parameters would be effective only when the RP participant is present.

e. (S) Interpretation of Results: This experiment is an attempt to determine if remote perturbation as defined exists. The nature of the experiment was suggested by earlier research which has claimed some degree of success. The scope of this project does not permit much extension in the list of independent variables. As a result, such potentially important variables as shielding, device/participant separation or the simultaneous use of multiple participants cannot be investigated.

(S) It has been assumed that if any RP effect is detected it is due to the designated participant. Obviously, there is a large number of individuals who might be in a position to exert an RP influence on the device, in particular, the experimenter. No attempt has been made in the design of the experiment to isolate the agent of any RP influence.

(S) At the end of the current program, the result can be characterized in one of three ways as follows:

(1) Positive: The experiments meet or surpass the overall criteria stated on page 5.

(2) Negative: The experiments do not meet the stated criteria for the entire experiment or the overall performance of a single subject.

(3) Indeterminate: Anything other than positive or negative as defined above.

(S) If the result is positive, we suggest that further experiments be undertaken in a follow on program to determine the limitations of the phenomenon for military exploitation. Such experiments would include an assessment of the effects of distance and shielding, possible interference from other physical phenomena and the potential for refinement for greater consistency or sharper definition. It is also likely that some experimentation would be undertaken to attempt to determine the mechanism for RP and the physiological source.

(S) If the result is negative as defined above, we would suggest that an additional experimental phase be added on only if there were certain well characterized portions of the data showing effects which are quite unlikely to have occurred by chance alone. This additional effort would be used to ascertain what conditions (sampling rates, feedback, etc.), prompted the unlikely results.

(S) An indeterminate result may take many forms. Contingencies have been considered for some of these.

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- If only one of the experiments is positive, an additional phase of testing might be undertaken with an exchange of certain critical hardware as well as other modifications which might be indicated by an analysis of the results.
- If one or two participants show a significant RP capability as defined on page 5, further experiments might be considered to determine if the capability can be transferred, or detected to be present in enough individuals for military consideration.
- If any observed effect seems to be inconstant--on again, off again--the data will be analyzed to seek correlations which might explain the fluctuation. A limited number of additional tests might be necessary to validate possible causes.

E. Participants (U)

(S) Some relation between remote perturbation and remote viewing might be expected since in ordinary physical interactions information about the state of a system (as in RV) can be obtained only by way of some interaction with the system, which in some cases may be supplied by the observer. We might therefore expect an observable dependence between RV and RP under certain conditions. For this reason, we plan to seek only experienced remote viewers to participate in this investigation, and we will work with no more than eight individuals. All participants are to be in general good health, as determined by a standard employment physical examination.

(S) SRI International has individuals who are presently, or have past experience in, participating in remote viewing experiments. These participants are consultants or members of the SRI staff and will work if selected in a contractual arrangement. Only those individuals who indicate a positive desire to participate, after familiarization with the remote perturbation experiments and procedures, will be accepted into the RP program. The information and consent form to be used is included in Reference 2. Some of these participants may have had some familiarity

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with RP experiments of a similar nature. The difference in levels of naivete among the RP participants will be offset by the oral and written briefing material (see Reference 2) and by the four-month pilot period.

(S) The total duration of Phase II of the investigation is six months. Experiment sessions will take place during the normal work week and will not exceed 1/2 hour length each. There will be no more than two sessions per day, one in the morning and one in the afternoon. The total number of trials by any individual during the pilot period and the ultimate contribution of 100 trials will not exceed 300. This should require approximately 30 half-hour sessions from each participant.

(U) A medical doctor will be briefed on the program and will be available during all periods of experimentation on a standby basis. Reference 2 describes the available medical facilities, the procedures employed, and insurance coverage applicable to the various participants.

(S) Participants will be debriefed as follows:

- Session Debriefing: At the end of each experimental session, the subject will be given all the data available pertaining to that group of trials. Any statistical significance or lack thereof will also be clearly explained to him.
- Experiment Debriefing: At the conclusion of experimental testing, a final unclassified report will be prepared, summarizing all results from the experiment, together with any conclusions or scientific findings that may have come out of the study. The report will be given to each participating subject. Finally, any remaining questions that the subjects may have about the experiment will be answered.
- Specific Debriefing Protocols: We do not anticipate that participation in these experiments will have any effect on the day-to-day life of the subjects. This study is a purely intellectual activity, and we believe that the debriefing provided by the final technical report will be a suitable termination of the experiment for the subject.

F. Facilities (U)

(U) The SRI experiment is to take place in the Building 44 laboratory. (See Reference 2 for complete description and photograph.)

(S) The room to be used by the RP participants for this work is a comfortable, carpeted, air-conditioned environment. It is lit by a combination of fluorescent fixtures in the ceiling and incandescent table lamps. There is a couch, an easy chair, and two tables. The computer graphics terminal stands on one of these tables. The participant will be seated on a conventional reclining swivel chair.

(S) In an adjacent room, the random event generators, computational equipment, programmable terminals and associated peripheral equipment will be installed. This room may be secured independently from the rest of the facility.

REFERENCES (U)

1. R. D. Mattuck, "Thermal Noise Theory of Psychokinesis: Modified Walker Model with Pulsed Information in Rote," Journal of Psychoenergetic Systems, August 1977.

2. "Proposed Grill Flame Protocol: Task II (S)," "Proposed SRI International Protocol for Research on Remote Perturbation Techniques (S)," SRI International, Menlo Park, CA (8 May 1979).

3. R. H. Haitz, "Controlled Noise Generation with Avalanch Diodes," IEEE Transactions on Electron Devices, Vol. ED-13, No. 3, pp. 342-346 (March 1966).

4. P. C. Stevenson, NAS-NS-3109, "Processing of Counting Data," National Academy of Sciences/Nuclear Regulatory Commission Scientific Series on Radiochemical Techniques (May 1966).

5. R. Rosenthal, "Combining Results of Independent Studies," Psychological Bulletin, 1978, Vol. 85, No. 1, pp. 185-193.

Appendix A

PHASE ONE TEST PROCEDURES

PHASE ONE TEST PROCEDURES

Sub-System Testing

- Haitz noise diode

  (1) Measure filtered and raw power spectra, and filtered pulse height distribution as a function of the following physical parameters:

(a)	Diode reverse current for	60-200 μ amps
(b)	Reverse current of 100 μ amp (manufacturers recommendation)	
	• Temperature	-40° to $+40^{\circ}$C
	• Magnetic field	6000 gauss (parallel and perpendicular to the diode junction
	• Low intensity gamma ray irradiation	1.33 MeV

  (2) Measure filtered and raw power spectra, and filtered pulse height distribution at 100 μ amps reverse current at 20°C with the diode and temperature sensor mounted in its final package.

- Electron detector

  (1) With detector and source mounted in the final assembly, confirm manufacturer's noise specifications, and measure the ^{147}Pm beta decay pulse height spectrum and compare with the known spectrum.

  (2) Confirm that amplifier and pulse shaping system ICs are functioning per manufacturer's specification.

- Pseudo random generator

  (1) Generate the entire number set (2^8-1) and compare with expected number set.

- Sequential analysis

  (1) Using tested computer algorithms for random number generation, Monte-Carlo test the sequential analysis formalism.

- Computer and display sub-systems

  (1) As there appears to be no evidence to the contrary, we will assume that the manufacturer's specifications of mean-time-between-failure to be an approximate measure of these sub-systems' susceptibility to possible environmental factors such as geophysical phenomena and cosmic rays.

  (2) We shall consider what thresholds must be exceeded before extreme environmental factors such as gamma irradiation become important.

  (3) These sub-systems must, of course, meet the usual acceptance criteria applied to such apparatus before they are declared operational.

Completed System Testing

Once the total system meets design specifications and is declared operational, a complete series of tests will be initiated.

(1) Each of the "true" random sources will be subjected to at least the following statistical tests.

(a) Frequency test

(b) FFT tests

(c) Serial test

(d) Gap tests

(e) Yule test (5-digit sums)

(f) Autocorrelations test

(g) Conditional bit tests

(h) D^2 test

(i) Runs-of-length-n test

(j) Sum-of-n test

(k) Maximum/minimum-of-n test

(2) The pseudo random generator must produce the expected sequence.

(3) All generators will be used individually in Monte-Carlo confirmations of the sequential analysis formalism.

(4) Finally, the various procedures to be used in Phase II will be simulated with extensive Monte Carlo runs.

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