Interim Report--Objective E, Task 2

December 1986

LOCATION OF TARGET MATERIAL IN SPACE AND TIME (U)

By: NEVIN D. LANTZ EDWIN C. MAY

Prepared for:

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CONTRACTING OFFICER'S TECHNICAL REPRESENTATIVE

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Covering the Period 1 October 1985 to 30 September 1986

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SRI Project 1291

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Geoscience and Engineering Center

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ABSTRACT (U)

(U) One reported psychoenergetic skill, known to the general public as "dowsing," is the ability to locate lost or hidden items of interest. In an effort to bring this putative ability that we call "search" into the laboratory, we conducted a computer-assisted-search (CAS) experiment. Participants scanned a computer graphics display and attempted to locate a hidden computer-generated target. We explored two conditions: (1) the target was fixed in space--space condition, and (2) the target was randomly shifting locations each millisecond--time condition. Eight of 36 participants showed an above chance ability ($p < 0.027$) to find computer-generated targets in our laboratory simulation of dowsing. This replicates and extends the results of work done in FY 1984, and provides a pool of individuals for a formal study of search techniques.

I INTRODUCTION (U)

(S) A continuing requirement of the intelligence community is determining the location of tactical and strategic military targets of interest, whose positions are not known or are known only approximately. Examples range from the location of (1) a "bug" in a secure facility, (2) a command post in a tactical situation, or (3) a submarine in a strategic situation.

(S) It has been claimed by the parapsychological community that individuals can search for and locate water, oil, minerals, objects, individuals, sites of archaeological significance, and so forth. If this can be demonstrated to be a genuine ability, and if it can be applied to targets of military interest, then we may have a potential match to the above requirement.

(S) This ability can be contrasted to the related psychoenergetic ability "remote viewing," in the following manner. In remote viewing, the viewer is given location information (e.g., coordinates, a "beacon" agent, or a picture), then asked to provide data on target content (e.g., BW R&D facility). In "search," the viewer is given information on target content, then asked to provide location data (e.g., position on a map). The two functions thus compliment each other.

(U) The ability to locate targets is most often referred to as "dowsing" in the Western literature, and "biophysical effect (BPE)" in the Soviet/East Bloc literature. In this report,* we shall refer to such techniques simply as "search." Although much of the literature is anecdotal,[1]† attempts to quantify the ability and to determine its mechanisms have been pursued.‡

(S) The goal of the present effort is to research the literature, then perform laboratory experimentation to determine whether, and to what degree, such functioning is a viable candidate for application to intelligence-collection tasks. This includes determining (1) the best methods and efficiencies of various search techniques, and (2) the appropriate statistical analyses for evaluating results.

(U) In attempting to determine if this putative ability can be brought under laboratory control, we have simulated "field conditions" with a computer-assisted-search (CAS) experiment.

(U) Our CAS experiments generally contain the following basic elements:

(1) A finite matrix of possible target locations (e.g., a 20 x 20 graphics matrix grid) from which one cell is randomly selected by the computer as the target.
(2) An individual whose task is to "scan" the graphics display area, and indicate, by pressing a button, his/her choice as to the target location.
(3) A feedback mechanism that displays the response and actual target location.
(4) An *a priori* defined analysis procedure.

(U) Using this general procedure, we conducted an experiment during FY 1984 in which two conditions were tested simultaneously:[1]§

- Searching for a target that remains fixed in space for the duration of the trial (space condition).

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*(U) This report constitutes Objective E, Task 2: Develop methodologies to locate target material in space and/or time.

†(U) For the most comprehensive and authoritative survey of the claims for dowsing, see Christopher Bird, *The Divining Hand*, E. P. Dutton, New York, New York (1979).

‡(U) See, for example, papers published by Z. V. Harvalik, beginning 1970, in *The American Dowser*, The Journal of the American Society of Dowsers (Harvalik is the ex-director of the basic research group at the U.S. Army Engineering Laboratories, Fort Belvoir, Virginia).

§(U) References are listed at the end of this document.

(U)

- Searching for a target that is rapidly moving in space (time condition).

Seven individuals, who were blind to the space/time condition, were asked to contribute 50 trials (25 space, 25 time). Five of them produced independently significant results: three in time only and two in space only. The most interesting aspect of our earlier result is that no participant was successful at both space and time conditions.

(U) During FY 1986, our effort was to replicate the previous findings and provide additional information on possible personality correlations using the Personality Assessment System (PAS).[2] Although locating computer-generated targets is academically interesting, it may not assist in locating objects in the "real world." This premise is of paramount interest and will be addressed during FY 1987.

II METHOD OF APPROACH (U)

A. (U) Selection of Subjects

(U) A pilot study was conducted to select participants for a formal test, and to refine the protocol. From the overall subject pool amassed for our FY 1986 experiments, participants were selected on the basis of availability and interest. This pool currently contains both "novice" subjects (persons who have never participated in psychoenergetic experiments) and "experienced" subjects (those who have).

B. (U) Procedure

(U) A Sun Microsystems work–station computer was used to conduct all aspects of the pilot experiment. This computer system is noted for its high– resolution graphics display and graphics input device.

(U) The approach chosen here was a modification of a procedure originally developed by Dr. Dean I. Radin at Bell Laboratories for evaluating geometric–distance scores in a perceptual task.[9] In this approach, we begin by constructing the target area of interest in the form of a square. A grid system is then laid down over the square in the form of an n x n matrix, to yield n^2 separate grid cells (e.g., 400 for a 20 x 20 grid). The computer randomly selects one of the grid cells as the target for a particular trial. The subject's task is to "locate" the target cell. After the subject responds, both the choice and the target are displayed. A trial is defined as a single response (button press) associated with a single target location.

(U) In our experiment, a bounded area representing the perimeter of a 20 x 20 cell matrix was shown to the participant, who could "search" for the target by moving a graphics pointing device (mouse) which controlled a cursor. By pressing a button on the mouse the participant could indicate his/her response. Each participant was told (1) the target could be any place within the display boundary, (2) move the cursor around the bounded area, and (3) when the moment "seemed right," to register his/her choice by pressing the button on the

(U)

mouse. The computer was programmed to give immediate feedback to the participant following each trial by automatically displaying the target cell as a filled square and the participant's choice as a shaded square with a line connecting the two (see Figure 1). After several seconds of the feedback display, the computer recycled to the next trial.

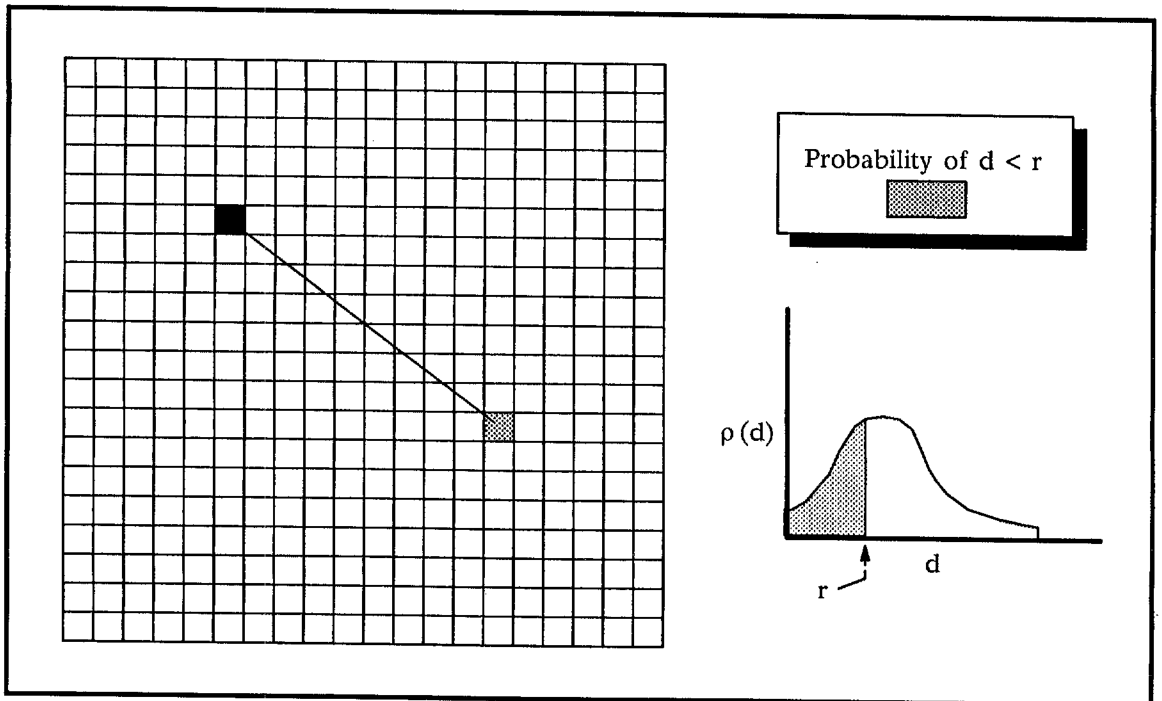

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FIGURE 1 (U) SEARCH MATRIX

(U) To test a participant in the space condition, the target location was fixed throughout the trial. To test the time condition, the target location was changed once each millisecond. During the screening phase of the experiment, the computer selected one of the conditions for each trial by a balanced random protocol. The participant and experimenter were blind as to which condition was being presented on any given trial. Participant choices versus computer selections were stored for future analysis. Each participant was asked to produce 10 trials per session. In the pilot phase, 36 individuals completed 50 trials--25 trials in each of the two conditions studied.

(U) In summary, our experimental design includes:

- Hypothesis--In the absence of known sensory information, it is possible to determine a "hidden," computer-derived target location to a significant degree.

(U)

- Independent Variable--Target location is on a 20 x 20 matrix grid.
- Dependent Variable--Geometric distance (d) is between choice and target:

$$d = \sqrt{(Y_t - Y_c)^2 + (X_t - X_c)^2} \quad .$$

C. **(U) Analysis**

(U) Using the grid as an approximation to a continuum, we can calculate exactly the a priori chance distribution that any given search response would lie at any given distance from a particular target location. From this, an evaluation can be made as to the quality of a single response (see Figure 1).

(U) To estimate the probability of observing a distance (d), the following calculations are performed:

- For the actual target position used in the trial, a distribution consisting of all possible (400) distances is constructed.
- The probability (p-value) of observing the distance (d) or less is given by

$$p \leq \frac{\sum_{r=0}^{r \leq d} \rho(d_r)}{400} \quad ,$$

where $\rho(d_r)$ is the distance distribution.

For n total trials by a given subject, the p-values are combined by compiling an average (over 25 trials) p-value for each condition. Then:

$$z = \sqrt{12n}\,(0.5 - \bar{p})$$

The overall p-value is computed from z.

1. **(U) Controls:** The particular random number generator algorithm used in this experiment has been studied in detail and is found to be adequate for multidimensional applications.[4]

(U) The p-value calculated for each trial above is an exact calculation. The distance distribution, $\rho(d)$, depends upon the single target point and the analysis assumes that

(U)

the response is random and that all possible responses are equally likely. This assumption is *not* valid; humans exhibit natural response "biases." For example, individuals tend to avoid the edges. To correct for this, the analysis described above is conducted reversing the meaning of the target and response pairs (i.e., the target is analyzed as though it were the response, and vice versa). This reversal satisfies the two criteria assumed in $\rho(d)$, namely, the "response" can be at any location with equal probability, and $\rho(d)$ now depends upon the single "target" point.

2. (U) Significance Criteria: To declare that a given individual has produced a significant series of 25 trials, the overall p–value must be less than or equal to 0.05. To declare the pilot series to be significant, at least eight participants must demonstrate independently significant results.

III RESULTS (U)

(S) Table 1 shows the p-values for each participant in each condition. Two individuals achieved significant p-values in the space condition and six persons showed significant p-values in the time condition.

Table 1 (U)
(U) p-VALUES FOR PARTICIPANTS IN SEARCH EXPERIMENTS

Subject I.D.	Space	Time
105	0.84078	0.16176
177	0.44148	0.13012
111	0.98868+	0.96894+
274	0.96954+	0.74088
144	0.63678	0.67126
099	0.95199+	0.21685
933	0.70792	0.14378
728	0.26703	0.11501
537	0.34966	0.19182
161	0.44627	0.31385
258	0.43465	0.96682+
594	0.54688	0.41565
677	0.76812	0.49793
653	0.23560	0.81473
636	0.85025	0.36908
570	0.67064	0.26024
393	0.44284	0.49724
255	0.97783+	0.96208+
425	0.74256	0.98615+
989	0.56330	0.80866
498	0.23507	0.84781
790	0.70135	0.63873
642	0.27391	0.03106*
300	0.13345	0.00010*
463	0.16690	0.01473*
428	0.34136	0.03143*
057	0.63092	0.03778*
004	0.99536+	0.04630*
531	0.25078	0.91276
432	0.01245*	0.29625
837	0.04117*	0.69349
003	0.10618	0.19182
580	0.08974	0.53519
763	0.18481	0.26932
038	0.18619	0.35158
164	0.97838+	0.61381

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* Significant at < 0.05 in predicted direction
\+ Significant at < 0.05 in direction of target avoidance

(S) Evidence supporting the tendency for significant subjects to do better on one task over the other (as reported in previous research) can be demonstrated by calculating a z-score for the difference between the z-scores associated with the average (across individuals) p-values of the significant condition versus the nonsignificant condition. We find $z = 2.87$, which is significant at the 0.002 level.

IV DISCUSSION AND CONCLUSIONS (U)

(S) The results are in line with predictions; eight persons showed significant deviation from chance expectation (probability equals 0.027). In addition, post hoc analysis shows a significant tendency to do better on one condition than ON the other.

(U) In FY 1987, the seven best individuals in each condition will participate in a formal CAS study, in which the conditions will be separated and the number of trials increased.

REFERENCES (U)

1. Puthoff, Harold E., and May, Edwin C., "Target Search Techniques (U)," Final Report, SRI Project 6600, SRI International, Menlo Park, California (December 1984) SECRET

2. May, Edwin C., and Saunders, David, "Personnel Identification and Selection (U)," Final Report, SRI Project 6600, SRI International, Menlo Park, California (December 1984) SECRET.

3. Radin, Dean, "Evaluating Geometric Distance Scores in a Perceptual Task," *Research in Parapsychology, 1981*, pp. 163–164, Scarecrow Press, Inc., Metuchen, New Jersey (1982) UNCLASSIFIED.

4. Lewis, T. G., and Payne, W. H., "Generalized Feedback Shift Register Pseudorandom Number Algorithm," *Journal of the Association for Computer Machinery,* Vol. 20, No. 3, pp. 456–468 (July 1973) UNCLASSIFIED.