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EXPERIMENTAL PSI RESEARCH: IMPLICATIONS FOR PHYSICS

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EXPERIMENTAL PSI RESEARCH: IMPLICATIONS FOR PHYSICS

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I ABSTRACT

Experimental laboratory work continues to provide evidence for the existence of so-called psi processes, a class of interactions between consciousness and the physical world as yet unexplained. These include (1) the acquisition of information not presented to any obvious sense, and (2) the production of physical effects not mediated by any obvious mechanism. At SRI we have concentrated primarily on the former, investigating a phenomenon we call "remote viewing," the ability of certain individuals to access and describe, by means of mental processes, information blocked from ordinary perception by distance or shielding.[1-6] Our data base consists of more than 100 experiments in the remote viewing of targets ranging from objects in nearby light-tight cannisters to geographic sites at transcontinental distances, viewed from locations which include shielded Faraday cages and a submerged submarine. Data from these observations indicate that models put forward to explain psi processes must account for bit rates on the order of 0.1 bits/s, resolution of approximately 1 mm, apparent ineffectiveness of ordinary electrical shielding, and relative insensitivity to distance up to at least 10,000 km.

Although such phenomena might appear to be in conflict with the laws of physics, we anticipate that with further work much of the data will be accounted for either within the framework of physics as presently understood, or on the basis of extrapolations that have been proposed to account for other (non-psi) data, and that, conversely, the psi data base may shed light on some of the current problems in physics, e.g., with regards to the foundations of quantum theory.

II INTRODUCTION

For the past seven years we have been investigating aspects of human perception that appear to fall outside the range of well-understood perceptual/processing capabilities. Of particular interest is a human information-accessing capability that we call "remote viewing." This phenomenon pertains to the ability of certain individuals to access and describe, by means of mental processes, remote geographical locations up to several thousand km distant from their physical location given only a known person on whom to target. These abilities are developed in several individuals sufficiently to allow them to describe--often in considerable detail--geographical or technical material such as buildings, roads, natural formations, interior laboratory apparatus, and sealed targets, along with the real-time activities of persons at the target site.

The experimental evidence indicates that (1) although the information channel is imperfect, the data generated by the remote viewing process exceeds any reasonable bounds of chance correlation, and (2) the extent of physical distance separating the subject from the target site up to transcontinental distances does not appear to significantly affect the accuracy of perception.

As observed in the laboratory, the basic phenomenon appears to cover a range of subjective experiences variously referred to in the literature as autoscopy (in the medical literature); exteriorization or disassociation (psychological literature); simple clairvoyance, traveling clairvoyance, or out-of-body experience (parapsychological literature); or astral projection (occult literature). We choose the term "remote viewing" as a neutral descriptive term free from prior associations and bias as to mechanisms.

Since the initial publication of our investigations of this remarkable phenomenon, a number of replication studies have been carried out in other laboratories, the bulk of which have been successful.[7-16] Thus, it appears that the remote viewing function can be elicited under a wide variety of laboratory conditions.

III REMOTE VIEWING OF LOCAL (SAN FRANCISCO BAY AREA) TARGET SITES

We begin with a synopsis of our basic data base of more than fifty local remote viewing trials with nine subjects.[2] The general protocol is to closet a subject with an experimenter at SRI, and at a prearranged time to obtain from the subject a description of an undisclosed, remote site being visited by a target team, one of whose members is known to the subject and who thereby constitutes a target person.

A. Experimental Procedure

At the beginning of a trial, a subject is closeted with an experimenter at SRI to await an agreed-upon start time. At the same time a target team is sent, without communication with the subject or experimenter remaining at SRI, to a target location somewhere in the San Francisco Bay Area (~500 square km). The target is determined by random-number access to a target pool of sealed travelling orders previously prepared by an independent experimenter and kept locked in a secure safe. The target pool consists of more than 100 target locations chosen from a target-rich environment.

During a predetermined viewing period, typically of 15 minutes duration, the subject is asked to render drawings and describe into a tape recorder his impressions of the target site being visited by the outbound target team. The experimenter with the subject is kept ignorant of the target, and is therefore free to question the subject to clarify his descriptions without fear of cueing, overt or subliminal. The experiment is thus of the double-blind type.

When the target team returns to SRI following the remote viewing period, the subject is then taken to the target site so that he may obtain direct feedback. Following a series of such trials over a several-day period, a formal blind judging procedure (described below) is used to evaluate the data and quantify the results.

B. Initial Experimental Series

To give a concrete example, we summarize the results obtained with the first subject in the local remote viewing series. This subject (designated here as S1) participated in nine trials. Subject S1 came to our experiments with a reported history of spontaneous remote viewing experiences. In general, the subject's ability in these trials to describe correctly buildings, docks, roads, gardens, and the like, including structural materials, color, ambience, and activity--sometimes in great detail--indicated the functioning of a remote perceptual ability. A landmark Hoover Tower target, for example, was recognized and correctly named; a boat marina was described in a consistent narrative that began with "what I'm looking at is a little boat jetty or boat dock along the bay ...," and so forth.

Nonetheless, the descriptions generally contained inaccuracies as well as correct statements. A typical example is indicated by the drawing shown in Figure 1. First, the subject correctly described a park-like area containing two pools of water: one rectangular, 60 × 89 ft (actual dimensions 75 × 100 ft); the other circular, diameter 120 ft (actual diameter 110 ft). However, as can be seen from his drawing, the subject also included some elements, such as the tanks shown in the upper right, that are not present at the target site. We also note an apparent left-right reversal, often observed in paranormal perception experiments. Finally, the subject incorrectly indicated the function of the site as water purification rather than recreational swimming. Thus we observe essentially a correct description of certain basic elements and patterns coupled with incomplete or erroneous analysis of function.

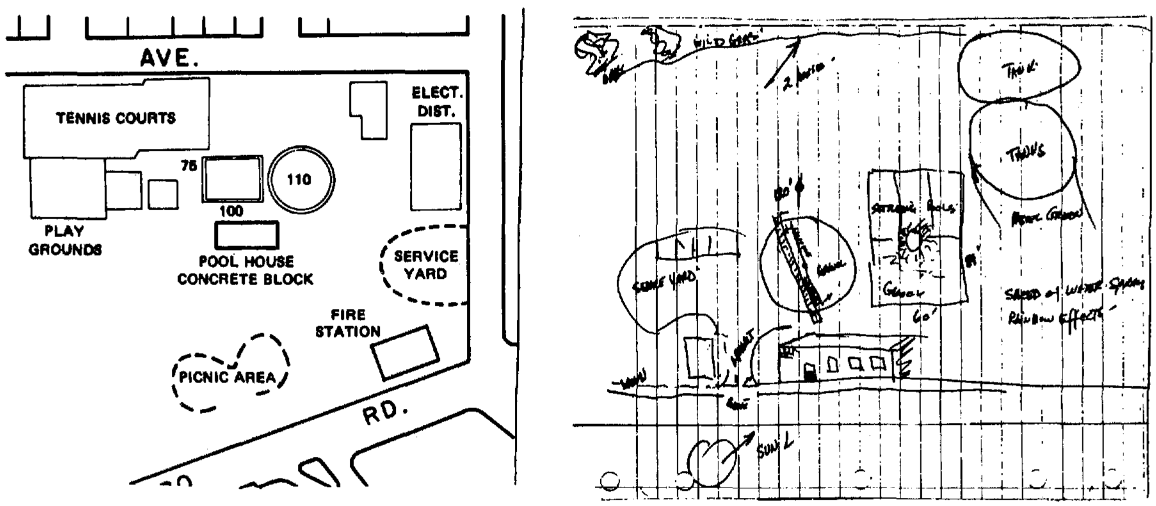
This latter theme emerged as a thread which continued throughout our work and eventually led to uncovering a possible relationship between paranormal perception and cerebral functioning, namely: that paranormal functioning may involve specialization characteristic of the nonanalytic part of the brain's cognitive apparatus, which predominates in spatial and other holistic processing, in contrast to that part which predominates in verbal and other analytical functioning.[17-19]

C. Judging of Results

To obtain a numerical evaluation of the accuracy of the remote viewing experiment, the experimental results were subjected to independent judging on a blind basis by an SRI consultant not otherwise associated with this series. The response packets, which contained the nine typed unedited transcripts of the tape-recorded narratives and associated drawings, were unlabeled and presented to the judge in a randomly-numbered order. Working alone, the judge's task was to visit each target location in turn and to blind rank order, on a scale 1 to 9 (best to worst match), each of the nine transcripts against each target, generating a 9 × 9 matrix (see Table 1).

As a first-order evaluation of the matrix we consider simply the number of direct matches (ones on the diagonal), in this case seven out of nine. The appropriate statistic is derived assuming nonindependent assignment of transcripts to target sites (as in guessing the order of a random sequence of the digits one through nine, each used once).[20] The result (seven out of nine correctly matched) is significant at $p = 10^{-4}$.

A more precise measure of the statistical significance of the matrix of target/transcript ratings is given by a direct-count-of-permutations method of great generality.[21] It is an exact calculation method requiring no approximations such as normality assumptions. Furthermore, the judging process that went into generating the matrix is not required to be independent transcript-to-transcript nor target-to-target. Finally, numerical estimates of target/transcript correspondences can be made on the basis of either rank-order or rating scales.(e.g., rank ordering 1 - n, best



(a) City map of target location (b) Drawing by Subject S1

FIGURE 1 SWIMMING POOL COMPLEX AS REMOTE VIEWING TARGET

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Table 1

DISTRIBUTION OF RANKINGS ASSIGNED TO TRANSCRIPTS
ASSOCIATED WITH EACH TARGET LOCATION
(SUBJECT 1)

Trial	Targets	Transcripts 5	3	1	8	2	9	4	7	6
1	Hoover Tower	1	6.5	2	6.5	3	6.5	6.5	6.5	6.5
2	Baylands Nature Preserve	5	1	7.5	2	7.5	3	7.5	7.5	4
3	Radio Telescope	2	7	1	7	3	7	7	7	4
4	Marina	3	2	6.5	1	6.5	6.5	6.5	6.5	6.5
5	Bridge Toll Plaza	8	5	7	4	6	2	3	1	9
6	Drive-in Theater	6	6	6	6	2	1	6	6	6
7	Arts and Crafts Plaza	6	2	8.5	8.5	5	4	1	3	7
8	Catholic Church	4	7.5	7.5	7.5	1	7.5	2	3	5
9	Swimming Pool Complex	3	2	7	7	4	7	7	7	1

Note: Transcripts blind rank ordered 1-9 (best to worst match). Non-differentiable transcripts at end of rank ordering are all assigned mean of remaining rank order numbers.

to worst match; rating 0-100, zero to complete correspondence; arbitrary scale rating arrived at by some complex procedure involving many factors such as occurs in multiple-judge voting, etc.) The argument is as follows.

In the absence of knowledge as to which transcript was generated in response to which target, one observes that in setting up the matrix there are n! possible ways to label the columns (transcripts), given any particular order of the rows (targets), and vice versa. Thus, there are n! possible matrices which could be constructed from the raw judging data, all of them equally likely a priori. Each has its associated sum on the diagonal corresponding to a possible alignment of targets and transcripts.

The significance level for the experiment is then determined by counting the number of possible matrices that would yield a result (diagonal sum) equal to or better (i.e., lower sum of ranks in the rank-order case, higher sum of scores in the correspondence-rating case, etc.) than that obtained for the matrix corresponding to the key, and dividing by n! This ratio gives the probability of obtaining by chance a result equal to or better than that obtained in the actual judging process.

The calculation method just outlined has in common with the previous approach (the direct-match statistic) that the various judging steps are not required to be independent. It is more precise, however, in that it takes into account measures of transcript quality represented by the whole range of rank-order numbers, not just the number of direct matches. For the 9×9 matrix under consideration we have by direct count $p = 32/9! = 8.8 \times 10^{-5}$, a result which in this case is essentially the same as that obtained by the direct-match statistic.

Finally we note, as an item of interest to be discussed later, that in trials 3, 4, and 6 through 9, the subject was secured in a double-walled copper screen Faraday cage, which provides 120-dB attenuation for plane-wave radio-frequency radiation over the range of 15 kHz to 1 GHz. The results of the judging indicate that the use of such shielding does not prevent high-quality descriptions from being obtained.

D. Replication Series

Having completed this initial series of trials with S1, we concluded that remote viewing appeared to be both a real and a robust phenomenon. We then carried out replication experiments with other subjects (the results of which are given in detail in Reference 2) until we had established a data base of over 50 trials. A summary tabulation of the statistical evaluations of these trials (with nine subjects) is presented in Table 2. Of the six studies, involving remote viewing of natural targets or laboratory apparatus, five reached statistical significance. The overall results, evaluated conservatively on the basis

Table 2

SUMMARY: REMOTE VIEWING OF LOCAL TARGETS

Subject	Number of Experiments	p-Value, Rank Order Judging
With natural targets		
S1	9	8.8×10^{-5}
S2 and S3 (four each)	8	5.2×10^{-4}
S4	9	1.7×10^{-3}
S5 and S6 (four each)	8	0.08 (NS)
V1 and V2 (three; two)	5	0.033
With technology targets		
S2, S3, S4, V2, V3	12	0.044

of a judging procedure that ignored transcript quality beyond that necessary to rank order the data packets (vastly underestimating the statistical significance of individual descriptions), clearly indicated the presence of an information channel of useful bit rate. The descriptions supplied by the subjects, although containing inaccuracies, were sufficiently accurate to permit the judges to differentiate (blind) among various targets to the degree that roughly 50% of the transcripts were directly matched.[2]

E. Criticisms

Three major criticisms have been raised with regard to this work. We now address each in turn.

(1) A statistical procedure used to evaluate the judging matrices in earlier publications[2-6] has been criticized on the basis that the judge's rank order assignments for a given target may not be independent of his assignments for other targets.[22] This has been rectified in this paper by the use of the direct-count-of-permutations method (introduced in Section C) which does not assume independence of assignments. The p-values quoted in Table 2 are therefore the corrected ones. As it turns out, the updated values do not differ significantly from the previously published ones (compare, for example, Table 2 here and Table VIII of Ref. 2), and therefore interpretations as to the significance of the data are unaffected.

(2) It has been suggested that post-trial feedback to the subject during an experimental series may provide information to the subject which helps him to narrow down the field of target possibilities in later trials ("closed-deck" fallacy).[23] The target pool was carefully constructed, however, to contain several targets of any given type--that is, several fountains, several churches, several boathouses, and so forth--specifically to circumvent the strategy of "I had a fountain yesterday, so it can't be a fountain today." (In Ref. 2 see, for example, fountain targets in tables IV and V and in figures 7, 8, and 15; churches in tables II and III; boat marinas in tables II and V and figure 14; and so forth). Thus, the content of a given target, determined by random entry into the target pool, is essentially independent of the contents of other targets ("open-deck" design).

(3) The initial experimental series of 9 trials with Subject S1 (Section B) was criticized on the basis that extraneous cues in the unedited subject transcripts might provide additional information useful to judges attempting to blind match transcripts to target sites (e.g., phrases from which one might infer the temporal order of the transcripts.)[24] To test this hypothesis, the entire data set was turned over to an independent researcher,* who set himself the task of reanalyzing the entire experiment, taking into account this criticism. To execute this task, he first edited the transcripts, removing all phrases which had been suggested as possible cues, together with any additional phrases for which even the weakest post-hoc cue argument could be made. He then arranged to have the set re-blind-judged by an individual unfamiliar with this study. The result: the same seven out of nine were directly matched as had been matched previously, and the direct-count-of-permutations analysis of the matrix yielded a result somewhat more significant than in the original study ($p = 8/9! = 2.2 \times 10^{-5}$). Thus, the hypothesis that the matches in the original study were due to artifactual cues was soundly rejected, and the paranormal interpretation upheld.[25-26]

Given (1) the failure of the cueing-artifact hypothesis to account for the success of the first study, (2) the inapplicability of that hypothesis to our later replication studies (the judging protocols were carefully checked prior to judging to insure absence of potential cues), (3) the open-deck strategy in target pool design, (4) the refinement of the statistical procedures without loss of significance, and (5) the continuing successful replication of this work in our own and other laboratories, the remote viewing data has withstood every attempt on the part of ourselves and others over the years to find some alternate explanation. Thus, remote viewing continues to be confirmed as a viable human perceptual ability.

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IV PHYSICS PRINCIPLES POTENTIALLY APPLICABLE TO PSI PHENOMENA

One of the common objections to the psi hypothesis is that it would seem to be in conflict with the laws of physics. In opposition to this view, many workers in the field are of the opinion that the data will in all probability be accounted for either within the framework of physics as presently understood, or within the framework of extrapolations that have been proposed to account for other (non-psi) data.

The areas of physics put forward for consideration as potentially relevant to modeling psi phenomena include: the possibility that remote viewing is mediated by extremely low-frequency (ELF) electromagnetic waves;[27-33] the possible significance for remote viewing of Bell's theorem[34] in quantum theory which requires interconnectedness of distant events in a manner that is contrary to ordinary experience[35-36] (experimentally confirmed at the microscopic level);[37-38] the proper interpretation of the effects of an observer (consciousness) on experimental measurement,[39-41] of possible significance in psychokinesis; the possibility that the advanced-potential solutions in physics play a role in so-called precognition;[42-44] and the potential relevance (for a general theory of psi phenomena) of theories based on geometries which provide for a more extended structure of the space-time metric.[45-46]

Although little progress has been made toward a rapprochement between psi and physics, physicists like ourselves are making an effort to design and carry out experiments which can in principle shed light on the alternative models. As a conservative start, a reasonable first hypothesis would be that remote viewing is mediated by extremely low-frequency (ELF) electromagnetic waves, a hypothesis that does not seem to be categorically ruled out by any obvious physical or biological facts.

This hypothesis, discussed in some detail in a series of papers by I. M. Kogan of the Soviet Union, suggests that information transfer under conditions of sensory shielding is mediated by ELF waves with wavelengths in the 300 to 1000-km region.[27-30] Experimental support for the hypothesis is claimed on the basis of: less than inverse square attenuation with distance, compatible both with earth-ionosphere waveguide mode trapping, and with source-percipient distances lying in the induction field range as opposed to the radiation field range; observed low bit rates (0.005-0.1 bits/s) compatible with the information-carrying capacity of ELF waves; apparent ineffectiveness of ordinary electromagnetic shielding as an attenuator; and standard antenna calculations entailing biologically generated currents yielding results compatible with observed signal-to-noise ratios.

On the negative side with regard to a straightforward ELF interpretation as a blanket hypothesis are: (a) apparent high-resolution, real-time descriptions of remote activities in sufficient detail to require a channel capacity in all probability greater than that allowed by a conventional modulation of an ELF signal; (b) lack of a proposed mechanism for coding (and decoding) the information onto the proposed ELF carrier; and (c) apparent precognition data. The hypothesis must nonetheless remain open at this stage of research.

Experimentation to determine whether the ELF hypothesis is viable can be carried out by the use of ELF sources as targets, by the study of parametric dependence on propagational directions and diurnal timing, by experimentation under unusual conditions of shielding (e.g., in a submarine), by the exploration of distance and resolution (target size) effects, and (in some forms of the model) by a study of differences between the presence and absence of a human link who can act as a transmitter of the target.

The experiments described in the following sections were designed to address the above issues. To anticipate the results, the introduction of factors which might be expected to degrade performance on the basis of an ELF model did not in fact appear to affect the channel deleteriously.

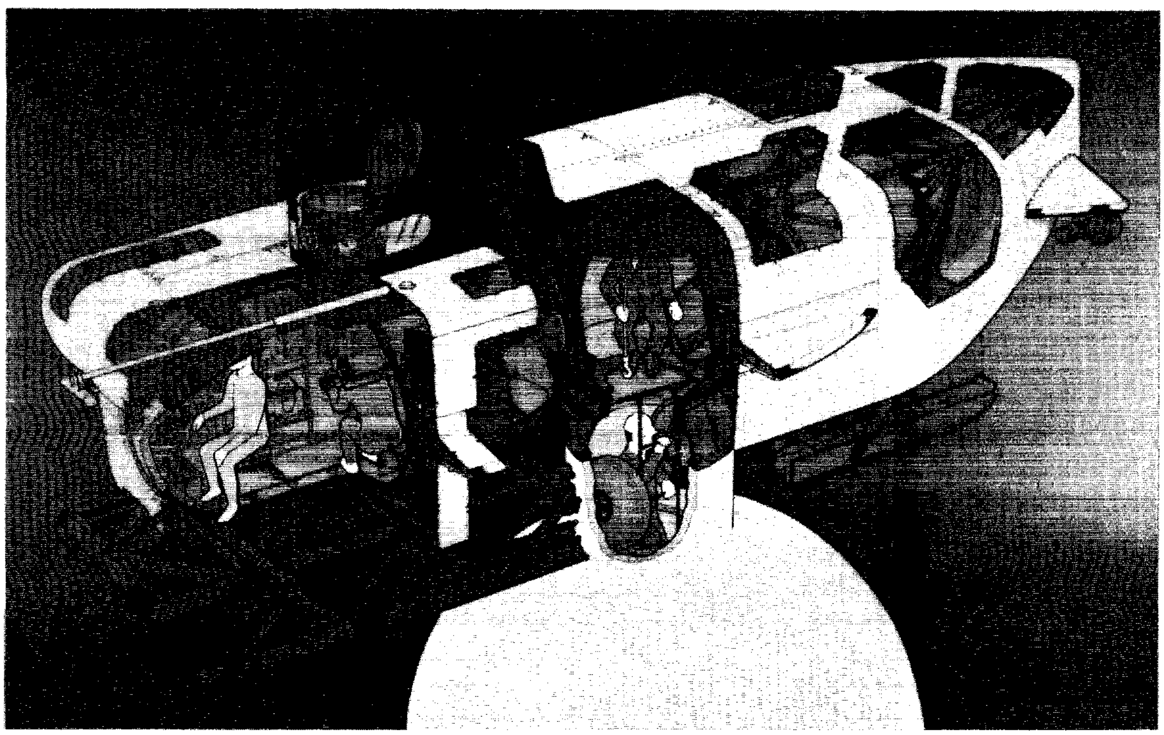
V LONG-DISTANCE REMOTE VIEWING FROM A SUBMARINE

In July of 1977 we carried out two preliminary tests of remote viewing from a submersible submerged in several hundred ft of seawater, approximately 500 miles from the target site. This provided an opportunity to investigate the remote viewing phenomenon under conditions of increased distance and shielding.

The submersible used in the experiment was the Taurus, a five-man underwater vehicle (see Figure 2) manufactured by International Hydrodynamics Company Ltd. (HYCO) of Canada. Experimental time on the Taurus was made available to SRI by Mr. Stephan Schwartz of the Philosophical Research Society of Los Angeles, who, as Director of Project Deep Quest, had arranged for its use in an underwater psi archaelogy experiment.[47] During the experimentation discussed here, the submersible operated submerged in the waters near Santa Catalina Island, off the coast of southern California.

The goal of the experiment was to provide data on the possible shielding effects of several hundred feet of seawater, known to be a good shield for all but the lowest frequencies of the electromagnetic spectrum.

(a) PHOTOGRAPH



(b) SECTIONAL VIEW

FIGURE 2 SUBMERSIBLE TAURUS

The protocol for each of the two tests was as follows. Target pools of six San Francisco Bay Area target locations each were assembled in advance of the tests. During a test a pair of experimenters comprising a target demarcation team went at a prearranged time to a randomly-determined site and remained there for 15 minutes. During this period a subject on board the submersible, monitored by an experimenter blind to the target pool, registered his impressions as to where the target demarcation team was, 500 miles away, as per standard remote viewing protocol. When shown the target list (for the first time) after the remote viewing trial was completed, the subject was asked to make a choice as to which target of the set of six was viewed.

Two trials of this type were carried out, one each with two subjects. (Four were planned in accordance with a prearranged time schedule, but two were aborted because the submarine did not follow its diving schedule.)

For the first trial the submersible was at a depth of 170 m in water 340 m deep. Figure 3 shows the subject's response to the target demarcated by the outbound team, a large oak tree. The subject correctly described a large tree, framed against a drop-off, and had no difficulty choosing the correct target from the list of six potential targets.

For the second trial the submersible rested on the bottom in 78 m of water. The outbound team again went at a prearranged time to one of six possible locations (chosen from a new list by a random procedure), a shopping mall shown in Figure 4. Figure 5 shows the subject's response to the target. The subject correctly indicated the flat stone flooring, small pool, reddish stone walk, and people walking around in an enclosed space. When shown the target list, the subject chose the correct target location.

Therefore, in the two trials that were carried out from the submersible, the subject in each case selected the correct one out of six targets, events whose combined probability of occurring by chance is $p = 1/36 = 0.028$.

To determine the significance of the success of the remote viewing experiment with regard to the ELF hypothesis, we examine the shielding effect of 170 m of seawater (for the first trial). The appropriate calculations have been carried out by the authors; we quote the salient features here.

Three modes of propagation have to be considered. They are the TE, TM, and quasi-TEM modes of propagation. (The latter is generally assumed in Project Sanguine/Seafarer calculations, where one considers coupling into the spherical resonant cavity comprised of the earth's surface as the inner radius, and the ionosphere as the outer radius.[48])

FIGURE 3 SUBMERSIBLE EXPERIMENT NUMBER 1: 170 m DEEP IN 340 m OF WATER. 16 July 1977. Target was a giant oak on a hilltop in Portola Valley, California. Subject's first words were: "A very tall looming object. A very, very, hugh tall tree and a lot of space behind them. There almost feels like there is a drop-off or a palisade or a cliff behind them."

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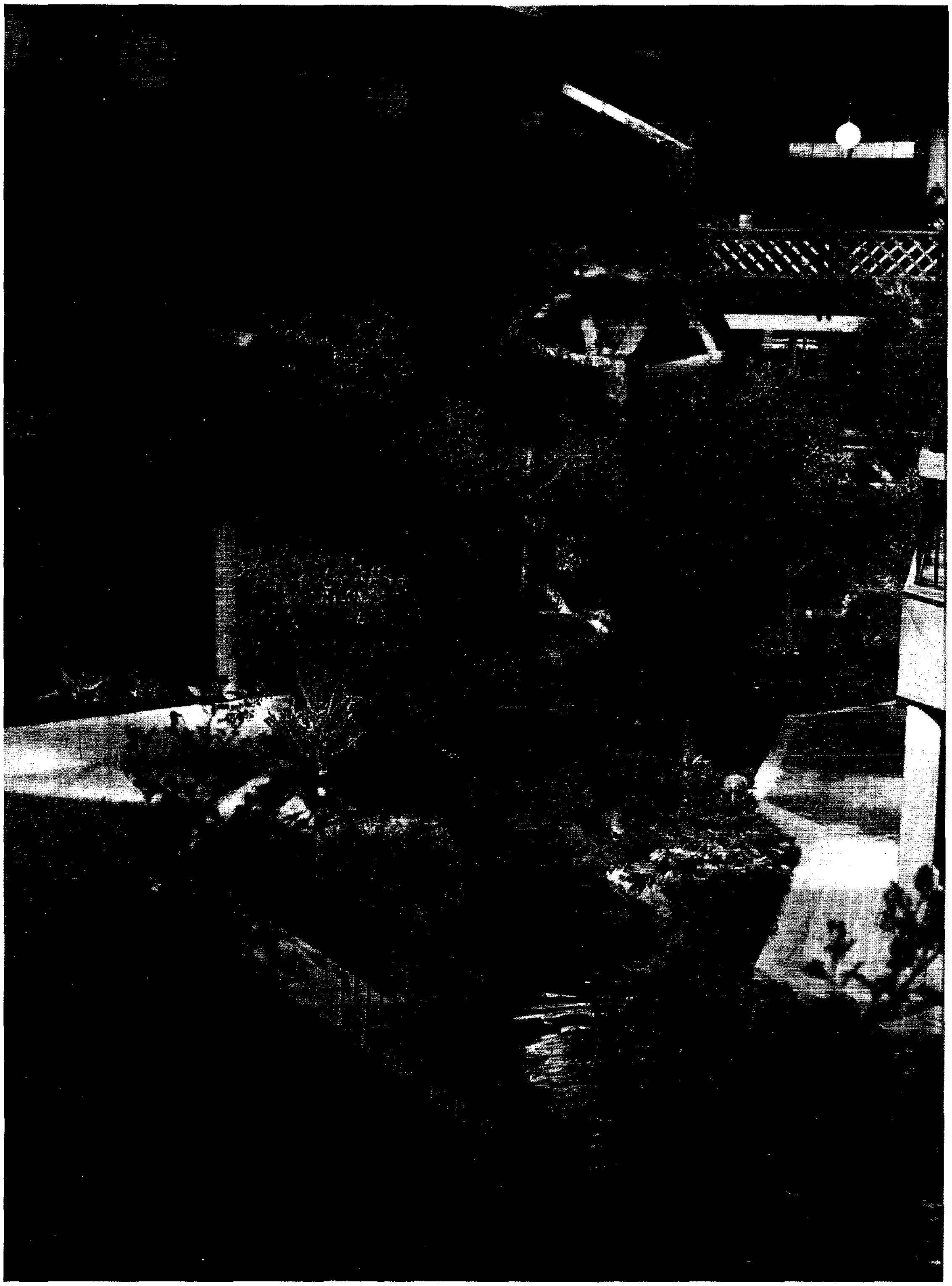
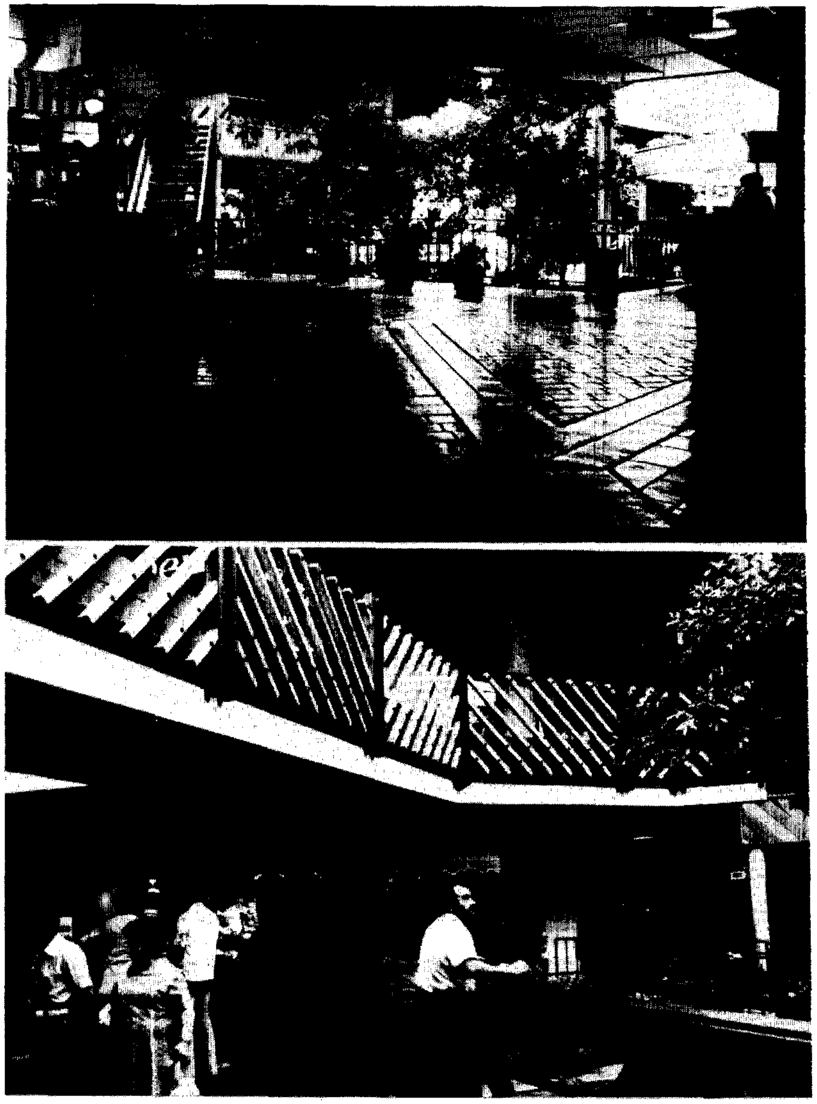


FIGURE 4 SHOPPING MALL TARGET USED IN SUBMERSIBLE EXPERIMENT NUMBER 2



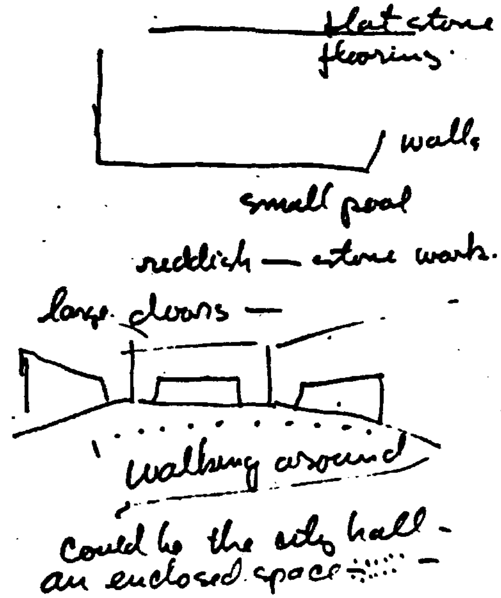


FIGURE 5 SUBMERSIBLE EXPERIMENT NUMBER 2: 78 m DEEP ON THE BOTTOM. Target was shopping mall in Mountain View, California. Subject's drawing correctly identifies: "Flat stone flooring, walls, small pool, reddish stone walk, large doors, walking around, an enclosed space."

Table 3 shows the minimum attenuation results for the three cases, assuming a depth of 170 m and a lower frequency limit of 10 Hz (alpha brainwave frequency). (The attenuation is higher at higher frequencies.) We see that in all cases there is greater than a 20 dB (factor of 100) attenuation of a 10-Hz ELF signal. The results are therefore suggestive that the postulated ELF electromagnetic radiation mechanism is not viable as a mechanism for remote viewing. A definitive test, of course, requires a lengthy series of experiments carried out at, say, 1000 m, where 10-Hz attenuation reaches more than 100 dB.

Finally, we note that although the subjects indicated that they had experienced some degree of stress due to cramped conditions and seasickness, these environmental factors did not appear to affect the quality of performance negatively.

VI REMOTE VIEWING OF TRANSCONTINENTAL TARGET SITES

After establishing the data base of more than 50 remote-viewing experiments with local targets (sites within a few kilometers), we undertook a series of five trials designed to provide an indication as to whether an increase in subject-target separation to transcontinental distances would degrade the quality or accuracy of perception. A major motivation for this effort was the desire to accumulate further data aimed at determining whether remote viewing might be mediated by extremely low-frequency (ELF) electromagnetic waves. Under simple forms of this hypothesis, one would expect a degradation in accuracy as the subject-target distance is increased from a few kilometers to several thousand kilometers.

As a secondary goal, we were interested in the real-time data rate, another important factor in assessing the ELF hypothesis. Therefore, the subjects were encouraged to describe real-time activity during the viewing period.

The methodology with regard to experimental design again was designed to eliminate possible cueing paths. The protocol was as follows. Arrangements were made in advance of each trial (via telephone or computer teleconferencing) as to the trial start time. The targets were then determined (following disconnect) either by random-number generator entry into a previously prepared target list unknown to subject and experimenters with the subject, or in one case, on the basis of site selection by an independent, skeptical challenger. The duration of each trial was fifteen minutes.

Table 3

SUBMARINE EXPERIMENT
(ELF Hypothesis)

Depth: 170 m	
Maximum-Transmission TE Wave (normal incidence, 10 Hz)	
$R_{surface\ loss}$	44.8 dB
R_{attn}	18.6 dB
Total	63.4 dB
Maximum-Transmission TM Wave (grazing incidence, 10 Hz)*	
$R_{surface\ loss}$	3.4 dB
R_{attn}	18.6 dB
Total	22.0 dB
Maximum-Transmission Quasi-TEM Wave (grazing incidence, 10 Hz)	
$R_{surface\ loss}$	50.3 dB
R_{attn}	18.6 dB
Total	68.9 dB

*Under the least-loss case (near-grazing TM wave), the attenuation for an ELF signal at 10 Hz is 18.6 dB at 170 m, to which must be added the air/surface reflection loss. (The air/surface interface adds another 3.4 dB.)

A. Menlo Park to New York City (Grant's Tomb)

Two subjects, S7 and S8, both in California, participated simultaneously in a trial with Grant's Tomb, the first of two New York City targets. Both subjects independently provided computer-stored records of their impressions, and one made the sketch shown in Figure 6.

Subject S8 said in his opening paragraph: "Outdoors, large open area, standing on and then off asphalt (rough material), dark for a path. A white building, like a ticket booth. Wooden structure, is white in color, and has an arched look about it. There is a large shade tree close to Russ (outbound experimenter)."

Subject S7, closeted in a separate SRI location, began with: "I thought of a high place with a view." The subject continued with "I saw a tree on your left in a brick plaza--it seemed to be in front of a building you were entering." Later, "I could not clearly identify the activity. A restaurant? A museum? A bookstore?" And, "You were looking at coins in the palm of your hand, maybe giving some to Nicky (son of outbound experimenter)." The coins were in fact given to the experimenter's son to purchase the postcard from which Figure 6 was made. Both subjects then went on for an additional paragraph to describe details of the activities they imagined to be going on inside the building they saw, details that were partly correct, partly incorrect.

B. Menlo Park to New York City (Washington Square Fountain)

In the second experiment, the target, again chosen by random protocol, was the fountain in Washington Square Park. One subject, S7, participated. The photos and the subject's drawing of the fountain are shown in Figure 7. The subject began with the following: "The first image I got at about the first minute was of a cement depression--as if a dry fountain with a cement post in the center or inside. There seemed to be pigeons off to the right, flying around the surface out of the depression .... At one point I thought you were opening a cellophane bag ...." (The experimenters had in fact bought ice cream during the experimental period.) "There was also a rectangular wooden frame, a window frame, but I wasn't sure if it was on a building, or a similar structure with a different purpose." (A possible correlation from a functional viewpoint to the Washington Square Arch through which the outbound experimenters viewed the fountain toward the end of the experimental period.) "All in all I thought you were in Riverside Park ...." (Incorrect analysis.) Finally, the subject described "cement steps going into the depression, like a stadium, and the rounded edge of the top of the depression as you go up to ground level," a description which shows correct detail.

GRANT'S TOMB TARGET IN NEW YORK CITY

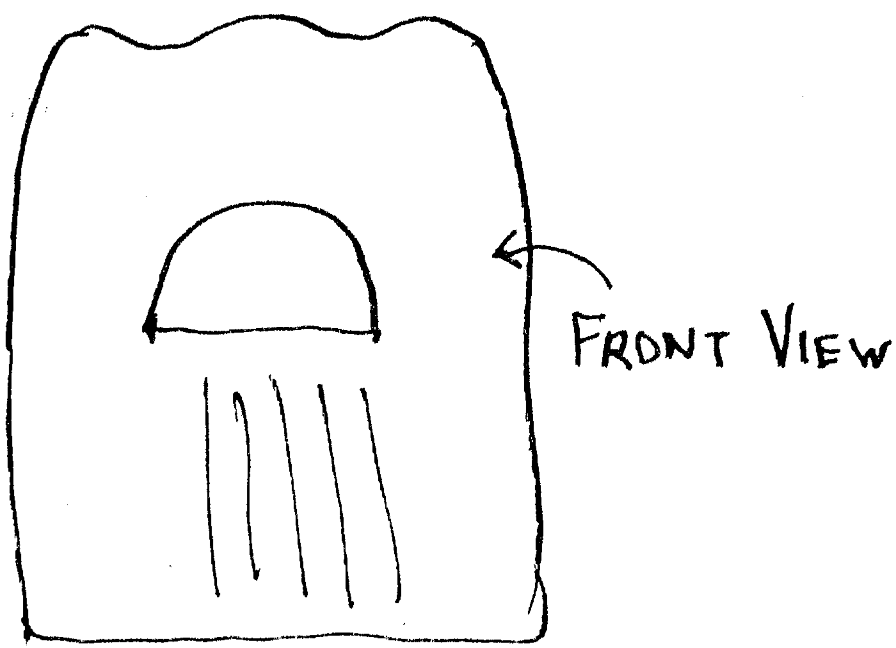
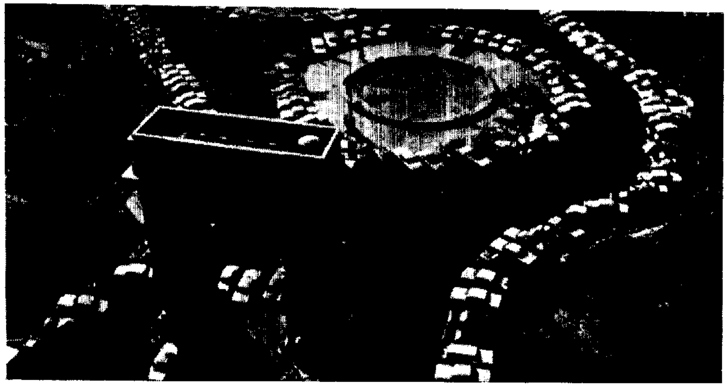
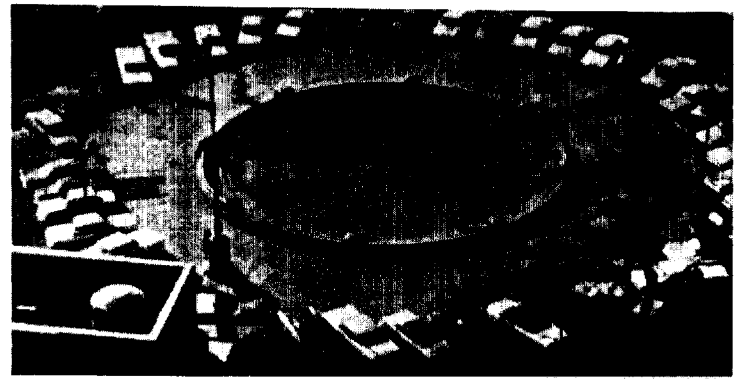
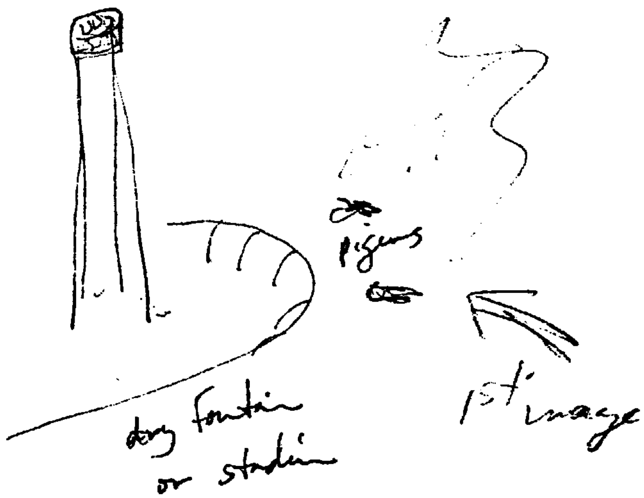


FIGURE 6 IN COAST-TO-COAST REMOTE VIEWING EXPERIMENT, SUBJECT DESCRIBED: "OUTDOORS, LARGE OPEN AREA.... SHADE TREES.... WHITE BUILDING WITH ARCHES"







COAST TO COAST REMOTE VIEWING EXPERIMENT WITH TARGET AT WASHINGTON SQUARE IN NEW YORK CITY. SUBJECT'S FIRST PERCEPTION WAS OF A "CEMENT DEPRESSION - AS IF A DRY FOUNTAIN — WITH A CEMENT POST IN THE CENTER OR INSIDE".

FIGURE 7 WASHINGTON SQUARE IN NEW YORK CITY, USED AS TARGET IN COAST-TO-COAST REMOTE-VIEWING EXPERIMENT, 6 JULY 1976

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C. New York City to Ohio (Ohio Caves)

A third long-distance remote-viewing experiment was carried out under the control of an independent, skeptical scientist not known to the subject. In this case SRI experimenters visiting in Ohio agreed to a remote-viewing experiment in which the target would be selected by our host.

Under the observation of our challenger, we telephoned Subject S4 in New York City and obtained the subject's agreement to participate in a long-distance remote viewing experiment. The subject was told only that we were located somewhere between New York City and California and that shortly we would be taken to a target. The time for the experiment was set for 2:00 PM EDT. We also agreed to call again at 3:00 PM EDT to obtain Subject S4's impressions and to provide feedback as to the actual target.

The scientist chose as a target location the Ohio Caverns at Springfield, Ohio (see Figure 8). We entered the grounds through an entrance arch that opened onto an enormous expanse of lawn, perhaps 20 acres. The caves are located at a depth of ≈150 ft and are entered through a small building having a long flight of steep stairs. Once underground, we walked through a maze of rock-lined tunnels that led eventually into a series of rooms lined with calcite stalactites and stalagmites, frosty white and beige crystals formed like icicles. The entire cavern was illuminated by small electric light bulbs attached to the walls. After a 45-minute walk, we exited the caves through a large metal door giving access to a square cross-sectional shaft with stairs leading to the surface.

Following the experimental period, the scientist-observer called the subject in New York, 45 minutes after we left the caves. The opening statements of the subject's transcript as dictated over the phone and posted to the SRI experimenters was as follows:

> "1:50 PM before starting--Flat semi-industrial countryside with mountain range in background and something to do with underground caves or mines or deep shafts--half man made, half natural--some electric humming going on--throbbing, inner throbbing. Nuclear or some very far out and possibly secret installation--corridor--mazes of them--whole underground city almost--Don't like it at all-long for outdoors and nature. 2:00 PM--(Experimenters) R and H walking along sunny road--entering into arbor-like

FIGURE 8 OHIO CAVES: DESCRIBED BY SUBJECT IN NEW YORK AS, "UNDERGROUND CAVES OR MINES.... DEEP SHAFTS.... DARKER, COOL, MOIST EARTH-SMELLING PASSAGES"

> shaft--again looks like man helped nature--vines (wisteria) growing in arch at entrance like to a wine cellar--leading into underground world. Darker earth-smelling cool moist passage with something grey and of interest on left of them--musty--sudden change to bank of elevators--a very man-made steel wall--and shaft-like inverted silo going deep below earth--brightly lit ...."

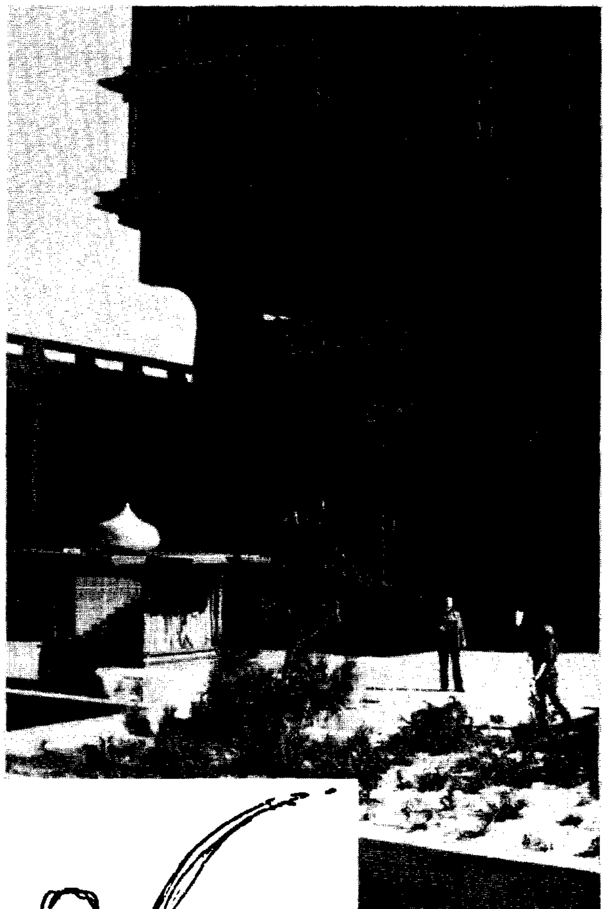
As is often the case, one observes that the basic gestalt of the target site was cognized (the underground caves aspect) while a specific interpretation (the labeling of the location as a nuclear installation) was in error.

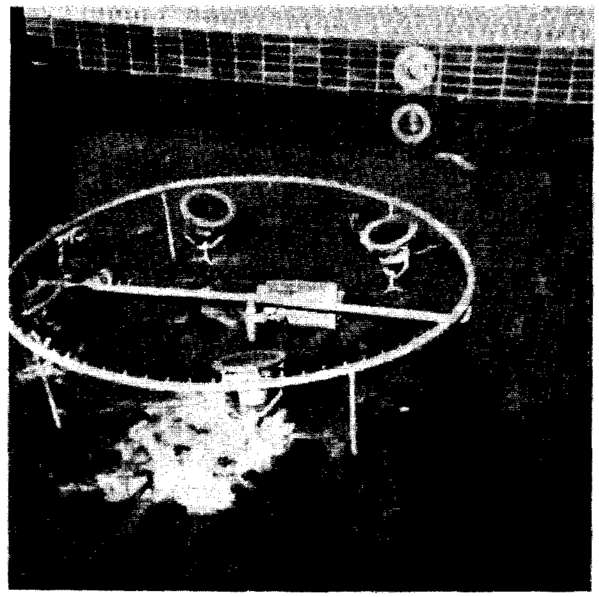
A second subject (S8) who had agreed in advance to participate in the same experiment by date and time, was less successful with the cavern target. This subject erroneously interpreted early impressions as associated with a museum. As a result the majority of his transcript, although containing some correct elements, reflects primarily this incorrect analytical interpretation and cannot be said to constitute evidence for paranormal functioning.

D. <u>New Orleans to Palo Alto (Northern California Bank Plaza)</u>

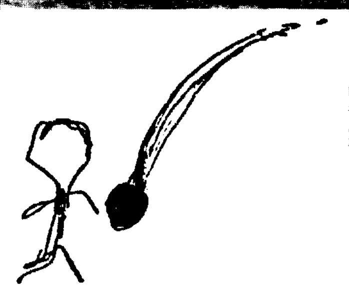
Two trials carried out between New Orleans and Menlo Park, California, constitute the final tests of this long-distance series. These last two were carried out with the two subjects who had participated in the first two California-to-New York experiments.

The first experiment in this series required Subject S7 in New Orleans to view the activities of a group of three people known to the subject, at a location in a Palo Alto/Menlo Park area 2000 miles away. The subject's principal impression was of an "overhang of a building over their heads ... also a round gold rim around a sunken depression." The target, a bank building, is shown in Figure 9. Principal features of the target include a building overhang, and a rectangular concrete depression with a fountain in which the water comes out of a circular gold rim. The subject also reported "some kind of fake china flowers mushrooming out of the depression," a possible correlation to four orange lamps mounted on the gold rim. Finally, S7 reported "there was a projectile coming toward (one of the outbound experimenters). Like a ball or frisbee, as if (another experimenter) has tossed him a ball." The experimenters had in fact found a paper airplane lying on the ground and had thrown it back and forth several times; the photo of the site <u>taken at the time of the experiment</u> shows the airplane between them.





Circular Fountain in Concrete Depression



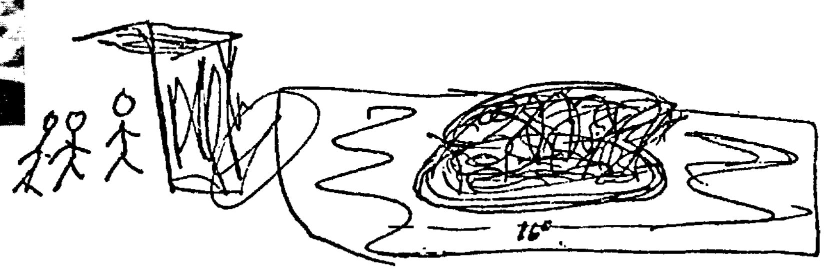


FIGURE 9 REMOTE VIEWING EXPERIMENT — NEW ORLEANS TO PALO ALTO, 30 OCTOBER 1976. Subject described: "The overhang of a building over their heads," also "A round gold rim around a sunken depression" .... "In the surface of the depression there is some kind of fake china flowers. It's like a Bonsai tree mushrooming out of the surface." Later in the transcript she said "There was a projectile coming toward Dave. Some kind of a projectile, like a ball or frisbee. As if Elizabeth tossed him a ball." (It was a paper airplane.)

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E. Menlo Park to New Orleans (Louisiana Superdome)

For the final experiment (subject in Menlo Park) it was agreed that at 1200 CST on a particular day, the outbound experimenter would choose a target location in his city by random protocol and remain there for the required 15 minutes. During this time, Subject S8 in Menlo Park would tape-record impressions and make any drawings that seemed appropriate.

The target chosen by randomized entry into a New Orleans guide book list was the Louisiana Superdome. The outbound experimenter tape-recorded the following description as he looked at the building: "It is a bright sunshiny day. In front of me is a huge silvery building with a white dome gleaming in the sun. It is a circular building with metal sides. It looks like nothing so much as a flying saucer. The target is in fact the 80,000-seat Louisiana Superdome stadium."

The subject in Menlo Park described the target as "a large circular building with a white dome." The subject also expressed feelings of wanting to reject what he saw because the dome looked "like a flying saucer in the middle of a city." Some appreciation for this perception can be obtained from Figure 10 in which the target is shown, together with the sketches that the subject made.

Due to the expense and distances involved, these five trials were not evaluated by our usual double-blind matching procedure. Nonetheless, on the basis of post-hoc content analysis it appears that the results obtained in these five long-distance remote-viewing experiments were roughly of the same accuracy with regard to site description as those obtained in local remote-viewing experiments. (For more detail, including samples of complete transcripts and associated content analysis, see Ref. 46.) The descriptions not only contain correct general information, but often show remarkable detail and resolution. Furthermore, in a number of instances, real-time activities were observed and correctly described.

Similar data has been obtained by Bisaha and Dunne in a series of successful long-distance remote viewing experiments carried out over intercontinental distances (e.g., Chicago-Moscow).[13] The data from our five trials taken together with their formally-judged experiments would seem to indicate that there is little, if any, degradation in quality of perception as the subject-target distance is increased from a few km to intercontinental distances. Therefore, any theory of paranormal functioning put forward at this time should take into account this apparent insensitivity to distance, and any application of paranormal functioning need not, to first order, consider distance as a barrier, at least to the range examined. This conclusion admittedly is based on the long-distance data

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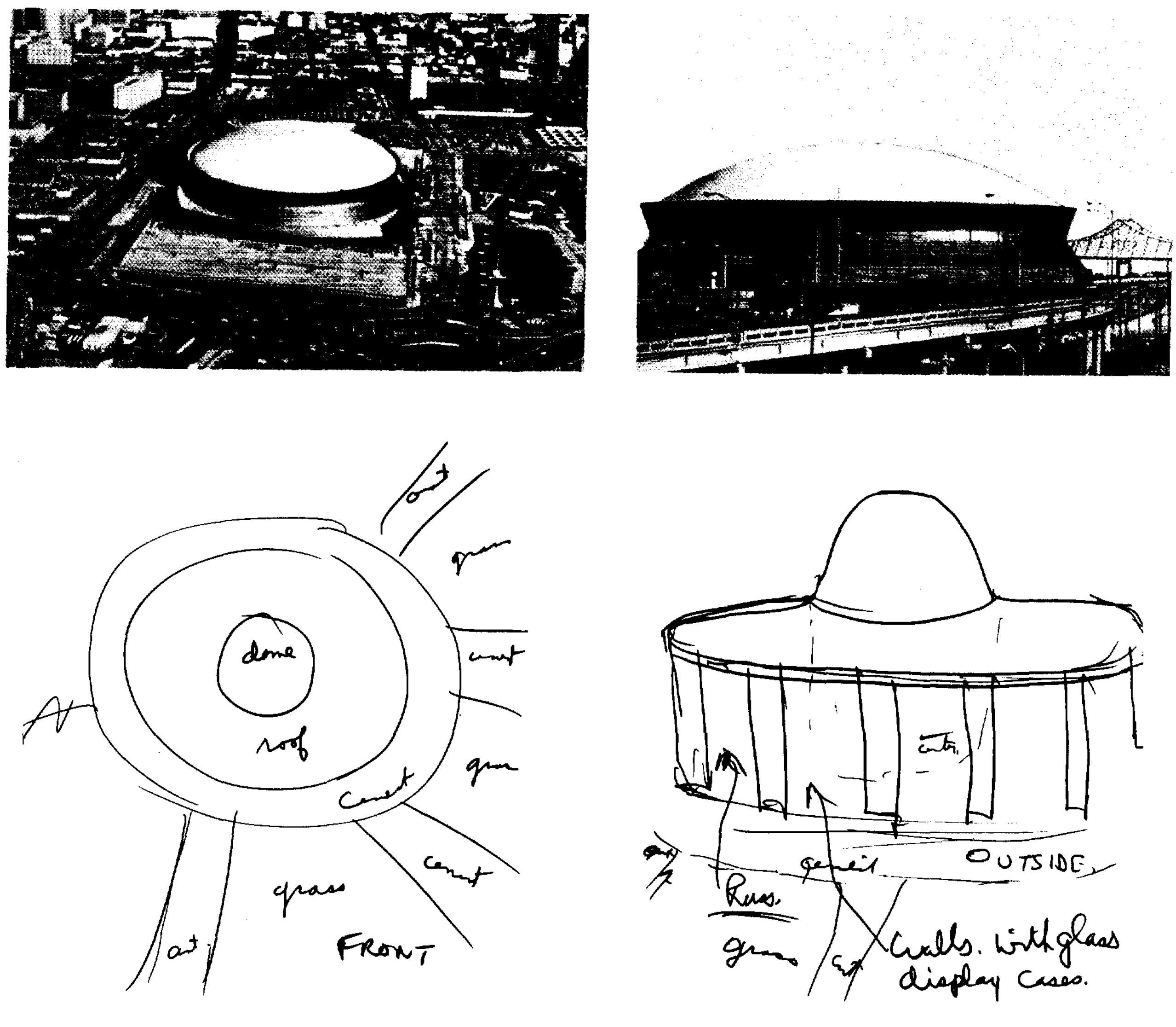

FIGURE 10 LONG DISTANCE REMOTE VIEWING EXPERIMENT — SRI, MENLO PARK, TO LOUISIANA SUPERDOME. Subject described large circular building with a white dome. 31 October 1976.

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obtained to date, which is not as extensive as that obtained for shorter distances. Nonetheless, in our opinion the indications are strong that this conclusion is correct.

VII RESOLUTION IN REMOTE VIEWING STUDIES: MINI-TARGETS

In order to obtain an estimate of the resolution capability of the remote-viewing process, an experimental series was carried out in which a subject (S4) was asked to render descriptions of objects hidden in small light-tight metal containers (35 mm film cans). This was the first experiment of this type in our laboratory. There were no previous trials or pilot experiments with these or similar targets. In this series the target can was not seen by the subject before or during the experiment; the location of the target was known to the subject only as being on the person of a known experimenter who had left the laboratory, obtained the target from a previously prepared target pool by use of a random number generator, and was now located at an unknown site away from SRI (about 1/8th mile distant). Furthermore, in order to test the "transmitter" hypothesis, during the trials no experimenter, <u>including the outbound experimenter with the target</u>, knew either the particular target, nor the contents of the target pool. The experiment was thus of the double-blind type. Statistically significant results, determined by blind judging, was obtained for this series.

In preparation for the series, a target selector not known to the subject and not otherwise associated with this study was asked to select ten small objects and to place each in a separate 35 mm light-tight film can.* The target pool was constructed to contain a number of cylindrically shaped objects, a number of metal objects, and so forth (that is, the objects were <u>not</u> chosen to be particularly distinct from one another), so as to circumvent subject strategies based on knowledge of previous targets (by feedback) as the series progressed. The film cans were then turned over to a second experimenter who, without opening them, numbered the film cans 1 to 10 and placed them in a secure safe. At this point all information as to film can contents and target can number was lost.

At the beginning of each trial the subject was closeted with an experimenter in an isolated windowless room of the Radio Physics Laboratory

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*The film cans were tested for light-tightness by exposing the cans containing 400 ASA Tri-X film to 30 flashes of a 1200 watt-second strobe light at 11 inches; photodensitometer traces showed no light exposure as compared with unexposed control film.

in the SRI complex. A second experimenter then left the laboratory, generated a random number by the use of the random-number function on a Texas Instruments Model SR-51 hand calculator, obtained the associated can from the target pool in the safe,* and took it to a convenient location (not told to the subject) in a park nearby SRI (about 1/8th mile distant). Thus the subject knew the location of the film can target only as being on the person of an experimenter, known to her, outbound to an unknown site. The outbound experimenter then remained at the remote location for an agreed-upon ten-minute target period, with the film can still unopened so that he remained ignorant of the target.

During the target period the subject was asked to locate the outbound experimenter and to describe the contents of the film can in his possession. Since the investigator with the subject was ignorant of both the particular target and the contents of the target pool, he was free to question the subject about her perceptions without fear of cueing. The entire interaction in the laboratory was tape recorded, and the subject was encouraged to make drawings to accompany her verbal description of the film-can contents.

Following the target period, the outbound experimenter returned to the laboratory, at which time all concerned (subject and experimenters) learned for the first time the contents of the target film can by opening it.

A sequence of ten trials was carried out. During the series the target cans were used without replacement until the ten possibilities were exhausted.

To facilitate analysis, it was decided <u>in advance of the experimental series</u> that the ten trials would be broken down into two subgroups of five trials each. Thus, in the blind rank-order procedure used (described below), a judge was asked to compare each target against five transcripts--one generated during the target period of interest and four generated during the other target periods of the subgroup.

In preparation for the judging of each subgroup, the subject's tapes were transcribed. The resulting transcripts were then edited only to the extent of deleting information which might act as artifactual cues to a judge, such as references to other targets, or phrases which might indicate the temporal order of the transcripts.

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*Because targets were used without replacement, when a previously used number came up, the random-number generator was reactivated until an unused number was obtained.

The transcripts and film can targets, each in their own random order different from the order of target usage, were then turned over to an independent judge not otherwise associated with the experimental series. The judge was instructed to blind rank order, on a scale 1-5 (best to worst match), each of the five transcripts against each of the five film can targets in each subgroup, generating the 5 × 5 matrices shown in Table 4. In the two series of five each, four were directly matched in the first series, two in the second. The resulting matrices were analyzed using the direct-count-of-permutations method discussed earlier. The results for the two matrices are, respectively, $p_1 = 2/5! = 0.017$, $p_2 = 35/5! = 0.292$, one tailed. Combining the results of the 2 subgroups using the conservative method devised by Eddington,[49] we obtain an overall probability of $P = (\Sigma p)^N/N! = (p_1 + p_2)^2/2 = 0.047$, one tailed. Thus the experimental series as a whole reaches significance, with the bulk of the significance being generated by the first subgroup which is independently significant.

As an example of the quality of descriptions obtained, the results generated in the first subgroup of five are shown in Figure 11. The captions contain quotes from the subject's first paragraph of each description. For a spool and a pin we have: "It's definitely something thin and long ... with like a nail head at the end ... silver colored;" for a curled up leaf: "a nautilus shape with a tail;" for a leather belt keyring: "The strongest image I get is like a belt;" for a can of sand: "like a miniature tower ... scalloped bottom ... light beige;" for a grey and white quill: "like a penguin ... grey and black and white ... it's organic and has been alive ... pointed or slightly rounded off at the top ... open or pointed at the bottom."

In this series we thus obtained evidence that small objects can be discriminated by psi processes, and that the channel functions down to at least the order of a few millimeters spatial resolution.* Such resolution would seem difficult if not impossible to accommodate under an ELF hypothesis, unless an elaborate process for encoding target information onto a carrier is invoked. Furthermore, given that all experimenters were blind as to the target, it would appear that a potential transmitter hypothesis which might in principle provide such an encoding, is not viable.

Finally, we note that either (1) the successful use of light-tight film cans indicates that the light level required to illuminate the target can be vanishingly small, or (2) the primary information channel is precognition of the feedback. Further work will be required to differentiate between the two.

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*In a follow-on study with 1 mm × 1 mm "microdot" targets, photographically prepared by reducing photos of ordinary objects and scenes, and secured inside double envelopes at a remote location, evidence to date continues to support this observation.

FILM CAN SERIES

Table 4

DISTRIBUTION OF JUDGE'S RANKINGS

Target	Transcript Letter				
	A	B	C	D	E
Belt keyring	1	5	3	4	2
Quill	5	1	2	4	3
Leaf	4	3	1	5	2
Spoon and pin	5	4	3	1	2
Can of sand	4	3	1	5	2

$p = 0.017$

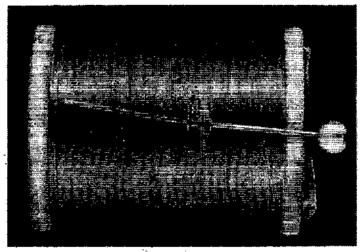
(a) First Five-Trial Subgroup

Target	Transcript Letter				
	A	B	C	D	E
Stamps	1	4	5	2	3
Doll	4	1	5	3	2
Pig	3	2	5	4	1
Metal spring	4	5	1	2	3
Whistle	3	1	5	2	4

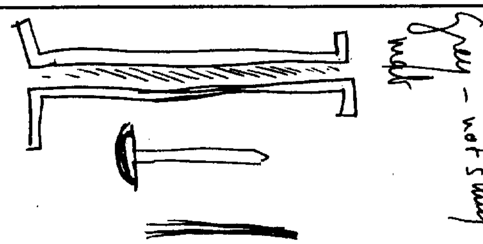
$p = 0.292$

(b) Second Five-Trial Subgroup

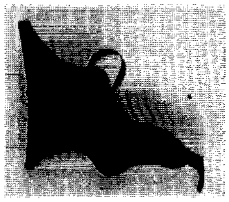
Total $p = 0.047$



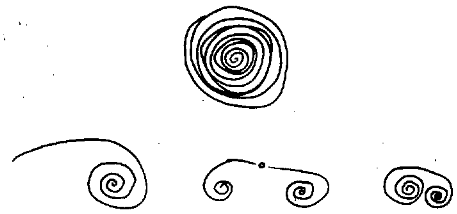
SPOOL AND PIN



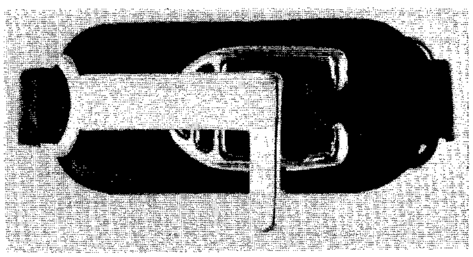
"IT'S DEFINITELY SOMETHING THIN AND LONG. . . WITH A NAIL HEAD AT THE END . . . SILVERED COLORED."



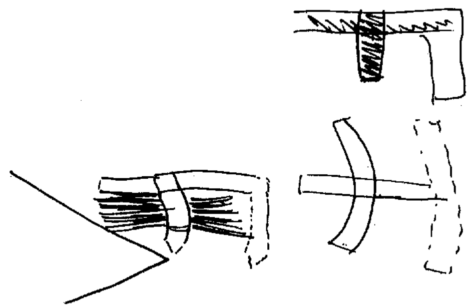
CURLED UP LEAF



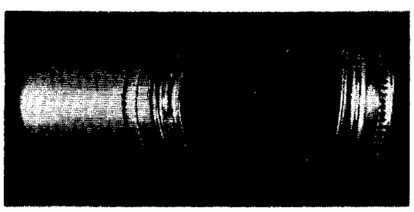
"A NAUTILUS SHAPE WITH A TAIL."



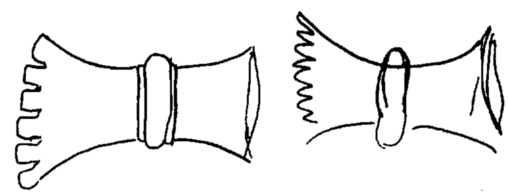
LEATHER BELT KEYRING



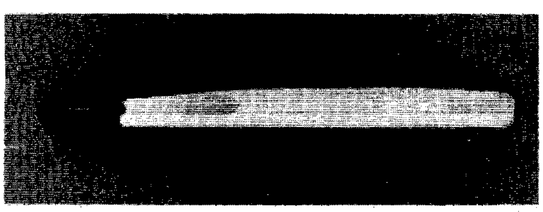
"THE STRONGEST IMAGE I GET IS LIKE A BELT."



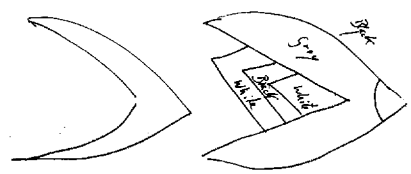
CAN OF SAND



"LIKE A MINIATURE TOWER . . . SCALLOPED BOTTOM . . . LIGHT BEIGE."



GREY AND WHITE QUILL



"LIKE A PENGUIN . . . GREY AND BLACK AND WHITE . . . POINTED OR SLIGHTLY ROUNDED OFF AT THE TOP . . . OPEN OR POINTED AT THE BOTTOM."

FIGURE 11 TARGET OBJECTS IN METAL CONTAINERS. Captions under subject drawings are quotes from first paragraph of transcript.

VIII SUMMARY AND CONCLUSIONS

Experimental laboratory work at SRI International and elsewhere continues to provide evidence for the existence of so-called psi processes, a class of interactions between consciousness and the physical environment as yet unexplained.

At SRI we have to date concentrated primarily on "remote viewing," the acquisition of information blocked from ordinary perception by distance or shielding. Our data base now includes the remote viewing of targets ranging from objects in nearby light-tight film cans to geographic sites at transcontinental distances, and viewed from locations that include shielded Faraday cages and a submerged submersible.

As is generally true of any subliminal perception process, the information generated by the psi process is fragmentary and imperfect. Nonetheless, the data generated by this process appear to exceed any reasonable bounds of chance correlation or acquisition by ordinary means.

In Table 5 we summarize the key findings with regard to target acquisition, resolution, shielding, and distance effects; factors that appear to enhance or inhibit success in remote viewing; accuracy, reliability, and robustness; screening and training of subjects; and technological and theoretical considerations.

Data obtained in our research indicate that the phenomenon is characterized by resolution on the order of at least millimeters, apparent ineffectiveness of ordinary electrical shielding, and relative insensitivity to distance up to and including transcontinental distances.

This work has gone forward in our laboratory under the assumption that psi phenomena are not necessarily inconsistent with the framework of a continually developing modern physics. It is clear, however, that the marriage of physics and psi is still at an embryonic stage, somewhat reminiscent of electrodynamics before the unification brought about by the work of Ampere, Faraday, and Maxwell. Nonetheless, it is our view that experiments can be designed to uncover patterns of relationships that might in principle differentiate between alternative models that are proposed. In pursuit of this goal we are endeavoring to define the level of compatibility between paranormal phenomena and the laws of physics as presently understood, and to examine the limits of specific physical theories in modeling these phenomena. The data presented in this paper, for example, derive from experiments designed to begin to test the ELF electromagnetic hypothesis, an hypothesis whose viability has been called into question by the results of our experiments. We plan to continue such research in the expectation that not only can we use physical principles to help bring about an understanding of psi phenomena, but we can expect that the psi data base will make a contribution toward the clarification of certain problems in physics.

Table 5

REMOTE VIEWING: STATE OF THE ART - CURRENT (1979) KNOWLEDGE

Characteristic	Known	Unknown
Target acquisition	Subject can acquire and describe target site on the basis of presence of cooperative experimenter at site	What is necessary for target acquisition (names, maps, pictures, other coordinate systems); whether person unknown to subject can be tracked on the basis of biographical information, pictures, and so forth.
Target attributes sensed	Descriptive aspects (shape, form, color, material) are described better than analytical concepts (function, name), although at times, the latter come through excellently; written target material correct only occasionally; alphabet targets successful only statistically	Whether analytical psi can be trained to levels similar to descriptive psi
Time of flight	Information access often appears to be available in essentially "real" time	Time-of-flight of psi mechanism of propagation
Temporal resolution	Real-time activities at the target site are often perceived; experiments have included successful real-time remote viewing to within ten seconds; estimated bit rate $\sim 10^{-1}$ bits/s; ephemeral, rapid, or repetitive targets more difficult	Extent to which a subject can improve temporal resolution, accuracy of the process; upper limit to bit rate and ability to track targets in motion

Table 5 (continued)

Characteristic	Known	Unknown
Spatial resolution	1 millimeter (mm)	Extent to which subject can improve spatial resolution
Distance effects	Accuracy and resolution not a sensitive function of subject-target distance over intercontinental distances	Whether, or at what range, distance effects become important
Shielding	Faraday cage or seawater electrical shielding not effective shield	Whether magnetic shielding effective
Sensory modalities	In addition to visually observable detail, subjects sometimes report sounds, smells, electromagnetic fields, and so forth, which can be verified as existing, at target locations	The accuracy of nonvisual sensory modalities; other sensory modes available
Factors that appear to inhibit success in remote viewing	A priori subject knowledge of target possibilities; absence of feedback; application of ability to trivial tasks (testing for the sake of testing); use of repetitive target sequences	Effects of environmental physical factors; electromagnetic jamming
Factors that appear to enhance success in remote viewing	Interest factor for subject; a priori necessity and relevance for obtaining information (seriousness of purpose); presence of a facilitating monitor to ask questions and direct the subject's attention; practice with feedback	Effects of environmental physical factors; electromagnetic generators for targeting

Table 5 (continued)

Characteristic	Known	Unknown
Accuracy and reliability	Analysis of remote-viewing transcripts generated by experienced subjects indicates that for a given target site, roughly two-thirds of the subject-generated material constitutes an accurate description of the site, while about one-third is ambiguous, general, or incorrect	Achievement levels to be reasonably expected
Use of redundancy to improve signal-to-noise ratio	Redundancy, whereby more than one individual attempts to collect data on a given target, improves reliability by reducing the effect of the biases of individual subjects	Optimum number of subjects for efficient utilization of this approach
Robustness of phenomena	Continuing demonstrations at SRI and replications in other laboratories indicate that the capability known as "remote viewing" is a robust human perceptual ability	
Distribution of psi capacity in population; identification of good subjects	Abilities appear widespread, though latent; volunteers with no previous history of psi functioning exhibit ability in screening experiments, indicating that reliance on the availability of special subjects may not be necessary	Percentage of population with natural talent or trainable; optimum screening procedures; medical or psychological profile of good subjects
Improvement potential	Subjects trained over a several-year period have shown improved performance both with regard to accuracy and reliability	Whether near-perfect results as sometimes obtained can become routine

Table 5 (concluded)

Characteristic	Known	Unknown
Technological considerations	Low-level perturbation of equipment observable during remote viewing (magnetometer, noise, and nuclear decay driven random event generator)	Degree to which phenomena can be stabilized, mechanized, energy stored; to what extent psi processes can be amplified by technological means
Theoretical considerations	Phenomena characteristics often appear to be at variance with present scientific models	Precise mechanisms responsible for the phenomena; relationship of phenomena to electromagnetic, quantum, and so forth bases of present scientific understanding; whether the data can be accounted for within the framework of physics as presently understood or on the basis of conservative extrapolations that have been proposed to account for other (nonpsi) data

Source: Compiled by the authors

REFERENCES

1. R. Targ and H. E. Puthoff, "Information Transfer Under Conditions of Sensory Shielding," Nature, Vol. 252, No. 5476, pp. 602-607 (October 18, 1974).

2. H. E. Puthoff and R. Targ, "A Perceptual Channel for Information Transfer over Kilometer Distances: Historical Perspective and Recent Research," Proc. IEEE, Vol. 64, No. 3, pp. 329-354 (March 1976).

3. R. Targ and H. E. Puthoff, Mind-Reach, Delacorte Press, New York (1977).

4. H. E. Puthoff and R. Targ, "Direct Perception of Remote Geographical Locations," Proc. IEEE Electro/77 Special Session on the State of the Art in Psychic Research, New York, N.Y. (April 19-21, 1977).

5. R. Targ, H. E. Puthoff, and E. C. May, "State of the Art in Remote Viewing Studies at SRI," Technical Session on Research in Psychoenergetics, Proc. 1977 IEEE International Conf. on Cybernetics and Society, Washington, D.C. (September 20, 1977).

6. Mind at Large: Institute of Electrical and Electronic Engineers Symposia on the Nature of Extrasensory Perception, Ed. by C. T. Tart, H. E. Puthoff, and R. Targ, Praegar Press, New York (1979).

7. A. Hastings and D. Hurt, "A Confirmatory Remote Viewing Experiment in a Group Setting," Proc. IEEE, Vol. 64, pp. 1544-45 (October 1976).

8. T. Whitson, D. Bogart, J. Palmer, and C. Tart, "Preliminary Experiments in Group Remote Viewing," Proc. IEEE, Vol. 64, pp. 1548-51 (October 1976).

9. J. Vallee, A. Hastings, and G. Askevold, "Remote Viewing Experiments Through Computer Conferencing," Proc. IEEE, Vol. 64, pp. 1551-52 (October 1976).

10. E. Rauscher, G. Weissmann, J. Sarfatti, and S. P. Sirag, "Remote Perception of Natural Scenes, Shielded Against Ordinary Perception," Research in Parapsychology 1975, pp. 41-45, Scarecrow Press, Metuchen, N.J. (1976).

11. S. Allen, P. Green, K. Rucker, R. Cohen, C. Goolsby, and R. L. Morris, A Remote Viewing Study Using a Modified Version of the SRI Procedure,"

Research in Parapsychology 1975, pp. 46-48, Scarecrow Press, Metuchen, N.J. (1976).

12. J. Bisaha and B. J. Dunne, "Precognitive Remote Viewing in the Chicago Area: A Replication of the Stanford Experiment," Research in Parapsychology 1976, pp. 84-86, Scarecrow Press, Metuchen, N.J. (1977).

13. J. Bisaha and B. J. Dunne, "Multiple Subject and Long Distance Precognitive Remote Viewing of Geographical Locations," Technical Session on Research in Psychoenergetics, Proc. 1977 IEEE Intern'l Conf. on Cybernetics and Society, Washington, D.C. (September 20, 1977).

14. B. J. Dunne and J. Bisaha, "Multiple Channels in Precognitive Remote Viewing," Research in Parapsychology 1977, pp. 146-51, Scarecrow Press, Metuchen, N.J. (1978).

15. H. Chotas, "Remote Viewing in the Durham Area," Jour. of Parapsychology 42, pp. 61-62 (1978).

16. B. J. Dunne and J. Bisaha, "Precognitive Remote Viewing in the Chicago Area: A Replication of the Stanford Experiment," Jour of Parapsychology 43, pp. 17-30 (March 1979).

17. J. Ehrenwald, "Cerebral localization and the psi syndrome," J. of Nervous and Mental Disease, Vol. 161, No. 6, pp. 393-398.

18. R. Ornstein, The nature of human consciousness, San Francisco, CA: Freeman, 1973, Ch. 7 and 8.

19. R. W. Sperry, "Cerebral Organization and Behavior," Science, Vol. 133, pp. 1749-1757 (1961).

20. W. Feller, An Introduction to Probability Theory and Its Applications, Vol. 1, 2nd ed., p. 98, John Wiley and Sons, New York (1957).

21. C. Scott, "On the Evaluation of Verbal Material in Parapsychology: A Discussion of Dr. Pratt's monograph," Jour Soc. Psych. Res., Vol. 46, No. 752, pp. 79-90 (June 1972).

22. J. E. Kennedy, "Methodological Problems in Free-Response ESP Experiments," Jour. Amer. Soc. Psychical Res., Vol. 73, No. 1, pp. 1-15 (January 1979).

23. P. Diaconis, "Statistical Problems in ESP Research," Science, Vol. 201, No. 4351, pp. 131-136 (July 1978).

24. D. Marks and R. Kammann, "Information Transmission in Remote Viewing Experiments," Nature 274, pp. 680-681 (August 1978).

25. H. E. Puthoff and R. Targ, "Information Transmission in Remote Viewing Experiments: II," subm. to Nature (January 1979).

26. C. T. Tart, "Reanalysis of SRI Remote Viewing Experiment," subm. to Nature (January 1979).

27. I. M. Kogan, "Is telepathy possible?," Radio Eng., Vol. 21, p. 75 (January 1966).

28. ________, "Telepathy, hypotheses and observations," Radio Eng., Vol. 22, p. 141 (January 1967).

29. ________, "Information theory analysis of telepathic communication experiments," Radio Eng., Vol. 23, p. 122 (March 1968).

30. ________, "The information theory aspect of telepathy," RAND Publ. P-4145, Santa Monica, CA (July 1969).

31. M. A. Persinger, "Geophysical models for parapsychological experiences," Psychoenergetic Systems, Vol. 1, No. 2, pp. 63-74 (1975).

32. ________, "The paranormal--P. II: Mechanisms and models," M.S.S. Information Corp., New York (1974).

33. ________, "ELF Field Mediation in Spontaneous Psi Events: Direct Information Transfer or Conditioned Elicitation?" in Ref. 6.

34. J. S. Bell, "On the problem of hidden variables in quantum theory," Rev. Mod. Phys., Vol. 38, No. 3, p. 447 (July 1966).

35. H. Stapp, "Theory of reality," Lawrence-Berkeley Lab. Rep. LBL-3837, Univ. of California, Berkeley (April 1975).

36. D. J. Bohm and B. J. Hiley, "On the intuitive understanding of non-locality as implied by quantum theory," Foundations of Physics, Vol. 5, pp. 93-109 (1975).

37. J. J. Freedman and J. F. Clauser, "Experimental test of local hidden variable theories," Phys. Rev. Lett., Vol. 28, No. 14, p. 938 (April 3, 1972).

38. J. F. Clauser and M. A. Horne, "Experimental consequences of objective local theories," Phys. Rev. D, Vol. 10, No. 2, p. 526 (July 15, 1974).

39. E. P. Wigner, "The problem of measurement," Amer. J. Phys., Vol. 31, No. 1, p. 6 (1963).

40. E. H. Walker, "Foundations of paraphysical and parapsychological phenomena," in Proc. Conf. Quantum Physics and Parapsychology (Geneva, Switzerland), New York: Parapsychology Foundation (1975).

41. R. Mattuck, "Thermal Noise Theory of Psychokinesis: Modified Walker Model with Pulsed Information Rate," unpubl. paper, Univ. of Copenhagen, Denmark (August 1977).

42. G. Feinberg, "Precognition--A memory of things future?," in Proc. Conf. Quantum Physics and Parapsychology (Geneva, Switzerland), New York: Parapsychology Foundation (1975).

43. O. Costa de Beauregard, "Quantum paradoxes and Aristotle's twofold information concept," in Proc. Conf. Quantum Physics and Parapsychology (Geneva, Switzerland), New York: Parapsychology Foundation (1975).

44. __________, "S-Matrix, Feynman Zigzag and Einstein Correlation," Physics Letters, Vol. 67A, No. 3, pp. 171-174 (August 7, 1978).

45. R. Rucker, Geometry, Relativity and the Fourth Dimension, Dover Publ., New York (1977).

46. R. Targ, H. E. Puthoff, and E. C. May, "Direct Perception of Remote Geographical Locations," in Ref. 6.

47. S. A. Schwartz, "Deep Quest," Omni, p. 94 (March 1979).

48. S. L. Bernstein et al., "Long Range Communication at Extremely Low Frequencies," Proc. IEEE, Vol. 62, No. 3, p. 292 (March 1974). See also E. G. Simmons, "Transmission Coefficients for Electromagnetic Plane Wave Radiation into a Conducting Half-Space," Tech. Rept. EE-60, Eng. Exp. Station, University of New Mexico, Albuquerque, N.M. (1961).

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