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PERCEPTUAL AUGMENTATION TECHNIQUES

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I OBJECTIVE

The purpose of the program is to determine the characteristics of those perceptual modalities through which individuals obtain information about their environment, wherein such information is not presented to any known sense.

The program is divided into two categories of investigation of approximately equal effort, applied research and basic research. The purpose of the applied research effort is to explore experimentally the potential for applications of perceptual abilities of interest, with special attention given to accuracy and reliability. The purpose of the basic research effort is to identify the characteristics of individuals possessing such abilities, and to identify neurophysiological correlates and basic mechanisms involved in such functioning.

II PROGRESS DURING THE REPORTING PERIOD

A. Applied Research

1. Remote Viewing

As discussed in previous reports, the remote-viewing channel through which individuals obtain information about their environment appears to be a relatively well-developed stable channel in certain of our subjects. As will be seen below, for example, the channel appears to be of sufficiently high data rate that a knowledgeable analyst could discriminate among possible alternative technologies on the basis of descriptions provided by remote viewing of technical apparatus.

Given the observed degree of stability of the phenomena, a

lengthy series of experiments were carried out in which certain variables were manipulated in order to test various hypotheses. These consisted of (a) the measurement of physiological correlates during remote viewing; (b) the effects of manipulating the feedback variable over the range 1) mid-testing feedback via walkie talkie, 2) delayed post-experiment feedback, 3) no feedback, the latter providing a test which permitted rejection of the hypothesis that apparent remote viewing was simply precognition of feedback data; (c) determination of whether resolution and discrimination on the order of technical laboratory equipments was possible, verified unambiguously in the affirmative.

(a) Local Targets with Mid-Experiment Interrogation and Feedback (Training Series)

In this series of training experiments, designed to give immediate data to experimenters and subject, a subject is asked to take part in a remote viewing experiment under the following conditions.

The subject and two experimenters (one of whom was R.T.) are in a first floor laboratory in building 30 at SRI. A second experimenter (H.P.) leaves the area and proceeds to a remote location of his choosing. None of the experimenters with the subject know of the remote target location. H.P. and R.T. are in two-way radio communication via walkie-talkie, (a) to provide the experimenter at the target location real-time data and (b) to give the subject immediate feedback after he has made his assessment of the target. By this means the subject is given an opportunity to learn to separate real from imagined images. We stress that this is not to be considered a demonstration-of-ability test, but rather a training step. In these experiments we also monitor physiological

correlates, as discussed in Section B.3. Following is a description and summary of the seven experiments of this type that were carried out. The first five experiments were carried out with Subject S-4, the last two with Subject S-3.

1) For the first experiment in the series, the remote experimenter was standing on a small bridge over a stream passing through a gully. The subject described a hill with a small amount of vegetation on the top, and some gray shingles, like a roof, over water, an almost error-free description of the location. Although there was no corrective feedback, the subject's narration was elicited by the remote experimenter via questions, and therefore it would be difficult to quantify the amount of remote viewing present given the possibility of unknown cueing.

2) The remote experimenter was standing in the middle of a bed of purple iridescent flowers surrounded by a bright green hedge. Before there was any radio contact the subject said that her main perception was of "iridescent blue and lush green vegetation". This is judged to have enough commonality to be considered a reasonable match.

3) The remote experimenter had gone to a kiosk bulletin board in the shape of a wooden cylindrical tower with a brown wooden roof. The structure is about 15 feet tall. The subject's first words, before radio communication was established, were: "He could be near a grey wooden tower with a brown roof." This was considered a direct hit and the subject was told that this was the case. The subject went on to describe correctly the roof around the tower as sloping but she incorrectly described the tower as square. The small-size perspective was not observed by the subject.

4) The experimenter was standing on the edge of a concrete

waterway made up of several zigzag elements. It is a decorative watercourse through a park. The subject's first comments are of a "strong zigzag". With a question from the remote experimenter as to its orientation (i.e., whether horizontal or vertical), her description evolves into a "zigzag water channel with concrete sides". We are confident that the feedback she received in this case by questioning could not have conveyed this information.

5) The remote experimenter stood next to a large oak tree. In his immediate forward field of view was a large circular brick wall surrounding a plaza area containing a fountain. The subject's first comments prior to radio feedback comprised a description of large trees and a brick elliptical wall that was nonfunctional. The subject was then given feedback that the primary things to be seen from that location were in fact a large tree and a circular brick enclosure.

6) The remote experimenter went to the top of a 100 foot wooden tower on which was mounted radar equipment. The tower is painted yellow and has a wooden wall enclosing the top. By and large, much of the material volunteered by the subject does relate to the target location. For example, he eventually described it as a yellow tower before either the color or the tower were mentioned, although the height was not cognized. As the first in a training series on local viewing for this subject there was considerable radio communication and therefore although remote viewing was in evidence, no clear judgment can be made as to quality.

7) The remote experimenter in this experiment walked through a blacktop parking lot past a blue construction building, entered a park along a footpath through the grass, and then stood next to a fountain.

The subject described the above material essentially without feedback or radio contact. As a single narrative, he told of first seeing blackness which he identified as an asphalt parking lot behind the experimenter, and told that there was a blue building nearby. When this was confirmed, the subject went on to describe a white footpath through grass and entry into a depressed area. The subject then asked if the area was a fountain, which was confirmed. This latter performance is indicative of the most successful perceptions that we have seen from this subject.

We stress again that this particular series, involving as it does mid-experiment questioning and feedback, is to be considered a training series to provide subject and experimenter alike means whereby various aspects of the phenomena may be examined in detail. Nevertheless, sufficient descriptive elements were given before feedback to indicate unambiguously a functioning ability. For a summary of pre-feedback identifications, see Table 1. Since these experiments were carried out with monitoring of physiological correlates, it was established that such monitoring is not intrusive.

Real-time observation of the remote site under conditions of real-time subject interrogation leads to the following best-effort qualitative interpretation: Remote viewing generally does not provide an integrated visual impression of an entire scene in the sense of direct visual observation. Rather, the subject provides an overall impressionistic gestalt together with individual salient elements, a response similar to that obtained under conditions of tachistoscopic viewing. Remote viewing is, however, generally (for experienced subjects) at a level sufficient to permit discrimination among known alternatives on the part of an analyst.

TABLE 1
SUMMARY OF REMOTE VIEWING EXPERIMENTS
WITH MID-EXPERIMENT QUESTIONING AND FEEDBACK

Target Location	Subject Description Before Any Feedback Given
1. Embankment with bridge and stream	Hill with vegetation at top only
2. Iridescent purple flower bed surrounded by bright green hedge	Iridescent blues and greens, like feathers.
3. 15 foot tall cylindrical wooden kiosk with a brown metal roof	Grey tower with a brown roof
4. Zigzag water channel with concrete sides	Strong zigzag shape
5. Large oak tree next to brick enclosure	Large chestnut tree and non- functional brick wall.
6. 100 foot wooden radar tower	Stone wall taller than experimenter
7. Blue building and circular fountain	Blue building and circular fountain

(b) Variable Feedback Study

In this second series of eight experiments, the variable manipulated was the type of feedback that was given to the subject. The feedback covered the range (a) immediate feedback via walkie-talkie as before, (b) subject taken to the remote site after the experiment, (c) no feedback given whatsoever. In this latter case the subject was not even told whether or not she was correct.

One aspect of the examination of the effect of feedback was to test a hypothesis proposed by Dr. Gerald Feinberg who had witnessed some of our early remote viewing experiments. A paper of his entitled, "Precognition--Remembrance of Things Future", is included as Appendix A. His theory, briefly stated, proposed that since the subject eventually gets to perceive directly the target location with this normal senses, he might in principle gain access to that information by reading his own mind precognitively. The physical basis for this would be the electromagnetic advanced potential wave carrying his future memory backward in time, thus allowing it to be "remembered" before it took place. Although this summary does not do justice to the theory, it is clear that the way to test such a theory is to withhold data entirely from the subject as to the nature of the target location.

With the two goals of testing the Feinberg hypothesis and measuring the overall effects of feedback, we arranged that walkie-talkie feedback, delayed (post-experiment) feedback and no-feedback experiments were randomly intermixed. The protocol for all experiments involved one of the experimenters leaving the subject with the other experimenter in the SRI laboratory. The traveling experimenter would be allowed fifteen

minutes to arrive at his target location. He would then pay close attention to his surroundings for ten minutes, after which he would return to SRI. In the first five experiments, H.P. was the outbound experimenter, in the last three experiments the experimenter roles were reversed with R.T. as the outbound experimenter. The entire set of experiments were carried out with Subject S-4.

1) The formal courtyard of SRI's International Building, about 20 x 20 meters surrounded on four sides by two-story concrete buildings, served as the first target. In the center of the courtyard is a presently inactive fountain and small trees planted in rows. During the experiment, the outbound experimenter (H.P.) stood in that fountain. There was no mid-test feedback, only post-experiment feedback.

The main descriptive elements of the subject pertained to a formal garden with a little dry fountain in the middle. Other elements that the subject described were a wrought iron fence, a trough leading to the fountain, and the experimenter climbing steps. In addition to the above correct descriptions, the subject also described a blue sign and railroad tracks behind a fence. These latter elements are not present at the site.

The formal garden ambience is clearly a correct gestalt of the place and would allow for easy discrimination from the other target locations that follow. Except for the two incorrect data noted above, the rest of the description was basically coherent and accurate.

2) The target location was a 30-foot long trailer used by SRI to house its mobile radio transmitter. Puthoff walked back and forth outside this stainless steel trailer for the ten minutes of the experiment. In our estimation the subject gave a nondefinitive set of impressions

which were too general to be considered as specifically related to the designated target. No feedback was given either during our following the experiment.

3) A bicycle shed behind SRI's building 30, brightly lit by sun shining on translucent white plastic walls, comprised the third target. The outbound experimenter (H.P.) sat on a bicycle.

The subject's main description detailed how brilliantly the place was lit with no shade. The descriptions which followed dealt with converging metal spokes. Her impression was that the metal spokes divided the space of a circular area rimmed by some other material. She submitted a drawing showing a stick figure representing the experimenter (H.P.) standing on one of the spokes of an eight spoked wheel, about a man's height in diameter. Since the content of her ten minute description dealt with the elements brightness and metal spokes, the inaccuracy is to be found in the scale of the description, and of course her omission of the fact that the spoked wheel belonged to a bicycle. As in the previous experiment, no feedback was provided to the subject either during or following the experiment.

4) The fourth target was a wooden bulletin board kiosk, used earlier as a target, about half a mile from SRI. It is a cylinder about fifteen feet high with a conical roof having a three foot overhang. Mid-test communication via walkie-talkie permitted questions to be asked by the remote experimenter, and post-experiment feedback was also given.

As in experiment two, nothing in the subject's description would allow one to identify the target. Feelings of anxiety were expressed

along with a request to terminate that location as a target because of "fear of a primal force and danger". A purely speculative point could be made concerning the fact that while at the target location the experimenter spent his time reading an announcement of a meeting about Vietnamese children maimed during the war. A separate test series would be required to test such a hypothesis.

5) The remote experimenter went to a rectangular concrete platform containing three cylindrical fire hydrants. He balanced himself as he walked on the wooden 2x2 header bordering the concrete pad. Mid-test communication and post-experiment feedback were given. The subject's first impression prior to any communication was that the experimenter was tightrope walking on a long narrow ledge out in the open, as, for example, on the top of a wall. Following confirmation of the tightrope aspect, the subject volunteered a description of metal tubes bisecting the masonry.

The correspondences to basic elements are manifold, including description of experimenter activity, and there are no incorrect data. In our estimation the essentially null mid-experiment feedback could not in this case have provided the data obtained by the subject.

6) The target site in this experiment was a children's playground about 4 miles from SRI. The outbound experimenter, R.T. in this case, spent the ten minute experimental period riding on a small merry-go-round in a sand box.

The subject describes R.T. as riding on something that leaves a wake, although not necessarily in water, e.g., it could be in the air. She sees sand or mud, and the "vehicle" he is riding on is described as curved and looks like chrome (correct). He is also described as being in

movement the whole time, happy, joyful, etc. She also claimed to see an axle, but could not give any details.

Although the merry-go-round as a gestalt was not recognized, the ambience of the place was well conveyed by the subject's descriptions. There was feedback to the subject only the day following the experiment.

7) The seventh target was an auditorium at SRI with a flood-lit stage and red carpets throughout. The outbound experimenter was R.T..

The subject's description was of a patterned carpet in a large well-lit room. The subject saw a scalloped design covering this interior space, in reds and maroons, and submitted a drawing which matched well the array of seat backs. She correctly described the experimenter as leaving the brightly lit area (stage) after five minutes and moving to a second area in the room.

This was the first indoor target area we have used with this subject. We consider her description excellent both with regard to structure and ambience, though again the significance was not cognized. Post-experiment feedback was given.

8) A church in Palo Alto served as the final target in the series. It is a tall, modern, very elegant building.

The subject's first comments are of a tall august lofty building that must be a library or a church, very solemn. She describes a cross or kite at the end of the solemn hall. The outside is correctly described as gray masonry with cutouts for windows. The remote experimenter (R.T.) is correctly described as leaving the building by a concrete passageway. We consider this to be the best match of the series with respect to structure, ambience, and activity of remote experimenter. No feedback

was given either during or following the experiment.

In this series of eight experiments, summarized in Table 2, three feedback protocols were employed. They included the use of a walkie-talkie communication during the experiment, feedback after the termination of the experiment, and no feedback at all. Since mid-test communication was used in some of these experiments, this series was not intended as a demonstration-of-ability test, but rather as a training series with a secondary goal of determining whether feedback to the subject is a necessary component of the remote viewing phenomenon.

The detailed tape recorded transcript of experiment number 8, the church, is one of the more accurate and complete descriptions we have ever obtained from a remote viewing experiment. In this case the subject was given no feedback whatsoever as to the nature of the target or the correctness of her description. We conclude from this experiment, and supporting evidence from the spoked wheel drawing from experiment 2, that a channel of significant capacity exists between a subject and a remote location even in the absence of feedback. Furthermore, from our analysis of the data and conversations with the subject, it appears that the existence of mid-experiment communications is more of a disturbance than a help to the subject in establishing rapport with the remote experimenter.

Finally, the roles of R.T. and H.P. as interrogator and outbound experimenter were interchanged for some experiments with no observable difference, indicating that the remote-viewing phenomenon is not strongly personality dependent.

TABLE 2

SUMMARY OF VARIABLE FEEDBACK EXPERIMENTS

Remote Site	Type of Feedback	Evaluation
1. SRI landscaped court yard	Post-exp.	Described correctly as a formal garden with dry fountain
2. Radio trailer	None	No relation to target
3. Bicycle shed	None	Correctly described bright area and drew wheel with metal spokes; size perspective lacking
4. Wooden Kiosk	mid-test	No relation to target (see text)
5. Concrete platform	mid-test	Accurately described target and experimenter's activity
6. Merry-go-round	post-exp. (1 day)	Had experimenter in moving vehicle which couldn't be identified
7. Auditorium	post-exp.	Correctly described large indoor area, brightly lit, with red rug
8. Church	None	Tall solemn, august building, church or library

(c) Technology Series

In this section we describe a series of experiments designed to measure the approximate resolution capability of the remote viewing phenomenon. We have established in other work that a high data rate channel exists between a remote viewing subject and a distant site. In this work we investigate the amount of specific detail that a subject is able to obtain concerning a remote and unfamiliar scene.

Just prior to these experiments we had carried out experiments with subjects S-3 and S-4 to measure the physiological correlates of remote viewing and to test feedback hypotheses. One of the observations that we made at the conclusion of that work was that the quality, accuracy, and coherence of the descriptions provided by both these subjects appeared to be improving. We therefore asked them to participate in this series of technology experiments in which they would attempt to describe laboratory equipment of the type with which they may not be familiar. As is now standard in our protocol, they were asked simply to describe what they saw rather than name the object. There were four experiments in this series, and the subjects were successful in obtaining significant information in all cases.

In the first three experiments one experimenter left the subject with a second experimenter blind to the target and by random protocol selected a piece of apparatus with which to interact, located in a part of SRI where the subject had not been previously. The experimenter then used the equipment in the appropriate manner for ten minutes, after which he returned to the laboratory. The subject was asked both to describe the apparatus and to submit drawings.

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1) Link Trainer, Target Number One, was a standard computer-controlled flight simulator which resembles the cockpit portion of an aircraft. It is made of high-gloss blue fiberglass. The interior has flight controls and a seat for the pilot. It is very cramped quarters for anyone over six feet tall. An experimenter (R.T.) flew the inactive trainer according to a printed flight plan book. This plan book is six inches high and 22 inches wide when open. The windows were frosted and translucent.

The subject's description was essentially devoid of incorrect statements. An element that appeared throughout was a shiny porcelain object like a bathtub. The subject had the definite impression that the experimenter was crowded into a very small space, with his head touching the ceiling (correct). She said that the inside had only gray diffuse light and lacked color. The experimenter was observed to be doing something with both hands. She also described a long paper, like a waiter's towel, over the arm, which appears to correspond well with the flight plan book which was held in this manner. Although the subject's description would not necessarily lead one to recognize the target location as a Link Trainer, except as a match between known alternatives, there were many correspondences and quite good freedom from error.

2) Target Number Two in the series was a video monitor used with a PDP 11 text editor. It is a three-foot cubical TV monitor with a 23 inch screen. It is painted matt black and is located in the center of a large room. During the ten-minute viewing experiment, the outbound experimenter entered text on the screen by means of a keyboard located directly under the monitor.

The subject provided an exceptionally coherent description of a

big box painted matt black in the center of a large room. The front of the box was said to have a glass porthole like a washing machine with blue light coming out of it. She described the experimenter as looking at that light and using switches located under the porthole to do something with the machine.

The description was sufficiently accurate that a technically-oriented analyst might reasonably be expected to identify the target from among a restricted range of possibilities. As is often observed, the basic elements are described correctly while the analytical significance is not cognized.

3) Target Number Three consisted of a drill press in a machine shop. The target was a seven-foot-high, belt-driven drill press, which was used by the outbound experimenter (R.T.) to drill holes in a piece of wood for the ten-minute experimental period.

The subject described the object as being a man-sized machine with wheels, gears, and some sort of conveyer belt. She drew a picture of a belt operating between a pair of pulleys. She also described an "anchor or umbrella" which she drew as a hub with four spokes, at the end of each of which was a knob. This resembles accurately the handle which is used to raise and lower the drill. She also drew a vertically-oriented graph, which is in fact on the front of the machine to indicate depth of drill motion. The three drawings together with her verbal description contain many elements that in our estimation would allow an analyst to assess correctly the nature of the machine, given a restricted class of possibilities.

These three targets were described by Subject S-4. Her only input

information was that the experimenters would make use of some laboratory equipment at SRI. It is clear that the three descriptions are differentiated from each other, and that varying amounts of technically correct information was obtained and recorded by the subject.

4) An abacus in a day/date/clock pedestal served as target number 4. The target is shown in Figure 1. The target object for this experiment was purchased on the day of the experiment in New York City for the purpose of measuring the resolution of Subject S-3 in the remote viewing situation. After the abacus was purchased, the subject was called and asked to take part in a remote viewing experiment in our hotel room.

Unlike the usual protocol, in this experiment both experimenters knew the description of the target object. We therefore had pre-recorded the entire experimental preamble for the subject which had been carefully checked in advance for unintentional verbal cueing.

Pre-recorded Preamble:

"Hal and I have brought a present for you. We wandered around New York this morning and we bought an object. This object is of the type that one interacts with, and Hal will use it for its normal purpose. Today is Friday, September 27, 1974. As in all our remote viewing experiments, we'd like to ask you to describe the object as you see it rather than attempting to give the object a name."

Shortly after the subject entered the hotel room, one experimenter (H.P.) took a large locked suitcase containing the target into the wash room. He locked the door and removed the abacus from the suitcase. He then quietly moved the wooden balls back and forth on their wires. We had verified in setting up the experiment that this action was inaudible.

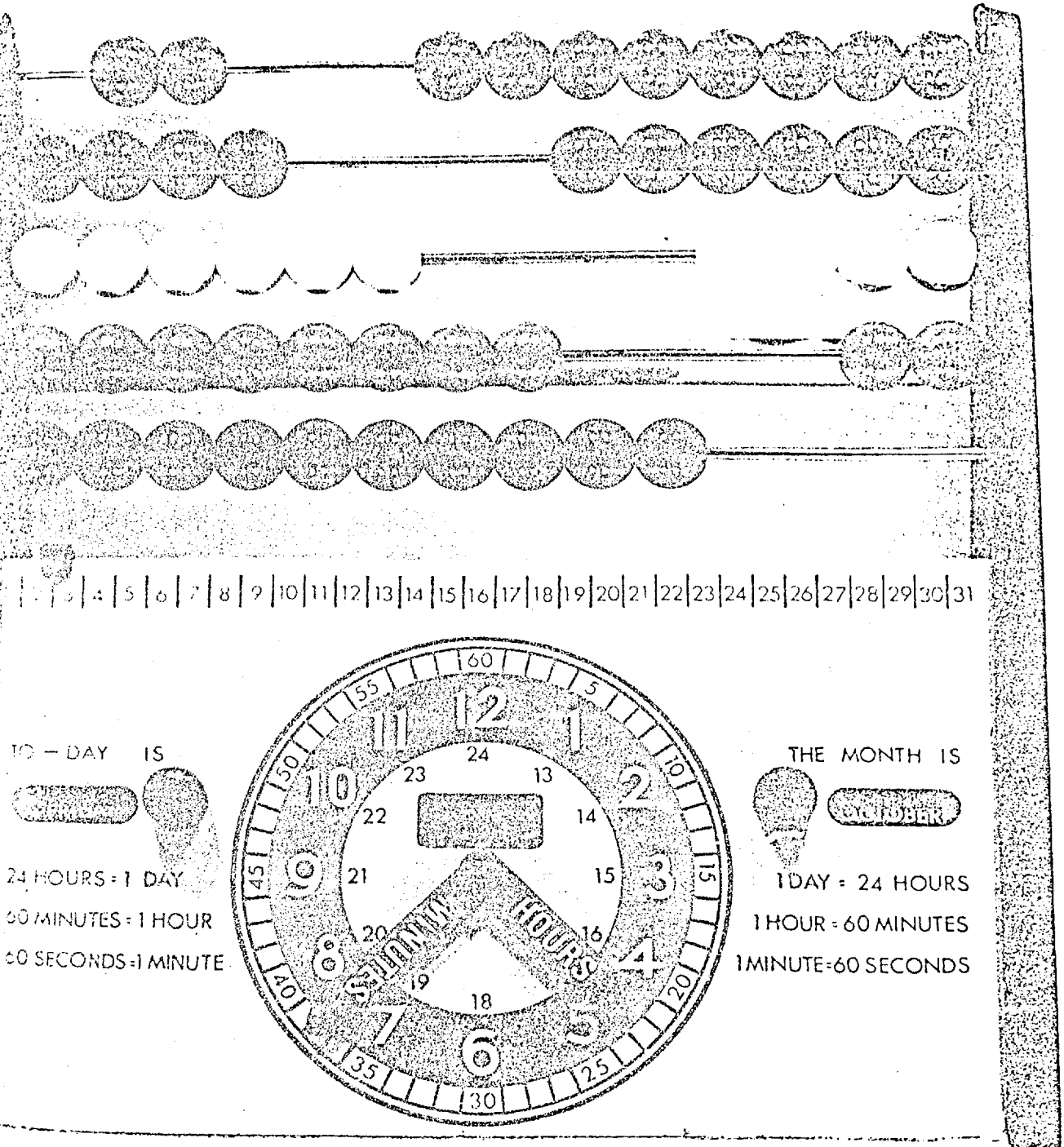


Figure 1. Abacus/clock target (Technology Series)

The instruction tape was played to the subject by the other experimenter (R.T.), and all subsequent interactions between himself and the subject were recorded.

The subject produced within one minute an outline drawing (Figure 2(I)) which he said was "it", although he didn't know what "it" was. (The large purplish-silver object corresponds well with the interior of the suitcase.)

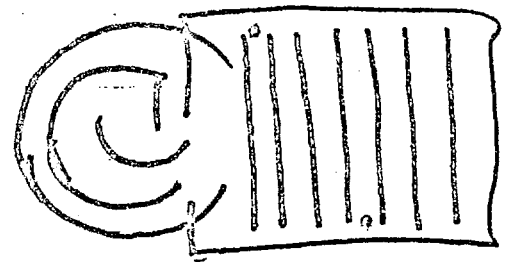
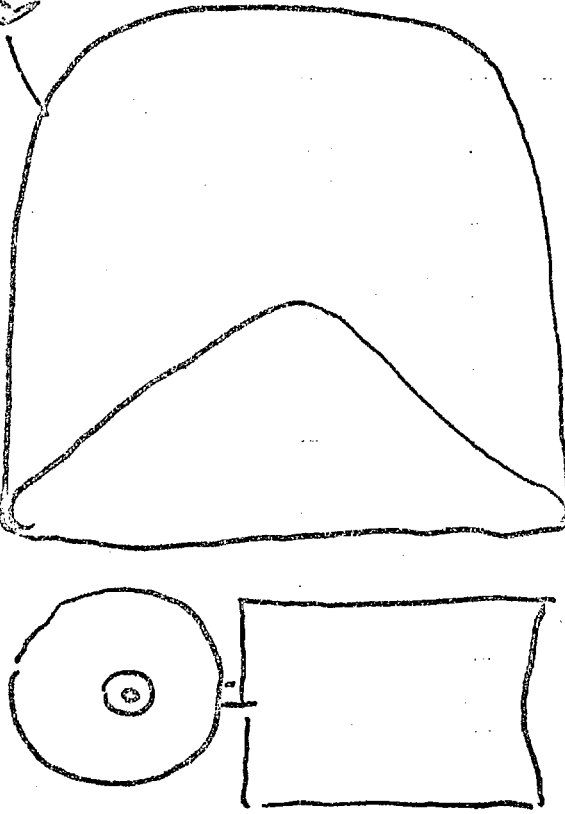
The experimenter then asked the subject for more detail. A second drawing (Figure 2(II)) was produced by the subject who described the object as a "game box with little balls". He felt that that was all he could do and handed in his second drawing. We then terminated the experiment and showed him the target object. The entire experiment took place in approximately five minutes total time.

Considering the high strangeness of the target object, and the essentially total lack of restriction on the possibilities at the outset as far as the subject was concerned, it appears that the correlation of the subject's drawings and description with the target constitute a highly significant result.

The results of the four-experiment technology series are summarized in Table 3. These four experiments clearly indicate that the remote viewing channel can be used to obtain information about mechanical and technical apparatus, in addition to the geographical and architectural information which had been obtained in our experiments previously. In these present experiments the subjects were not technically oriented as to the possible types of targets that might be encountered. We do

compass
dial

Polished brass
dial



I

II

Figure 2. Subject responses (I) and (II) to abacus/clock target

Table 3

SUMMARY OF REMOTE VIEWING TECHNOLOGY SERIES

Target	Subject Responses
1. Link Trainer flight simulator	Experimenter crowded into very small space. Gray diffuse light. Experimenter described as doing something with both hands.
2. 23" Video Monitor with keyboard	Big black box in center of room. Glass porthole with blue light. Switches underneath porthole.
3. Drill press	Man-size machine with belt and pulley. Spoked handle, vertical graph.
4. Abacus	Game box with balls. Drew six tracks with balls in them and a circular pattern below.

not at this time know whether their ignorance of the possible target pool is a help or a hindrance to their descriptions.

We plan to continue working with this type of target material to gain further information as to the resolution capability of various subjects in this perceptual area.

(d) Project Atlas Remote Viewing

A second remote-viewing experiment has been carried out on a client-designated target of interest, a European R&D test facility[†]. The subject for this experiment (S-3) was given map coordinates in degrees and minutes and told only that the target was a technical facility. The subject's response follows. A map accompanying the description is shown in Figure 3.

"First view taken at 11.00 a.m., EST (27 Aug 74)

The given coordinates gave a view of a rather flat environment composed of what looked like sand dunes covered intermittently with a scrubby grass. The wind was blowing, and the view was at night (approx. 12 hours difference).

The view was hovering over a road running NNW, and there could be seen a fence to the right, and beyond that a series of rectangular buildings in rows. There appeared to be a network of roads and lots of wire fences. A strange orange circular platform could be seen, but not identified as to purpose. There appeared to be tall towers in the distance, and around one tower-like structure there were a lot of lights and activity.

Second view taken at 12.25 a.m., EST (28 Aug 74).

Again, the wind was blowing. The sun was reflecting off the ground, and it seemed dusty. There appeared to be huge fenced perimeters (steel fencing?). There are hills or mountains to the south, and also some high-power voltage lines. There is a marsh (?) to the NNW.

Comment: Tiredness at the second viewing seemed to inhibit mobility in the view. Also, due to the complexity of the structures at the site, it is difficult to progress without some form of feedback. It is possible that the coordinates suffice to locate

[†]The first experiment was carried out with Subject S-1.

Map one (night view)

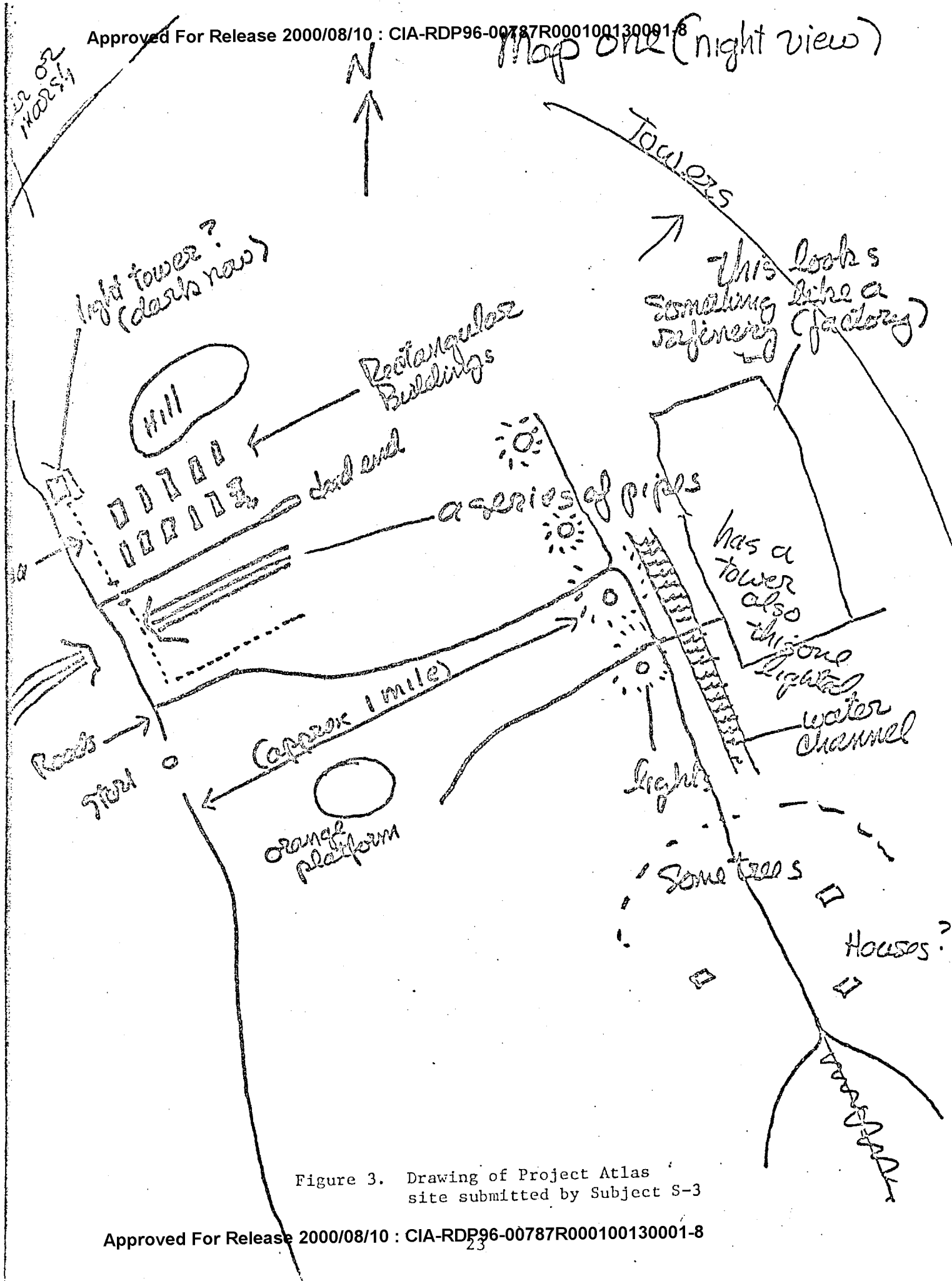


Figure 3. Drawing of Project Atlas site submitted by Subject S-3

the perception at the general site, but that preciseness as to artificial structures, especially in a complicated area, will have to have some additional orientation sequence.

MAP 1 follows."

Evaluation of the data by the client is underway.

B. Basic Research

In addition to the testing of individuals under conditions which yield data indicating the feasibility of the application of paranormal abilities to operational needs, fifty percent of the effort is devoted to identification of measurable characteristics possessed by gifted individuals, identification of neurophysiological correlates which relate to paranormal activities, and identification of the nature of paranormal phenomena.

1. Criteria for the Determination of Gifted Individuals

(a) Remote Viewing of Natural Targets

Data continues to be taken on the remote viewing phenomena. As this report goes to press, Subjects 4 and 6 have completed the required series of nine sites, and the results will be judged and included in the following report.

(b) Line Drawings

The line drawing series has yet to be completed on all subjects.

(c) Four-State Electronic Random Stimulus Generator

As discussed in detail in Progress Report #3, the determination of the state of a four-state electronic random stimulus generator comprises one of the three screening tests. The target is in the form of one of four art slides chosen randomly ($p = 1/4$) by an electronic random generator. The generator does not indicate its choice until the subject indicates his choice to the machine by pressing a button. As soon as the subject indicates his choice, the target slide is illuminated to provide visual feedback as to the correctness or incorrectness of his choice. Until that time both subject and experimenter remain ignorant of the machine's choice, so the experiment is of the double-blind type. The machine choice, subject choice, cumulative trial number, and cumulative hit number are recorded automatically on a printer.

For the purpose of screening, each subject is required to complete 100 25-trial runs (i.e., a total of 2500 trials). Since Progress Report #3, an additional subject (S-4) has completed the required number of runs. The machine screening data now stands as shown in Table 4.

Table 4

SCREENING DATA: FOUR-STATE ELECTRONIC RANDOM STIMULUS GENERATOR

Subject	Mean Score/100 Trials Over 2500 Trials	Binomial Probability
1	25.76	0.22
2	29.36	3×10^{-7}
4	25.76	0.22
6	25.40	0.33

2. Identification of Measurable Characteristics Possessed by Gifted Subjects

Medical and Psychological Evaluation

The medical and psychological evaluation of program participants is continuing at the Palo Alto Medical Clinic under coordination of Dr. Robert Armbruster, Director of the Department of Environmental Medicine. The work is close to being completed, as indicated in Table 5 and 6. The raw data for subjects 2, 3, and 6 are included in Appendices 2, 3, and 4. Summarized data and interpretation will follow at program completion.

Personnel (subjects, leavers, controls, experimenters)

General Physical Examination

Laboratory Examinations

Neurological Examination

Audiometric Examination

Ophthalmologist Examination

Special Visual Examinations

EMI Brain Scan

Personnel #1 - 5, subjects, #1 - 9, leavers/controls, 7, 8, experimenters.

#1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
#2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
#3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
#5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
#6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
#8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1. General Physical Examination
Complete medical
Family history
2. Laboratory Examinations
SMA-12 panel blood chemistries
Protein electrophoresis
Blood lipid profile
Urinalyses
Serology
Blood type and factor
Pulmonary function screening
Electrocardiogram 12-lead
3. Neurological Examination
Comprehensive
Electroencephalogram, sleeping and routine
4. Audiometric Examination
Comprehensive
Bekesy bone conduction
Speech discrimination
Impedance bridge test
5. Ophthalmologist Examination
Comprehensive
Card testing
Peripheral field test
Muscle test
Dilation funduscope
Indirect ophthalmoscopic and fundus examination
6. Special Visual Examinations
Electroretinogram (Stanford Med.)
Dark adaptation test (Stanford Med.)
Visual contrast sensitivity (SRI)
7. EMI Brain Scan

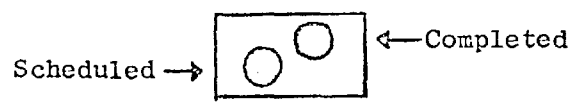


Table 6

PSYCHOLOGICAL EXAMINATION

Personnel #1 - 3, subjects;

#4 - 6 learners/controls; #7 - 8, experimenters.

	Personnel (subjects, learners, controls, experimenters)	In-depth interview	W.A.I.S.	M.M.P.I.	Benton Visual Memory Test, Wechsler Memory Scale	1	2	3	4	5	6	7	8	9
#1														
#2														
#3														
#4														
#5														
#6														
#7														
#8														

SRI

Palo Alto Medical Clinic

3. Identification of Neurophysiological Correlates Which Relate to Paranormal Activities

As part of the program to determine whether physiological correlates can be used as an indicator of paranormal functioning, measurements are obtained during a random selection of remote viewing experiments. In these experiments the subject is connected to physiological recording instruments and a four-channel polygraph. Baseline and experimental measures of the following observables are made: 1) Galvanic skin response (GSR) is recorded using finger electrodes taped in place on second and fourth fingers; 2) Blood volume/pulse height is recorded using a reflected-light plethysmograph; 3) Unfiltered EEG is recorded from the right occipital region; 4) Percent-time in alpha (8-12 Hz) is recorded on the fourth channel. The alpha filter is a sharp cut-off digital type with essentially zero-pass outside the prescribed bandpass limits.

During the course of an experiment the subject is asked to describe his perceptions as to the nature of the remote target. His comments are tape recorded and noted on the polygraph, along with the time. A correlation is then attempted between those descriptions which are found to be uniquely correct and accurate, and the corresponding sections of polygraph recording. Of the correlates being monitored, the one which seems the most promising is the unfiltered EEG. In our preliminary analysis of the data it appears that there is often an overall reduction in EEG power in the twenty-second period just before a subject renders a correct description. Subsequent to this observation, we have learned that Janet Mitchell at the American Society for Psychical Research made very similar detailed observations in her studies with Subject 3, also in remote viewing experiments. Considerable data remain to be analyzed, and completion is targeted for the next reporting period.

4. Identification of the Nature of Paranormal Phenomena and Energy
 - (a) 23rd Annual International Conference--Quantum Physics and Parapsychology, Geneva, Switzerland, August 26-27, 1974

A major input to the researchers Puthoff and Targ during the reporting period was afforded by attendance at a closed working conference sponsored by Parapsychology Foundation, Inc., New York. The conference was set up to provide discussion on the identification of the nature of paranormal phenomena and energy. The attendees and their affiliations are given in Table 7, along with the titles of the papers presented. A significant outcome of the papers (and discussions which followed) was that data concerning paranormal processes are not in violation of but rather are commensurate with the basic principles of information theory and quantum processes. It was considered that this conclusion could be drawn even though the precise mechanisms still elude specification.

A conservative summary of the conceptualizations involved includes the following:

- (1) Researchers in the area of psychokinesis appear to be plagued by results whose amplitudes have a signal-to-noise ratio near unity, regardless of the process or mechanism involved. A number of observations indicate that rather than simple perversity, what is being articulated is a coherence phenomenon involving partial mobilization of system noise, and thus the magnitude constraint. That is, when a subject is asked to interact with an experimental setup, one often first observes a reduction in noise followed by a signal, as if the components of the noise spectrum had been brought into phase coherence. (Such an interpretation does not

Table 7

Program, 23rd Annual International Conference--Quantum Physics
and Parapsychology, Geneva, Switzerland, August 26-27, 1974

"Foundations of Paraphysical and Parapsychological Phenomena," Evan Harris
Walker, Ballistic Research Laboratories, Aberdeen Proving Ground,
Maryland, U.S.A.

"Precognition--A Memory of Things Future?" Gerald Feinberg, Columbia
University, New York, U.S.A.

"Parapsychology, Quantum Logic and Information Theory," C.T.K. Chari, Madras
Christian College, Madras, India (read by Harold Puthoff).

"Quantum Paradoxes and Aristotle's Twofold Information Concept," O. Costa
de Beauregard, Institut Henri Poincare, Paris, France.

"Life and Quantum Physics," V.A. Firsoff, Royal Astronomical Society,
London, England.

"Physics, Entropy, and Psychokinesis," Harold Puthoff and Russell Targ,
Stanford Research Institute, Menlo Park, California U.S.A.

"Remote Viewing of Natural Targets," Russell Targ and Harold Puthoff,
Stanford Research Institute, Menlo Park, California U.S.A.

"Parapsychology as an Analytico-Deductive Science," J.H.M. Whiteman,
University of Cape Town, Cape Town, South Africa.

"A Logically Consistent Model of a World with Psi Interaction," Helmut
Schmidt, The Institute for Parapsychology, Durham, North Carolina,
U.S.A.

"Connections Between Events in the Context of the Combinatorial Model for
a Quantum Process," Ted Bastin, Cambridge Language Research Unit, Cambridge,
England.

necessarily deny the possibility of large macroscopic effects.)

The subject thus appears to act as a local negentropic source. If true, it may be more advantageous as a practical matter to work with extremely noisy systems, rather than with highly constrained or organized systems, in order to maximize possible effects due to the introduction of order.

(2) Paranormal phenomena often appear to be more the result of coincidence than the effect of a well-defined cause. Again, rather than being the result of the perversity of nature, the observed goal-oriented synchronicity may indicate that physical systems are more easily manipulated at the global level of boundary conditions and constraints rather than at the level of mechanism. Thus, the apparency that a given desired result can be explained away by a coincidental but "natural" event needs to be explored more fully. Unexpected but natural causes may be the effect of a series of causal links, outside the defined experimental boundaries but representing an unforeseen line of least resistance. At worst, such causal links may in fact be unobservable in the sense of the hidden variables concept in quantum theory, but nevertheless, act as instruments of the will.

(3) Paranormal phenomena appear to be intrinsically spontaneous; i.e., it is difficult to evoke paranormal phenomena "on cue", with the result that the phenomena are often considered to be not under good control, and therefore not amenable to controlled experimentation. This difficulty is so pronounced that it is likely that we are observing some macroscopic

analog of a quantum transition, an event similarly unpredictable in time except as a probability function. If the analogy is correct, experimentation in this area simply needs to be treated in the manner of, for example, weak photon experiments.

(4) Possibly related to item (3), the more closely one attempts to observe paranormal phenomena, the less likely one is to see them, a factor considered by many to support hypotheses of poor observation, fraud, etc. To a sophisticated observer, however, simple dismissal does not stand up under scrutiny. Invoking again the idea of a macroscopic analog of a quantum transition, we may, as observers of delicate phenomena, be witness to observer effects generally associated with the uncertainty principle. Paradoxically, from the subject's viewpoint, the production of the phenomena may also be an observer effect, perturbing as it does the expected behavior of a system. In this model the scrutiny of paranormal phenomena under laboratory conditions could in principle be considered to be collective phenomena involving interfering observer effects in a manner known to occur at the microscopic quantum level.

(5) Finally, it appears to be useful as a guiding principle to recognize that all of the phenomena dealt with in macroscopic psychoneuroenergetics are totally permissible at the microscopic level within the framework of physics as presently understood. It is simply that time reversibility, tunneling through barriers, simultaneous multiple-state occupation, etc., are generally unobservable as gross macroscopic phenomena for statistical reasons only, as codified in the concept of increasing disorder (entropy). Therefore, it may be appropriate to consider an individual with paranormal abilities primarily as a source of ordering

phenomena of sufficient magnitude so as to restructure the otherwise random statistics of the macroscopic environment.

(b) Precognition Model

As discussed in Section II A.1.(b), an hypothesis which required consideration was the possibility that apparent paranormal perception was instead precognition of post-experiment feedback, an hypothesis easier to justify within accepted paradigms of electromagnetic theory. (See Appendix I.) Therefore, the experiments of Section II A.1.(b) were carried out with the testing of that hypothesis as a basic research objective. By task, that experiment is part of Program II (Basic Research), but is presented in Section II to preserve the chronology of experimentation. As indicated in the summary, the results obtained in that series are deemed sufficient to permit rejection of the precognition hypothesis.

(c) Information Theoretic Approach to the Use of Paranormal Channels

Independent of the mechanisms which may be involved in psychoenergetic phenomena, observation of the phenomena implies the existence of information channels in the information-theoretic sense. Since such channels are amenable to analysis on the basis of information-theoretic techniques, headway can be made in determining channel characteristics such as bit rate, independent of a well-defined underlying theory (in the sense that thermodynamic concepts can be applied to the analysis of systems independent of underlying mechanisms). To indicate the utility of such an approach, we consider the following substudy.

Experimentation in the areas of remote viewing and the determination of the state of a four-state electronic random stimulus generator have yielded results at levels of statistical significance $p < 10^{-6}$. As good

as such results are from the standpoint of statistical significance, the information channel is imperfect, containing noise along with the signal. When one considers how best to utilize such a channel, one is led to the communication theory concept of the introduction of redundancy as a means of coding a message to combat the effects of a noisy channel.¹ We consider here the implementation of such a technique as a means of utilizing a noisy channel of the paranormal type as a practical communication system. A prototype experiment employing such techniques has proven successful.² The approach presented here constitutes both a pedagogical vehicle for the elucidation of the characteristics of the paranormal channel, and a developmental program potentially resulting in a communication channel of utilitarian value.

For our purposes we shall consider a message to consist of a sequence of alphabet characters, each character represented by a 5-bit code as shown in Table 7.* Each binary digit to be sent through the channel is to be encoded to combat channel noise, i.e., is to have added to it additional redundancy bits.

Efficient coding requires a compromise between the desire to maximize reliability and the desire to minimize redundancy.

One efficient coding scheme for such a channel is obtained by application of a sequential sampling procedure of the type used in production line quality control.³ The adaptation of such a procedure to paranormal communication channels was considered first by Taetzsch.⁴ The sequential

*Taking into account the uneven distribution of letter frequencies in English text, this code is chosen such that 0 and 1 have equal probability.

Table 7

5-Bit Code for Alphanumeric Characters*

E	00000	Y	01000
T	11111	G,J	10111
N	00001	W	01001
R	11110	V	10110
I	00010	B	01010
O	11101	Ø	10101
A	00011	1	01011
S,X,Z	11100	2	10100
D	00100	3	01100
H	11011	4	10011
L	00101	5	01101
C,K,Q	11010	6	10010
F	00110	7	01110
P	11001	8	10001
U	00111	9	01111
M	11000	.	10000

*Alphabet characters listed in order of decreasing frequency in English text. See, for example, A. Sinkov, Elementary Cryptanalysis--A Mathematical Approach, Random House (1968).

method gives a rule of procedure for making one of three possible decisions following the receipt of each bit: (1) accept "1" as the bit being translated, (2) reject "1" as the bit being transmitted (i.e., accept "0", or (3) continue transmission of the bit under consideration. The sequential sampling procedure differs from fixed-length coding in that the number of bits required per message bit is not fixed prior to transmission, but depends on the results accumulated with each transmission. The primary advantage of the sequential sampling procedure as compared with other methods is that, on the average, fewer bits per decision are required for an equivalent degree of reliability.

Use of the sequential sampling procedure requires the specification of four parameters, determined on the basis of the following considerations. Assume that a message bit (0 or 1) is being transmitted. In the absence of a priori knowledge, we may assume equal probability ($p = 0.5$) for the two possibilities (0,1). Therefore, from the standpoint of the receiver the probability of correctly identifying the bit being transmitted is $p = 0.5$ due to chance alone. An operative psi (paranormal) factor could then be expected to alter the probability of correct identification to a value $p = 0.5 + \psi$, where the parameter ψ satisfies $0 < |\psi| < 0.5$. (ψ may be positive or negative depending on whether the paranormal channel results in so-called psi-hitting or psi-missing.)

To indicate the design procedure, let us conservatively assume a baseline psi parameter $\psi_b = 0.1$ and design a communication system on this basis. The four parameters requiring specification in the sequential sampling procedure are:

- 1) q_1 , the acceptable level of fraction misses for receipt of a given binary digit, say "1". For $\psi_b = 0.1$, $q_1 = 1 - p = 0.4$;
- 2) q_2 , the unacceptable level of fraction misses for receipt of a given binary digit, say "1", indicating receipt of the alternative digit, say "0". For $\psi_b = 0.1$ and the symmetrical binary channel under consideration, we take $q_2 = 1 - q_1 = 0.6$;
- 3) α , the probability of rejecting a correct identification (Type I error). We shall take $\alpha = 0.01$.
- 4) β , the probability of accepting an incorrect identification (Type II error). We shall take $\beta = 0.01$.

With the parameters thus specified, the sequential sampling procedure provides for construction of a decision graph as shown in Figure 4. A cumulative record of receiver-generated responses to the target bit is compiled until either the upper or lower limit line is reached, at which point a decision is made to accept "0" or "1" as the bit being transmitted.

Channel reliability (probability of correctly determining message being transmitted) as a function of operative psi parameter ψ is plotted in Figure 5. As observed, the sequential sampling procedure can result in 90% or greater reliability with psi parameters on the order of a few percent. Figure 6 indicates the average number of trials required to come to a decision on a given message bit, a number which falls off rapidly as a function of increasing psi parameter ψ .

Implementation of the sequential sampling procedure requires the transmission of a message coded in binary digits. Therefore, the target space must consist of dichotomous elements, e.g., white and green cards as used in the experiments by Ryzl.²

In order to eliminate the deleterious aspects of repetition, and in order to take advantage of the observed tendency to recognize basic target elements even in the absence of comprehending the gestalt, the message information

is coded in the form of projected slides viewed by the sender. Each slide represents one or the other group of dichotomized elements shown in Table 8 depending on whether a "0" or "1" is to be sent. Based on receiver description detail, up to five bits may be transmitted per slide in accordance with the five dichotomies listed in Table 8.

In operation, a slide sequence corresponding to the target bit (0 or 1) is sent and the cumulative entries made as shown in Figure 4 (with up to five entries per slide) until a decision is made to accept either a "1" or "0" as the bit being transmitted. At a prearranged time the next slide sequence is begun, etc., until the entire message has been received.

From the results obtained in such an experiment, the channel bit rate can be ascertained for the system configuration under consideration. Furthermore, bit rates for other degrees of reliability (i.e., for other q_1 , q_2 , α and β) can be estimated by construction of other decision curves over the same data base, and thus provide a measure of the bit rate per degree of reliability. The procedures described here thus constitute a basis for specification of the characteristics of a paranormal channel under well-defined conditions, and provide for a determination of the feasibility of such a channel for communication purposes.

Table 8

Dichotomized Target Slides

<u>"0"</u>	<u>"1"</u>
black and white	color
indoor	outdoor
objects	people
stillness	motion
artificial	natural

Figure 4

SEQUENTIAL SAMPLING PROCEDURE
 $q_1 = 0.4, q_2 = 0.6, \alpha = 0.01, \beta = 0.01$

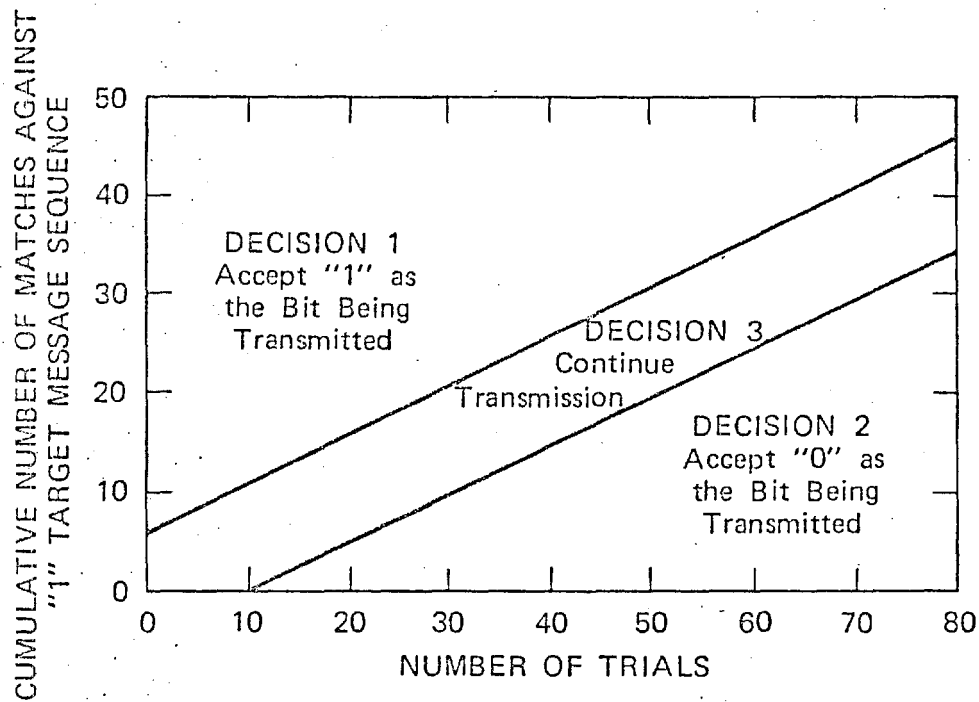


Figure 5

OPERATING CHARACTERISTIC CURVE
FOR SEQUENTIAL SAMPLING PROCEDURE
 $q_1 = 0.4, q_2 = 0.6, \alpha = 0.01, \beta = 0.01$

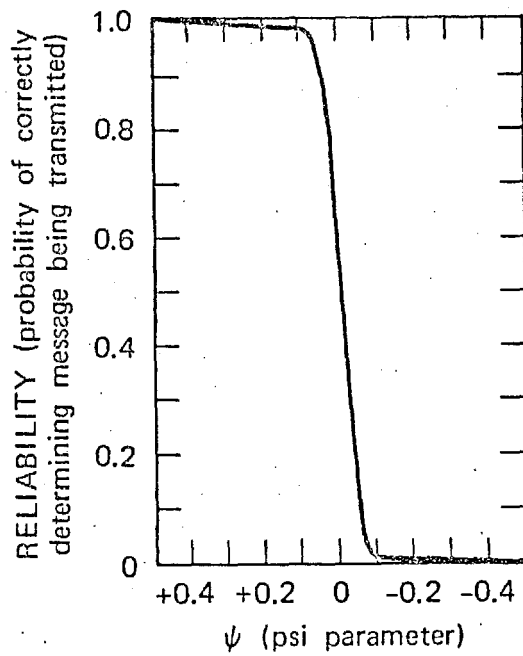
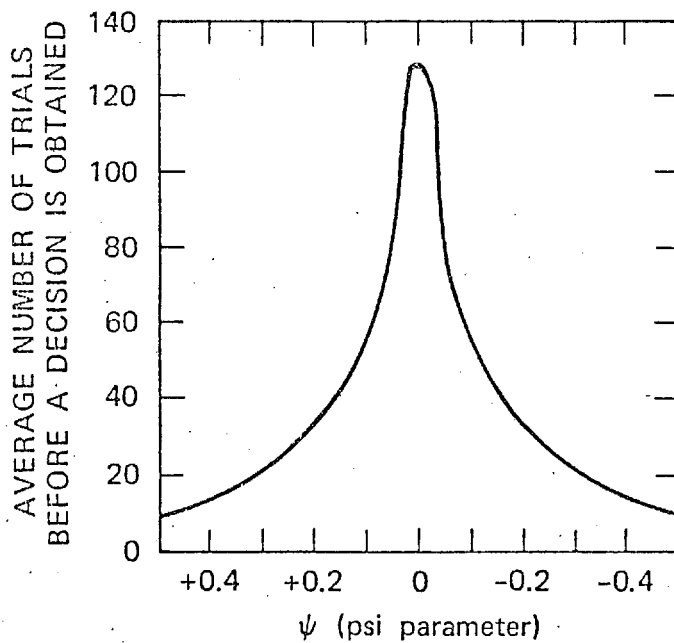


Figure 6

AVERAGE SAMPLE NUMBER FOR
SEQUENTIAL SAMPLING PROCEDURE
 $q_1 = 0.4, q_2 = 0.6, \alpha = 0.01, \beta = 0.01$



REFERENCES

1. C. Shannon and W. Weaver, The Mathematical Theory of Communication, Univ. of Illinois Press, Urbana, Ill. 1949.
2. M. Ryzl, "A Model of Parapsychological Communication," Jour. of Parapsychology 30, No. 1, p. 18, March, 1966.
3. P. Hoel, Introduction to Mathematical Statistics, 2nd Edition, p. 27, John Wiley and Sons, Inc., New York, 1954.
4. R. Taetzsch, "Design of a Psi Communications System," Intern'l. Jour. of Parapsychology 4, No. 1, p. 35, Winter, 1962.

APPENDIX 2

Medical Evaluation (Raw Data)

Subject 2

Next 9 Page(s) In Document Exempt

Next 5 Page(s) In Document Exempt

APPENDIX 3

Medical Evaluation (Raw Data)

Subject 3

Next 12 Page(s) In Document Exempt

APPENDIX 4

Medical Evaluation (Raw Data)

Subject 6

Next 15 Page(s) In Document Exempt