PHYSICS, ENTROPY, AND PSYCHOKINESIS

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In this paper we present results of recent experiments at Stanford Research Institute which indicate anew that certain individuals are capable of producing physical effects in the environment by means of some as yet unidentified modality, generally referred to psychic or psychoenergetic.

Such phenomena have of course been under scientific consideration for over a century. However, even a cursory review of the literature reveals that in spite of well-conducted experiments by reputable researchers yielding reproducible results (e.g., Sir William Crookes'study of D.D. Home, or von Reichenbach's researches as reported in The Dynamics , London, 1851), the study of these phenomena has never emerged from the realm of quasi-scientific speculation. One reason for this is that, in spite of experimental results, no satisfactory theoretical construct has to date been advanced to correlate data or predict new experimental outcomes. Consequently, the area in question remains in the recipe stage reminiscent of electrodynamics before the unification brought about by the work of Ampere, Faraday, and Maxwell.

The overall goal of our research program is the determination of the laws underlying these phenomena. That is, our goal is not just to catalog interesting events, but rather to uncover patterns of cause-effect relationships of the type that lend themselves to analysis and hypothesis in the form with which we are familiar in scientific study. The results presented here constitute for us a first step toward that goal, in that we are establishing under known conditions a data base from which departures as a function of physical and psychological variables can be studied in future work. Our observations to date have led us to conclude that such phenomena can be studied under laboratory conditions. It is our expectation that with the sensitive instrumentation and powerful theoretical tools presently available, progress in this field will be forthcoming.

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Magnetometer Observation (Pilot Experiment)

One of the first psychoenergetically-produced physical effects observed by SRI personnel (H.P.) in early research (1972) was the apparent perturbation of a superconductor-shielded Josephson effect magnetometer by a gifted subject, Mr. Ingo Swann. Following is a fairly detailed account of that first observation, since it reveals a number of aspects of PK research that we consider to be of significance.

This magnetometer is located in a well under a building and is shielded by μ-metal shielding, an aluminum container, copper shielding and, most important, a superconducting niobium shield. (See Fig. 1). The magnetometer is of the superconducting quantum interference device (SQUID) variety, which has an output voltage whose frequency is a measure of the rate of change of magnetic field present.

Before the experiment, a decaying magnetic field had been set up inside the magnetometer, and its decay with time provided a background calibration signal that registered as a periodic output on an x-y recorder, the frequency of the output corresponding to the decay rate of the calibration field ($\sim 10^{-6}$ Gauss). The system had been running for about an hour with no noise.

Mr. Swann was shown the setup and told that if he were to affect the magnetic field in the magnetometer, it would show up as a change in the output recording. Then, to use his own description, he placed his attention on the interior of the magnetometer, at which time the frequency of

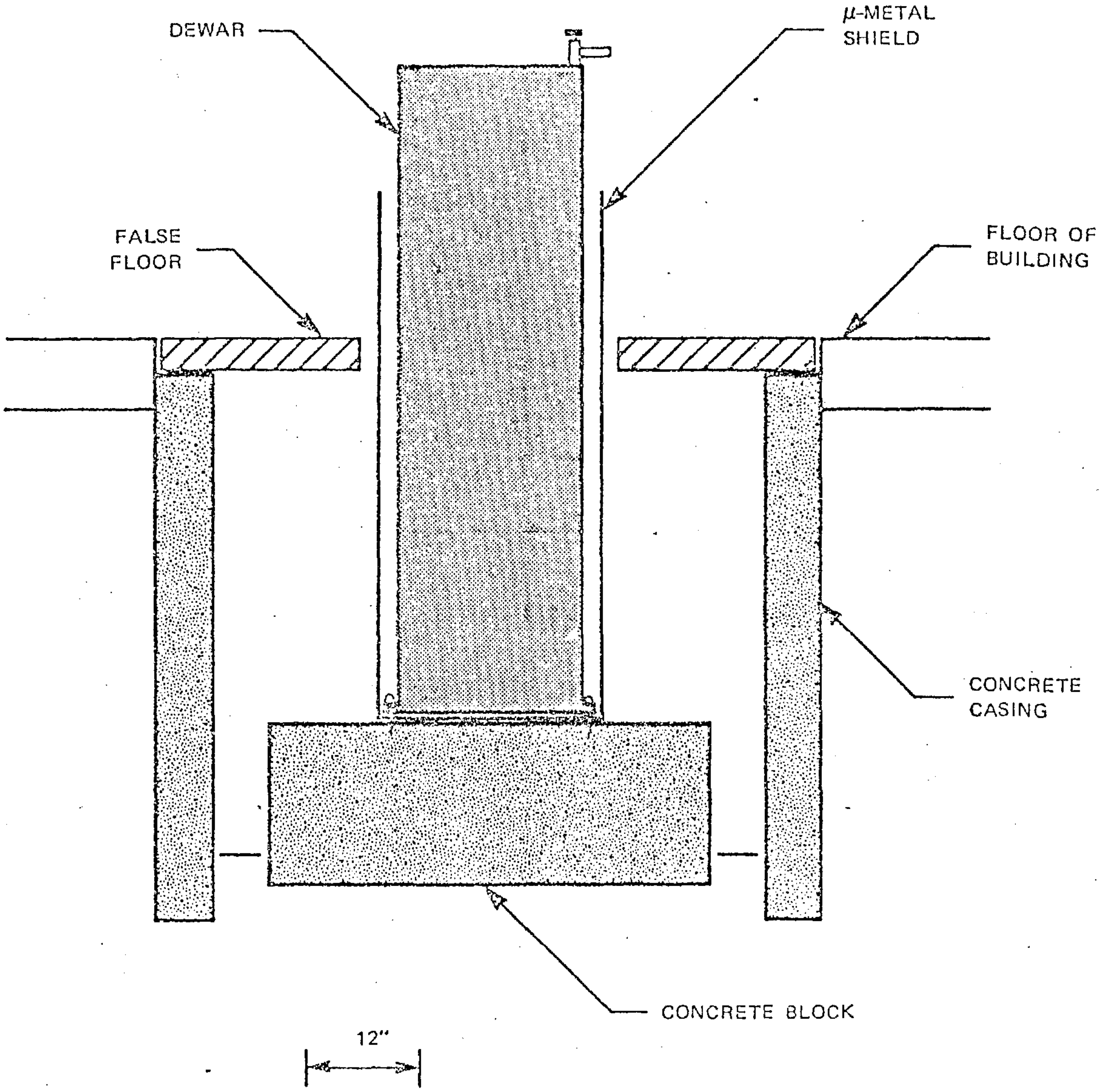

FIGURE 1 MAGNETOMETER HOUSING CONSTRUCTION

the output doubled for about two of the cycles or roughly thirty seconds. This is indicated by A in Figure 2. Mr. Swann was next asked if he could stop the field change being indicated by the periodic output on the recorder. He then apparently proceeded to do just that, as can be seen at B in the graph, for a period of roughly forty five seconds. He then "let go," at which time the output returned to normal (C). Upon inquiry as to what he had done, he explained that he had direct vision of the apparatus inside and that the act of looking at different parts seemed to him to be correlated with the different effects. As he described what he was doing, the recording again traced out a double frequency cycle (shown at D), as had occurred before. An atypical dip (E) in the recording took place then, and on questioning him about what was happening, he said he was looking at a new part, the niobium ball sitting in a cup. This ball was inert at the time, not being used in the magnetometer experiment. He was asked to refrain from thinking about the apparatus, and the normal pattern was then traced out for several minutes (continued on lower trace) while he was engaged in conversation on other subjects. At one point he started to discuss the magnetometer again, at which point the tracing went into a high frequency pattern, shown at F. At our request he stopped, and the observation was terminated because Mr. Swann was tired from his effort.

We then left the lab, while the apparatus was run for over an hour with no trace of noise or nonuniform activity, as indicated in Figure 3, where the

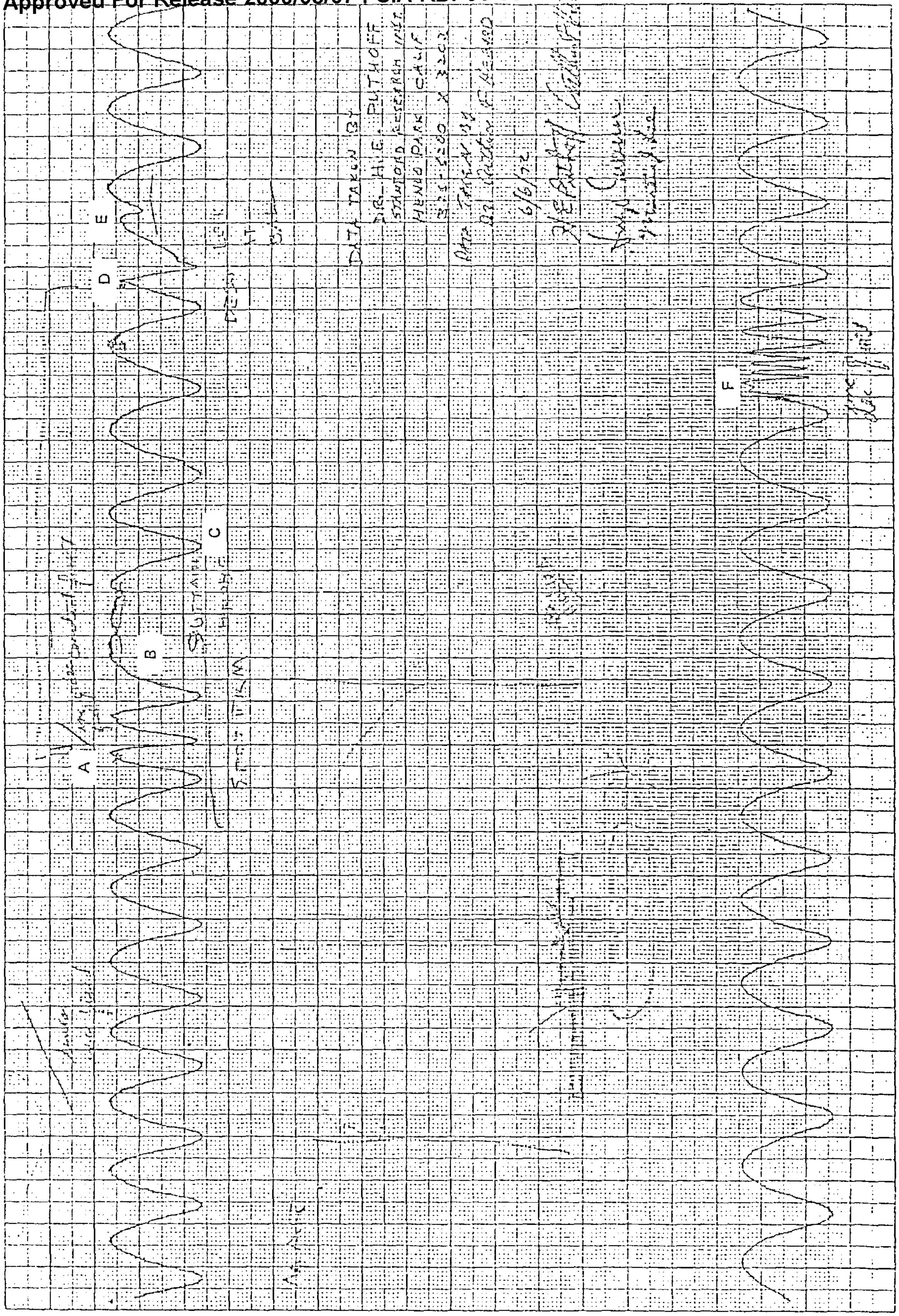

FIGURE 2 RAW DATA, MAGNETOMETER TEST RUN

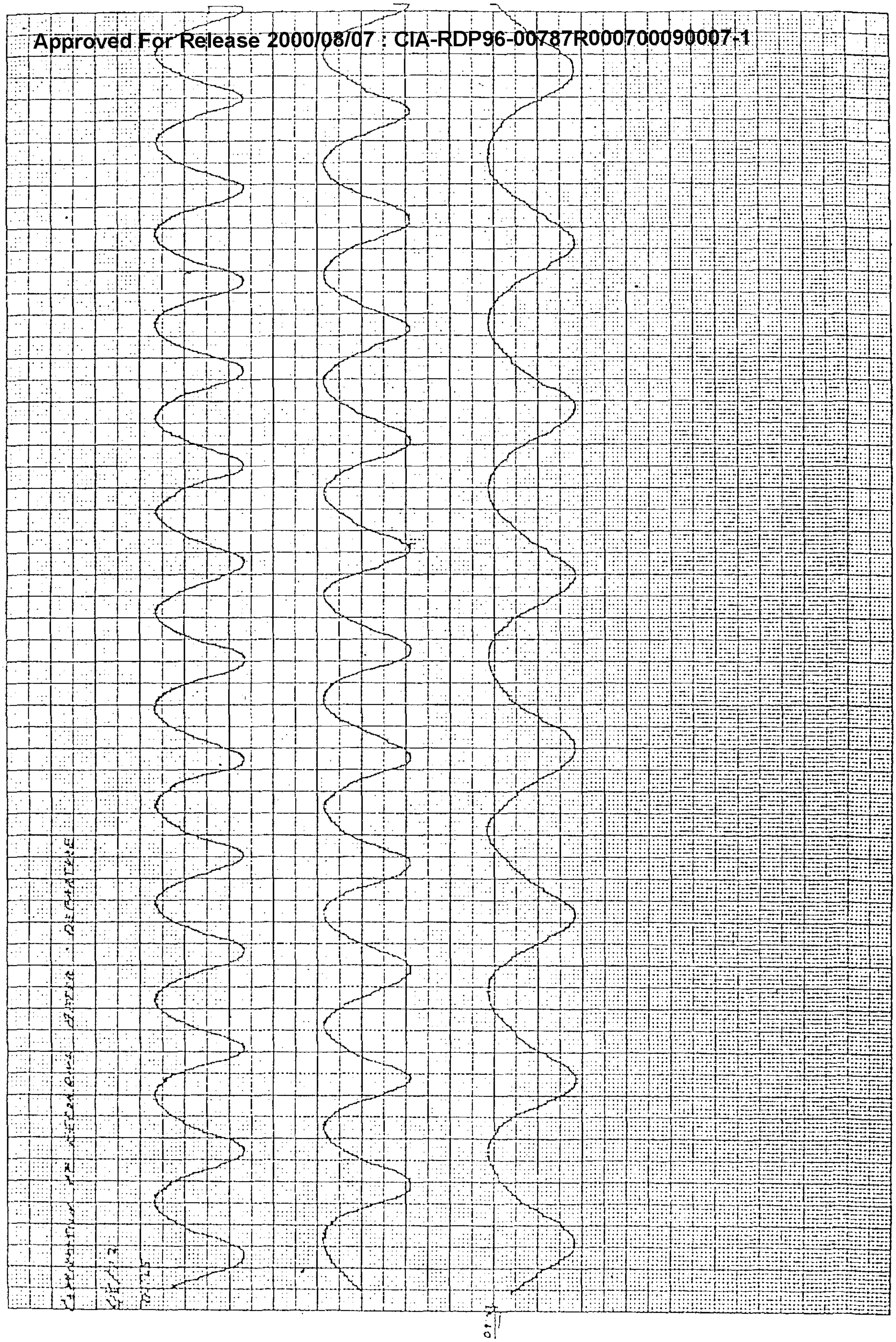

FIGURE 3 RAW DATA, MAGNETOMETER CONTROL RUN

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top two traces show a continuing record following termination of the experiment. The third trace was taken some time later, the increase in the period indicating the reduced rate of magnetic field decay. At various times during this and the following day when similar data with Mr. Swann were taken, the experiment was observed by numerous other scientists.

The conditions of this observation, involving as it did a few hours use of an instrument committed to other research, of course prevented a proper investigation. The number of data samples was too few to permit meaningful statistical analysis, and the lack of readily-available multiple recording equipments prevented investigation of possible "recorder only" effects. Therefore, the following longer term study with a similar device was undertaken.

Experiments with a Superconducting Differential Magnetometer (Gradiometer)

A series of experiments were carried out using a Develco Model 8805 superconducting second-derivative gradiometer manufactured by Develco, Inc., Mountain View, California. The assembled device is shown in Figure 4.

Basically, the gradiometer is a four-coil Josephson effect magnetometer device consisting of a pair of coil pairs wound so as to provide a series connection of two opposing first-derivative gradiometers, yielding a second-derivative gradiometer (i.e., a device sensitive only to second and higher order derivative fields.) As a result, the device is relatively insensitive to uniform fields and to uniform gradients. This arrangement allows for sensitive measurement of fields from nearby sources while discriminating against relatively uniform magnetic fields produced by remote sources. The device is ordinarily used to measure magnetic fields originating from processes within the human body, such as action currents in the heart which produce magnetocardiograms. The sensitive tip of the instrument is simply placed near the body area of interest.

In our application, however, the subject is located at a distance of four meters from the gradiometer probe. As a result, the subject is located in a zone of relative insensitivity; e.g., standing up, sitting down, leaning forward, and arm and leg movements produce no signals. From this location the subject is asked, as a mental task, to affect the probe. The results of his efforts are available to him as feedback from three sources: an oscilloscope, a panel meter, and a chart recorder, the latter providing a permanent record.

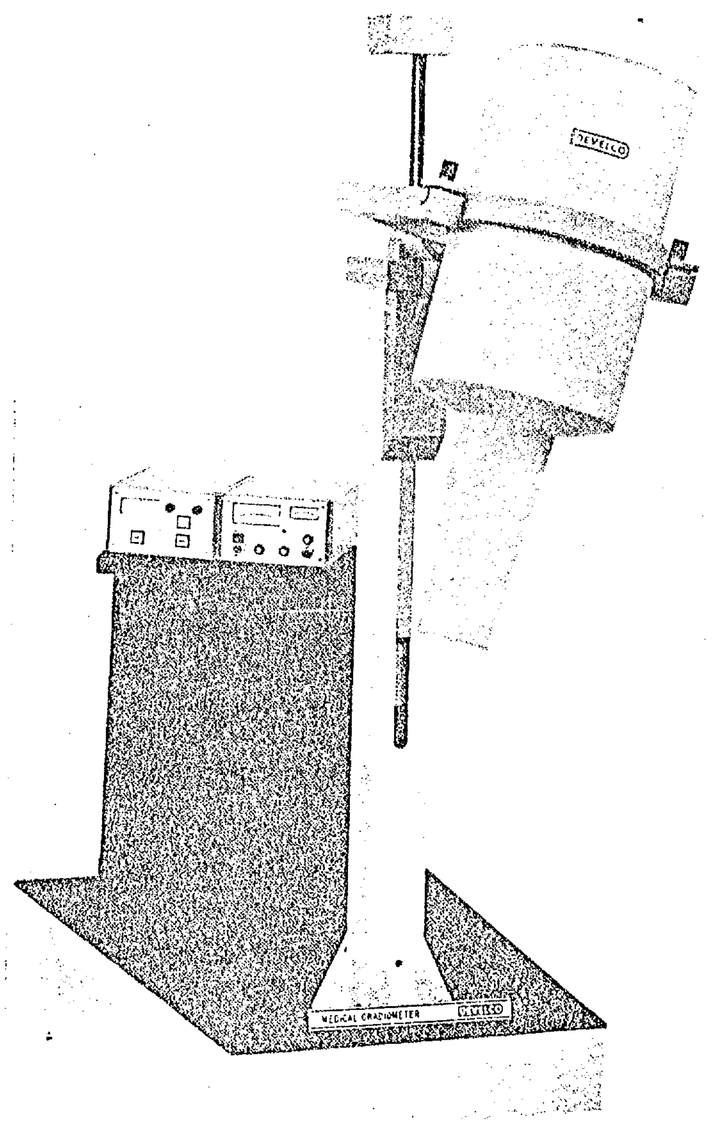

FIGURE 4   SUPERCONDUCTING DIFFERENTIAL MAGNETOMETER

A protocol for subject operation was conducted as follows: The subject removes all metal objects, and the effects of body movements are checked at the start of each experimental period. The subject then works with the machine in a learning mode, observing effects being produced, if any, via feedback from the instrumentation. Once satisfied that a possibility exists of producing effects on command under experimenter control, the experimenter announces the start of the experiment. A randomization protocol (discussed in the Appendix) is then used to generate ten activity periods of equal length (e.g., twenty-five seconds) pre-determined by the experimenter.

A sample run with a second gifted subject, Mr. Patrick Price, is shown in Figure 5. The randomly-generated ON (activity) periods are Nos. 2, 8, and 9. As observed, signals appear in each of these three periods. The signal appearing in period 9 was strong enough to cause loss of continuous tracking. This latter type of signal can be the result of an exceptionally strong flux change, or an RF burst whether subject-generated or artifactual,* and are handled on the basis of statistical correlation as discussed below. An artifact due to the passage of a truck in the parking lot adjacent to the laboratory (under continuous surveillance by the experimenter) is noted in period 6. Each of the signals on scale corresponds to an input $\sim 1.6 \times 10^{-9}$ Gauss/cm^2 (second derivative $\partial^2 B_z / \partial_z{}^2$), equivalent to $\sim 3.5 \times 10^{-7}$ Gauss referred to one pickup coil.

* RF interference effects are sometimes in evidence due to proximity to other instrumentation.

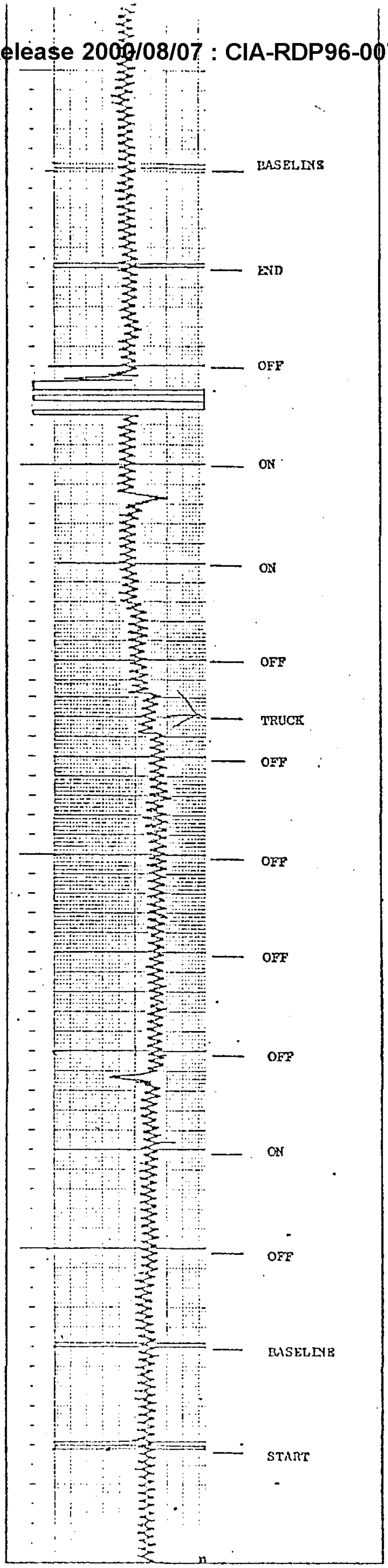

Figure 5 -- Gradiometer data.

The interpretation of such observations must be subjected to careful analysis. For example, the emphasis on "corresponds to" is based on the following: although the probe is designed to register magnetic fields, and the simplest hypothesis is that an observed signal is such, in a task as potentially complex as "psychokinesis", one must be cautious about assigning a given observed effect to a specific cause. Therefore, until further work with multiple measurement employing equally sensitive apparatus, one can only conclude that generation of a magnetic field is the most probable cause.

With regard to signal display, the signal was observed simultaneously on three recording devices, and thus a "recorder only" effect can be considered low probability, although an electronics interference effect ahead of all display cannot be ruled out. We therefore treat the magnetic cause as tentative, although most probable, and concentrate our attention on whether a correlation exists between system disturbances and subject efforts.

Thirteen ten-trial runs were obtained with Mr. Price. Each of the ten trials in the run lasted fifty seconds each,* the activity/no acitivity command for each trial being generated by the randomization technique discussed in the Appendix. In the 13 x 10 = 130 trials, consisting of a random distribution of 64 activity and 66 no-activity periods, 63 events of signal-to-noise ratio > 1 were observed. Of these 63 events, 42 were distributed among the activity periods, 21 among the no-activity periods, a correlation significant at the $p = 0.004$ level.

* With the exception of the first run where 25-second trials were used.

We therefore conclude that the observed number of precisely timed

events in pilot work coupled with the statistically significant ($p = 0.004$) correlation between subject effort and signal output in controlled runs indicate a highly probable cause-effect relationship. Thus it appears that a gifted subject can interact with a second derivative magnetic gradiometer of sensitivity $\sim 10^{-9}$ Gauss/cm^2 from a distance of four meters. Further work would be required to determine absolutely the precise nature of the interaction, although given the equipment design the generation of a magnetic field is the most probable mechanism.

In this series of experiments we examine the possibility that a subject may be able to exert a physical influence on a remotely located physical system. The target is a torsion pendulum suspended by a metal fiber inside a sealed glass bell jar. The pendulum consists of three 100 gram balls arranged symetrically at 120° angles on a 2 cm radius. The entire apparatus is shock mounted, and protected from air currents by the enclosing bell jar.

The angular position of the pendulum is measured by means of an optical readout system. The system consists of a laser beam from a lo power argon laser† reflected from a small mirror on the pendulum onto a position sensing silicon detector†† 1.5 meters from the pendulum. The detector yields an output voltage proportional to spot position. The output from the detector is monitored by a chart recorder††† which provides

The system exhibits a sensitivity of approximately 10 microradians. Under typical experimental conditions random accoustical fluctuations drive the pendulum in its torsional normal mode of 10 second period to a level ~ 100 microradians angular deviation. During control runs the pendulum executes harmonic motion with a maximum variation in amplitude of ± 10 percent over an hour period. Sudden vibrational perturbations in the environment produce oscillation of the pendulum in the vertical plane at a frequency of 1 Hz, as contrasted with the torsional mode in the horizontal plane at 0.1 Hz.

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† Spectra Physics Model 262

†† United Detector Technology Model SC/10

††† Brush Model Mark 200

The subject is asked, as a mental task, to affect the pendulum motion, the results of which would be available as feedback from the chart recorder. The subject is then encouraged to work with the pendulum from a distance of 1 meter, observing effects being produced. If satisfied that there is a possibility of producing effects (typically following a week's activity, a couple of hours per day), an experiment is begun.

As in other experiments, subject efforts to increase or decrease oscillation amplitude are determined by an experimenter utilizing the universal randomization protocol described in (a). Each experiment lasts one hour and consists of six 5-minute work periods alternated with six 5-minute rest periods.

In later work, the subject is removed to a room 12 meters down the hall with three intervening office spaces to determine whether effects can be produced from a remote location. The subject is provided feedback at the remote location either by closed circuit video or by a second chart recorder in parallel with the recorder in the enclosed target laboratory. The remote aspect was instituted both to prevent artifactual effects from body heat, etc., and also to determine whether energy can be coupled via the remote viewing channel to a remote location.†

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†. Both experimental evidence and theoretical work indicate that distance may not be a strong factor in paranormal phenomena. See, for example, E.H. Walker "Properties of Hidden Variables in Quantum Theory: Implications for Paraphysics", U.S. Army Ballistic Research Laboratories, Aberdeen Proving Ground, Maryland.

In pilot studies we observed considerable evidence indicating that a gifted subject located in the same room is able, by concentration, to increase or decrease pendulum motion on command while sitting quietly one meter from the bell jar. The change-to-baseline ratio is often 5:1 or better so the effects are not small. A sample chart showing a rest period followed by a decrease period is given in Figure 8.

Vibrational artifacts can be ruled out on the basis that when such inputs occur, a marked 1 Hz oscillation signal due to vertical motion is superimposed on the 0.1 Hz torsional motion. What is especially interesting are the decreases which take the motion below that generally observed due to environmental noise driving. Such observations indicate the application of a constraint which couples energy out of the pendulum motion. Similar observations have been observed with the subject removed to the second location 12 meters away. Although less pronounced (change-to-baseline ratios typically 2:1), the effect remains easily observable.

The universal randomization protocol is used throughout to determine increase/decrease periods. Control run data are being collected to be subjected to the same analysis. Multiple recording is used throughout to rule out artifacts due to recorder effects. Finally, an electrometer with the base of the bell jar serving as one electrode is monitored to record acoustic vibration independently. Due to the potential significance of such findings, considerable data is being taken in order that the matter can be subjected to statistical analysis over a large sample involving hundreds of work periods. A few hundred data samples have already been collected for this purpose, an the results will be published when available.

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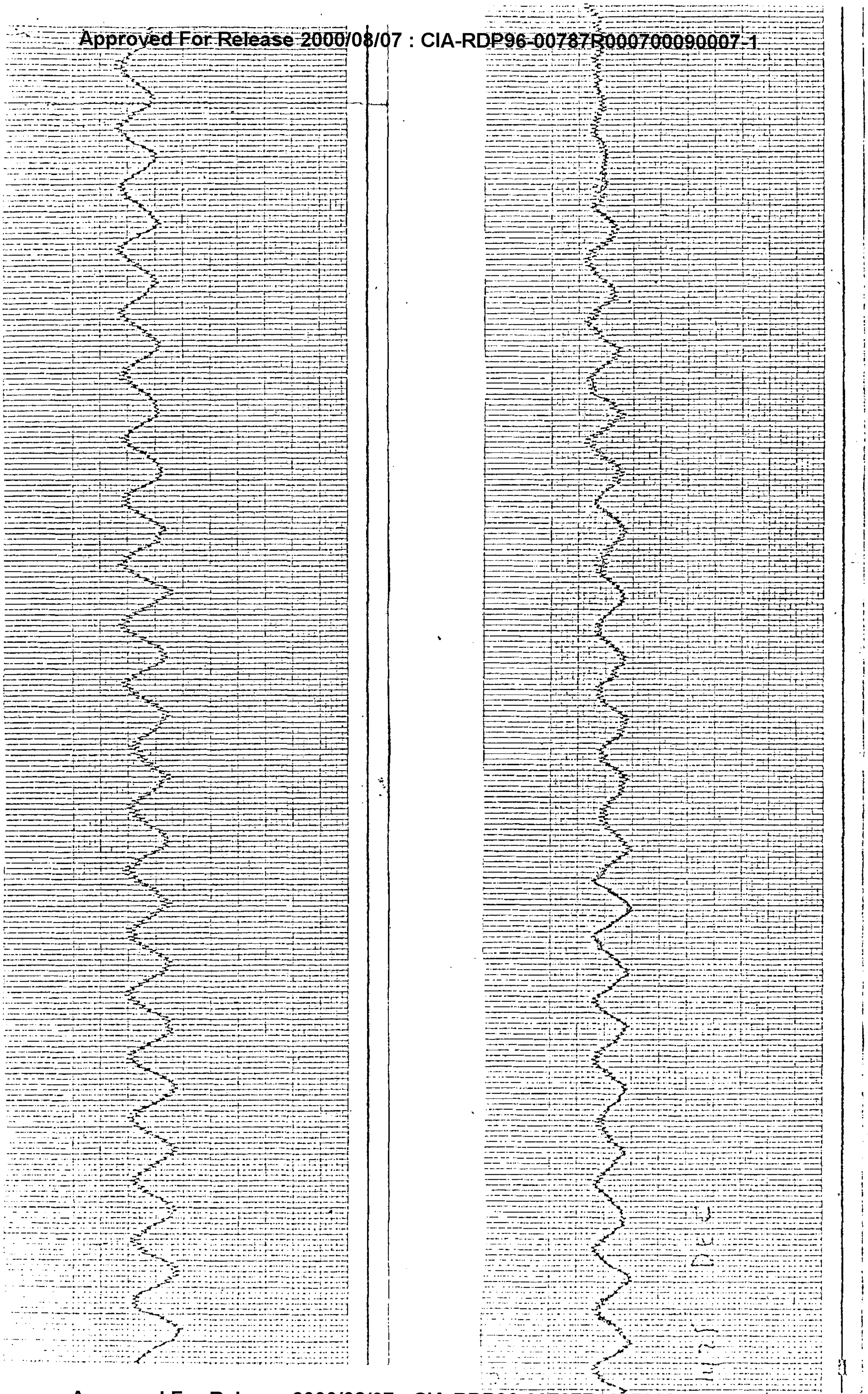

FIGURE 6 PENDULUM MOTION

Large amplitude variation corresponds to 0.1 Hz torsional mode

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Speculations

Here we present some speculations about the nature of the paradoxes associated with psychoenergetically-produced physical phenomena. These ideas fall into the category of intuition based on integration of observation over time. Thus, they are not conclusions drawn from statistically significant data, but rather conceptualizations or hypotheses around which specific experiments can be designed.

(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 our observations indicate that, rather than simple perversity, what is being articulated is a coherence phenomena 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.

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) Psychokinetic 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 unforseen 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.

So is it [illegible]

(3) Psychokinetic phenomena appear to be intrinsically spontaneous; i.e., it is difficult to evoke psychokinetic phenomena "on cue", with the result that the phenomena is 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 psychokinetic phenomena, the less likely one is to see it, a

And its absence therefore is most conclusive proof of its presence!

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 piece of instrumentation. In this model the scrutiny of psychokinetic phenomena under laboratory conditions could in principle be considered to be a collective phenomena involving interfering observer effects in a manner known to occur at the microscopic quantum level.

(5) Finally, we find it useful as a guiding principle to recognize that all of the phenomena we deal with in macroscopic psychoenergetics 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 psychokinetic abilities primarily as a source of ordering phenomena of sufficient magnitude so as to restructure the otherwise random statistics of the macroscopic environment.

Universal Randomization Protocol

It was deemed desirable in our work to establish a universal randomization protocol independent of the particular experiment under consideration. The only exceptions were to be automated experiments where target selection is determined by radioactive decay or electronic randomization.

The randomization procedure is designed around a ten-unit base, e.g., ten targets, ten work periods, etc. A ten-digit sequence governing an experiment is blind to both experimenter and subject, and is uncovered by means of the following procedure. A three-page RAND Table of Random Digits (Table 1) is entered to obtain the ten-digit sequence, the entrance point being determined by four throws of a die,† the first 1, 2, or 3 determining page, the next 1, 2, 3, or 4 determining column block, and the final throw determining from which of the first six rows in the block the ten-digit sequence is to be taken. An opaque card with a single-digit window is then moved across the row to uncover digits one at a time. If a multiplicity of targets exist, the digits 0 through 9 are employed directly. If a binary command is required (e.g., increase/decrease or activity/no activity) the parity of the digit (even or odd) is employed.

† A technique found in control runs to produce a distribution of die faces differing nonsignificantly from chance expectation.

Table of Random Digits *

11 16 43 63 18	75 06 13 76 74	40 60 31 61 52	83 23 53 73 61
21 21 59 17 91	76 83 15 86 78	40 94 15 35 85	69 95 86 09 16
10 43 84 44 82	66 55 83 76 49	73 50 58 34 72	55 95 31 79 57
36 79 22 62 36	33 26 66 65 83	39 41 21 60 13	11 44 28 93 20
73 94 40 47 73	12 03 25 14 14	57 99 47 67 48	54 62 74 85 11
49 56 31 28 72	14 06 39 31 04	61 83 45 91 99	15 46 98 22 85
64 20 84 82 37	41 70 17 31 17	91 40 27 72 27	79 51 62 10 07
51 48 67 28 75	38 60 52 93 41	58 29 98 38 80	20 12 51 07 94
99 75 62 63 60	64 51 61 79 71	40 68 49 99 48	33 88 07 64 13
71 32 55 52 17	13 01 57 29 07	75 97 86 42 98	08 07 46 20 55
65 28 59 71 98	12 13 85 30 10	34 55 63 98 61	88 26 77 60 68
17 26 45 73 27	38 22 42 93 01	65 99 05 70 48	25 06 77 75 71
95 63 99 97 54	31 19 99 25 58	16 38 11 50 69	25 41 68 78 75
61 55 57 64 04	86 21 01 18 08	52 45 88 88 80	78 35 26 79 13
78 13 79 87 68	04 68 98 71 30	33 00 78 56 07	92 00 84 48 97
62 49 09 92 15	84 98 72 87 59	38 71 23 15 12	08 58 86 14 90
24 21 66 34 44	21 28 30 70 44	58 72 20 36 78	19 18 66 96 02
16 97 59 54 28	33 22 65 59 03	26 18 86 94 97	51 35 14 77 99
59 13 83 95 42	71 16 85 76 09	12 89 35 40 48	07 25 58 61 49
29 47 85 96 52	50 41 43 19 66	33 18 68 13 46	85 09 53 72 82
96 15 59 50 09	27 42 97 29 18	79 89 32 94 48	88 39 25 42 11
29 62 16 65 83	62 96 61 24 68	48 44 91 51 02	44 12 61 94 38
12 63 97 52 91	71 02 01 72 65	94 20 50 42 59	68 98 35 05 61
14 54 43 71 34	54 71 40 24 01	38 64 80 92 78	81 31 37 74 00
83 40 38 88 27	09 83 41 13 33	04 29 24 60 28	75 66 62 69 54
67 64 20 52 04	30 69 74 48 06	17 02 64 97 37	85 87 51 21 39
64 04 19 90 11	61 04 02 73 09	48 07 07 68 48	02 53 19 77 37
17 04 89 45 23	97 44 45 99 04	30 15 99 54 50	83 77 84 61 15
93 03 98 94 16	52 79 51 06 31	12 14 89 22 31	31 36 16 06 50
82 24 43 43 92	96 60 71 72 20	73 83 87 70 67	24 86 39 75 76
96 99 05 52 44	70 69 32 52 55	73 54 74 37 59	95 63 23 95 55
09 11 97 48 03	97 30 38 87 01	07 27 79 32 17	79 42 12 17 69
57 66 64 12 04	47 58 97 83 64	65 12 84 83 34	07 49 32 80 98
46 49 26 15 94	26 72 95 82 72	38 71 66 13 80	60 21 20 50 99
08 43 31 91 72	08 32 02 08 39	31 92 17 64 58	73 72 00 86 57
10 01 17 50 04	86 05 44 11 90	57 23 82 74 64	61 48 75 23 29
92 42 06 54 31	16 53 00 55 47	24 21 94 10 90	08 53 16 15 78
35 54 25 58 65	07 30 44 70 10	31 30 94 93 87	02 33 00 24 76
86 59 52 62 47	18 55 22 94 91	20 75 09 70 24	72 61 96 66 28
72 11 53 49 85	58 03 69 91 37	28 53 78 43 95	26 65 43 78 51

* This table appears through the courtesy of The RAND Corporation and the McGraw-Hill Book Company, Inc. and is reprinted by permission from The Compleat Strategyst, by J. D. Williams, pp. 219-221 [44].

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07 42 85 88 63	96 02 38 89 36	97 92 94 12 20	86 43 19 44 85
35 37 92 79 22	28 90 65 50 13	40 56 83 32 22	40 48 69 11 22
10 98 22 28 07	10 92 02 62 99	41 48 39 29 35	17 06 17 82 52
90 12 73 33 41	77 80 61 24 46	93 04 06 64 76	24 99 04 10 99
63 00 21 29 90	23 51 06 87 74	76 86 93 93 00	84 97 80 75 04
40 77 98 63 82	48 45 46 52 69	02 98 25 79 91	50 76 59 19 30
43 21 61 26 08	18 16 78 46 31	94 47 97 65 00	39 17 00 66 29
96 16 76 43 75	74 10 89 36 43	52 29 17 58 22	95 96 69 09 47
70 97 56 26 93	35 68 47 26 07	03 68 40 36 00	52 83 15 53 81
85 81 26 18 75	23 57 07 57 54	58 93 92 83 66	86 76 56 74 65

37 10 06 24 92	63 64 24 76 38	54 72 35 65 27	53 07 63 82 35
53 40 61 38 55	38 51 92 95 00	84 82 88 12 48	25 54 83 40 75
55 17 28 15 56	18 85 65 90 43	65 79 90 19 14	81 36 30 51 73
40 35 38 48 07	47 76 74 68 90	87 91 73 85 49	48 21 37 17 08
18 89 90 96 12	77 54 15 76 75	26 90 78 81 73	71 18 92 83 77
68 14 12 53 40	92 55 11 13 26	68 05 26 54 22	88 46 00 63 52
51 55 99 11 59	81 31 06 32 51	42 58 76 81 49	88 14 79 97 00
92 21 43 33 86	73 45 97 93 59	97 17 65 54 16	67 64 20 50 51
15 08 95 05 57	33 16 68 70 94	53 29 58 71 33	38 26 49 47 08
96 46 10 06 04	11 12 02 22 54	23 01 19 41 08	29 19 66 51 87

28 17 74 41 11	15 70 57 38 35	75 76 84 95 49	24 54 36 32 85
66 95 34 47 37	81 12 70 74 93	86 66 87 03 41	66 46 07 56 48
19 71 22 72 63	84 57 54 98 20	56 72 77 20 36	50 34 73 35 21
68 75 66 47 57	19 98 79 22 22	27 93 67 80 10	09 61 70 44 08
75 02 26 53 32	98 60 62 94 51	31 99 46 90 72	37 35 49 30 25
11 32 37 00 69	90 26 98 92 66	02 98 59 53 03	15 18 25 01 66
55 20 86 34 70	18 15 82 52 83	89 96 51 02 06	95 83 09 54 06
11 47 40 87 86	05 59 46 70 45	45 58 72 96 11	98 57 94 24 81
81 42 28 68 42	60 99 77 96 69	01 07 10 85 30	74 30 57 75 09
21 77 17 59 63	23 15 19 02 74	90 20 96 85 21	14 29 33 91 94

42 27 81 21 60	32 57 61 42 78	04 98 26 84 70	27 87 51 54 80
17 69 76 01 14	63 24 73 20 96	19 74 02 46 37	97 37 73 21 12
05 68 63 02 43	34 13 40 29 36	50 19 77 98 69	86 49 76 87 09
52 99 24 66 50	89 91 05 73 95	46 95 46 75 36	28 96 88 19 36
94 51 89 39 84	81 47 86 77 50	82 54 96 26 76	31 12 34 98 99
00 18 47 21 86	78 90 67 54 88	61 79 88 16 00	80 01 88 47 42
87 46 26 31 65	79 81 66 16 30	57 66 62 90 55	46 51 80 14 87
88 69 25 87 16	12 27 34 81 76	29 80 56 49 94	66 87 26 22 30
20 09 44 29 62	41 38 21 67 68	06 71 13 49 39	19 59 97 62 47
60 93 58 15 04	50 52 08 21 53	13 93 44 68 85	58 31 58 83 66

51 39 28 59 36	43 89 85 05 96	28 54 99 83 27	99 94 32 53 77
54 23 94 19 18	79 52 64 62 74	40 87 16 18 03	25 76 75 54 84
57 89 27 33 94	07 16 09 02 62	47 70 43 83 55	71 70 88 01 17
02 33 07 47 36	53 27 44 44 68	62 61 11 96 98	09 30 42 92 65
76 11 52 92 47	55 34 25 12 99	03 04 78 39 81	11 91 60 92 67
63 31 28 18 86	29 08 52 01 01	26 46 05 05 01	31 73 11 89 38
27 63 22 15 70	34 27 45 64 26	01 76 42 59 59	69 29 38 98 75
06 33 56 21 11	44 01 45 25 67	11 76 25 48 06	02 65 15 29 12
64 14 28 76 76	21 35 88 87 73	31 73 63 16 95	11 52 36 42 13
28 43 62 54 68	75 23 57 53 70	97 15 54 87 06	52 23 92 18 31
09 52 28 38 55	85 97 31 58 88	31 18 14 96 72	17 23 70 40 24
93 71 41 54 14	93 71 20 27 42	32 11 58 26 83	67 18 28 90 30
15 68 15 35 99	58 18 57 38 40	07 06 87 59 47	71 74 36 92 85
77 71 22 39 14	08 90 74 37 68	26 62 27 41 84	75 16 69 67 48
78 45 35 48 44	61 50 90 12 45	02 80 55 26 76	22 51 94 78 48
24 86 06 82 84	19 36 72 90 73	32 30 15 87 01	04 19 33 01 42
37 28 40 68 44	78 88 75 72 76	26 33 95 69 09	39 33 14 21 01
35 48 85 24 73	37 63 43 25 69	95 27 40 95 08	81 01 24 24 13
51 59 55 99 09	35 22 34 49 91	24 27 53 96 32	09 77 79 88 00
90 66 03 51 71	30 02 19 11 20	36 11 64 21 28	65 40 19 41 99
47 50 50 20 08	20 30 08 71 88	96 19 50 70 59	13 26 63 13 89
13 35 00 84 14	64 04 99 43 77	22 40 89 49 58	19 09 55 80 35
33 00 69 26 90	69 24 89 74 43	53 89 62 35 08	16 22 75 69 29
55 21 66 38 86	06 80 41 18 61	22 56 50 24 75	00 25 87 90 18
21 99 12 62 28	14 80 11 91 92	49 43 82 07 72	60 84 66 97 32
71 02 52 82 12	10 47 42 75 22	65 62 03 46 84	00 21 00 48 63
65 52 21 52 42	84 55 47 45 60	20 24 62 69 41	41 29 80 47 63
27 97 55 49 23	90 65 00 61 70	09 43 30 91 67	35 16 63 27 31
07 30 00 97 04	36 09 96 15 77	95 55 27 34 56	16 57 88 81 40
54 35 71 36 89	19 56 90 38 14	76 05 30 51 50	69 12 56 94 42
00 97 70 44 81	42 04 40 86 49	34 82 23 58 43	78 46 88 23 80
13 92 07 87 61	12 31 19 28 08	07 75 30 40 73	58 52 08 00 22
08 39 53 70 43	37 88 03 41 72	04 20 49 44 34	62 79 88 19 02
46 16 66 72 06	01 61 94 37 69	96 77 01 94 40	29 70 04 20 93
87 76 77 76 07	03 74 20 16 13	65 98 96 28 43	10 91 73 44 58
29 88 09 52 88	21 64 44 65 87	06 64 49 47 84	66 99 56 18 12
36 24 83 66 66	14 89 45 92 73	88 95 04 60 77	34 65 11 20 38
12 38 62 96 56	30 47 42 59 64	21 48 29 54 22	02 00 23 36 71
52 06 87 38 01	52 18 81 94 91	55 13 76 10 39	02 00 66 99 13
41 72 75 21 71	56 71 90 60 54	98 44 18 15 29	59 60 76 52 25

AN OVERVIEW OF EXTRASENSORY PERCEPTION

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The following brief summary presents some conclusions and observations derived from an independent, and somewhat critical, study of extrasensory perception over the past several months. These opinions are based upon study of the literature, material presented at the Geneva Conference of the Parapsychology Foundation in August 1974 and, in particular, the work of Puthoff and Targ at SRI as reflected in their publications as well as their oral presentation in Washington. First some general observations and recommendations in this area are presented, then a brief comment on the SRI work, and finally some remarks about practical applications.

GENERAL OBSERVATIONS AND RECOMMENDATIONS

1. A large body of reliable experimental evidence points to the inescapable conclusion that extrasensory perception does exist as a real phenomenon, albeit characterized by rarity and lack of reliability. It appears as a low-capacity, high-noise information channel exhibiting data rates orders of magnitude less than normal perceptive processes. Almost by definition extra-sensory perception must involve in an essential way the operation of the human mind.

2. There exists no satisfactory theoretical understanding of these phenomena. Present theories, of which there are many, are both speculative and unsubstantiated. They range in content from the physical through the psychological to the metaphysical. One theory- that of the French physicist, Costa de Beauregard- offers the possibility of interpreting psi phenomena within a modest extension of established physical theory, but in general these efforts appear premature. At this stage of knowledge the most meaningful basic research consists of a search for correlates- physical, physiological, and psychological- to which the phenomena may be quantitatively related. Guidance must consist of general ideas which are not dependent upon possibly overspecific theoretical assumptions.

3. All the experimental evidence to date is consistent with the assumption that paranormal perception behaves as an information channel in the conventional sense of information theory. The information theoretic approach to investigation in this area has probably not been adequately exploited but offers definite possibilities of aiding understanding as well as practical advantages. The success of enhancement techniques such as redundancy, majority vote, etc. is indicative of the efficacy of even simple applications of information theory in parapsychological research.

   a. Information theory in itself makes no assumptions of specific mechanism, but contains a body of concepts (bit rate, redundancy, equivocation, etc.) by which experimental results may be quantitatively presented and analysed. Moreover these quantities have direct meaning in terms of applications.

   b. Although problems of coding are of central concern in information theory, it is innately an input-output theory. Experiments can be devised to measure information rates in comparatively unstructured situations, independently of coding assumptions.

   c. The very low information rates (0.01 to 0.1 bits/sec) measured in extrasensory perception may explain the failure to detect physical energy or correlated physical variables associated with the phenomena. A signal lower in strength than thermal noise and only detectable through its high redundancy would exhibit a similar low rate of information transmission. Physical energy less than thermal noise would be very difficult to detect.

4. The complete ESP channel may or may not involve a detectable physical link, but it most certainly does involve a psychological one. Although difficult to quantify there do appear to exist some genuine psychological correlates of paranormal perception. Rather than detail these, mention is made of only one aspect which seems especially significant, namely the striking similarity between many psychological features of paranormal perception and normal, though subliminal perception. Clearly this suggests that similar processes may be operative in both cases and that studies of subliminal perception below the conscious threshold may be of relevance to the psychological part of paranormal perception.

This assertion needs support

5. The physiological correlates of extrasensory perception which have been measured are autonomic responses and therefore somewhat related to emotional responses. Variations of EEG alpha rhythm, galvanic skin resistance and blood capillary volume have all been identified in relation to extrasensory activity. There is some experimental evidence for believing that these physiological responses may be

more sensitive indicators of paranormal communication than consciously controlled responses. Presumably a large part of the noise in the paranormal channel originates by the interfering effect of conscious processes, and measurement of autonomic responses could short circuit a noisy part of the channel. Also the physiological responses themselves are directly accessible to physical, instead of only psychological, measurement.

THE RESEARCH AT STANFORD RESEARCH INSTITUTE

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The work at SRI, using gifted individuals, has acheived some convincing and striking demonstrations of the existence of paranormal perception, and has demonstrated perhaps less convincingly the possible existence of psychokinetic influences upon sophisticated physical instrumentation. The careful and systematic use of sensory shielding in these experiments has excluded a large class of gross physical correlates of paranormal perception. The work has been less successful in showing unambiguous relations of inhibition or enhancement between paranormal performance and possible physical, physiological, and psychological conditions. The enhancement method used was selection of special individuals either through prior reputation or through preliminary screening. Thus the approach was one of enhancement through selectivity rather than enhancement (or inhibition) by deliberate manipulation of variables. This research produced some information, measurement of alteration of alpha rhythm amplitude and measurement of neurological profiles, relevant to the question of correlates but was not aimed primarily in this direction. The contribution to fundamental understanding was a minor part of this work, but it produced manifestations of extrasensory perception sufficiently sharp and clear cut to justify serious consideration of possible applications.

This negates the "learners" assertion of P & T.

A separate point is that the high apparent bit rate of information transmission implied by successful replication of drawings or recital of detailed descriptions may be illusory. In no case was the percipient asked to replicate or describe unfamiliar or unknown objects. A low bit rate may trigger detailed stored associations which in themselves have high information content.

PRACTICAL APPLICATIONS

No matter how gifted the paragnost existing ignorance of the basis of paranormal phenomena together with the capricious and unreliable nature of the channel dictate that information derived from this source can never stand alone and must be used with caution. Extrasensory information should at best supplement normal information or guide its collection, but should never serve in place of it. Even such limited use of this information channel would seem to require much more detailed investigation of its character and limitations. A certain bare minimum of understanding, or at least experience, is required to establish confidence. Experimental tests guided by a thorough information theoretic analysis, as alluded to earlier, offer the closest coupling with applications and the best prospect of usefully quantifying the capabilities of this information channel.