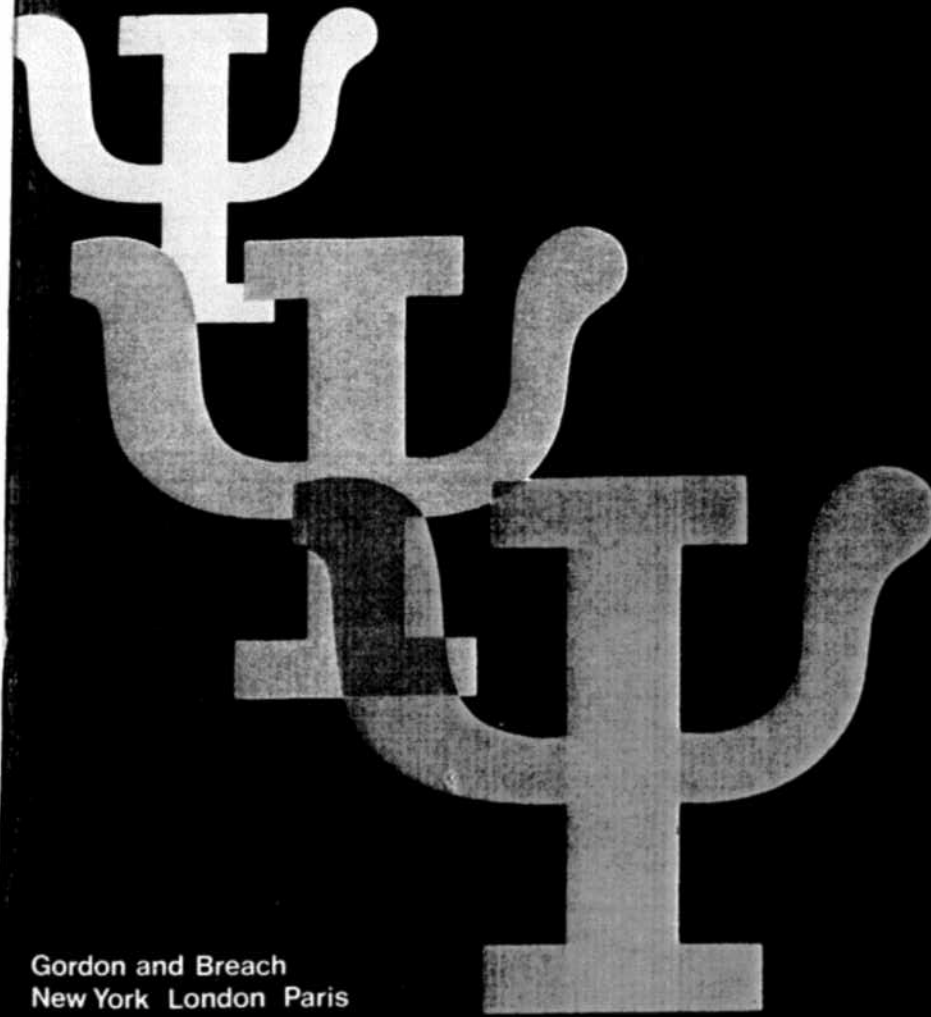


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A search for the electromagnetic concomitants of ESP

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INTRODUCTION

We have investigated several ESP phenomena over the past three years. In this paper we present our results of experiments which aimed at detection of unusual electromagnetic (e.m.) radiation emitted by the subjects while they were achieving or trying to achieve the following phenomena: metal-bending, psychic healing, dowsing, telepathy and distant-viewing. The case of psychokinesis (PK) will be treated separately in a later communication.

The search for e.m. concomitants of ESP is a natural approach to take, bearing in mind that out of the four known forces of nature only e.m. could, at least at first glance, give a satisfactory explanation of ESP phenomena. The crucial feature is whether e.m. signals are emitted by subjects during paranormal events, and if so, if these signals can be associated with the production of the observed paranormal phenomenon. The second feature, that would make the analysis even more quantitative, is whether the sensitivity of subjects to incoming radiation can be ascertained. For example, sensitivity at least down to the levels of any paranormal emission from another subject would be necessary for telepathy to occur.

Earlier work on e.m. signals related to ESP has been inconclusive. Cazamali² proposed an e.m. explanation of telepathy by means of waves of 10cm to 1m wavelength, and he claimed to have detected such emission from subjects. However, his results were never subsequently confirmed. L. L. Vasiliev,³ after many years of investigation, concluded that telepathy could not be explained by electromagnetism. A critical review of his work shows lack of statistical significance in his results (based on two sets of experiments respectively repeated seven and ten times), thus leaving the e.m. explanation still open. Various other tests, such as those at the SRI⁴ have been put forward as contradicting the e.m. explanation of ESP, but careful analysis shows that none, if valid, exclude some portion or other of the e.m. spectrum.

It therefore seemed highly relevant for us to use suitably sensitive e.m. detectors to try to clarify the position of the e.m. hypothesis in ESP phenomena. The protocol was to use e.m. detectors covering a wide range of frequencies (see Figure 1) together with two video-tape cameras, one to keep a continuous record of the subject's performance and the other to keep a permanent record of the visual readout of some of the detectors.

Table I contains the results of the e.m. radiation detection for all phenomena mentioned above, with all our subjects.

Table II indicates the results of the tests on human sensitivity to low levels of e.m. radiation (see Figure 2).

Section I presents our conclusions on metal-bending.

Section II contains an analysis of our results on psychic healing.

Section III gives our assessment of the dowsing tests.

In Section IV we evaluate the results of the telepathy and distant-viewing experiments.

Finally, the last section states our overall conclusions.

I. METAL-BENDING

A great deal of work has been done and much has been written about metal-bending. This happened after the appearance in England of the Israeli entertainer Uri Geller. The effect is that of the abnormal bending, or even breaking, of a piece of metal when gently stroked by a subject. The "Geller effect," as it has been called, is achieved by the subject stroking a spoon or fork at its narrowest portion. The claims of the subjects who have come forward with similar abilities as Geller's (mostly children in the U.K.) are extremely varied, but they can be divided into two main groups: (i) contact bending (ii) distant bending (i.e. without the subject stroking the piece, or even without the subject attempting to bend that particular piece). Of a total of 65 subjects (including Geller, M. Manning and J. P. Girard) investigated over a period of three and half years, all of them claimed ability to achieve contact bending, i.e. by stroking the metal. Nearly 50 percent of them reported on occasions bending at a distance. Some subjects (ten percent of the total number) reported spontaneous bending, i.e. bending of a piece of metal without them attempting to bend it. In some instances, the spontaneously bent piece would be near another which was being attempted to be bent, and at other times cases of cutlery bending while put away in a closet were claimed. Only three subjects claimed bending abilities with non-metal specimens, i.e. plastic and wood. Two subjects claimed the ability to achieve "scrunches" of a certain number of paper clips, without contact, and one of

them produces "sculptures" made of twisted and bent metal strips, allegedly, without direct contact. Two subjects also achieved bending of two specimens sealed in glass tubes, one of them having bent into a remarkable S shape. A third subject, Silvio, not investigated by us directly, as he lives in Switzerland, claims also ability to bend a metal strip inside a sealed tube. A video-tape of that effect was obtained last year by Prof. H. Bender of the University of Freiburg, Germany. Also, the same subject is seen in a video-tape bending a plastic spoon at a distance (~ 50cm) by pointing his finger at it (the bending occurring towards his finger and not away from it), and achieving the bending of a 1 Swiss franc coin (same size as a 5p coin) by holding it between his thumb and first finger, without any stroking.

I.1 The protocols for the investigation of metal-bending

i) A subject was required to stroke a strip of copper, aluminium or brass (supplied by the Metallurgy Department, KCL), 0.2×0.6 cm cross section and of various lengths of up to 15cm. The strip was securely attached to the top of a letter balance and could only be touched on its upper surface. During the test, a VTR was used to record a clear picture of both the strip being stroked, the finger stroking it and the amount of pressure being used by means of the reading on the letter balance dial. A clock (showing the second hand) was also included in the picture so that continuity was assured and the video-tape could not have been spliced fraudulently.

ii) EMG sensors were placed on the subject's forearms, and a continuous picture of the dials of both EMG boxes was obtained with the VTR, thus allowing for a permanent record of the pressure applied by the subject to be kept at all times while he attempted bending.

iii) A room with a one-way viewing system was used on several occasions, this being located in the Psychology Lab. of the University of Bath. These tests were done in collaboration with Mr. H. Collins, lecturer in Sociology at that University. The camera was placed on one side of the one-way mirror, while the subject sat on the other side and attempted bending. In those instances, either the letter balance or EMG's were used together with the one-way viewing system.

Due to reasons of space and the difficulty of compressing such an enormous amount of experimental data gathered during three years with the number of subjects mentioned above, we have preferred to present our results in the way of a table. This shows the instruments that were used in order to measure any e.m. emission from the subject's body; for each detector used, we detail either a successful or unsuccessful bending attempt according to whichever occurred, the presence or absence of a signal in the

There were, occasionally, signals at various frequencies: mostly within the range DC-3KHz (physiological frequencies), a signal at 8650Hz which was consistently observed for many subjects (both inside and outside a screened room, previously calibrated as to its transmission characteristics, with a signal generator placed outside it). Also, measurements with the 15GHz radiometer (T1) seemed to reveal an indication as to a possible enhanced emission from the subject's body when attempting comparison between that emission (as detected with the radiometer) and the skin temperature variation (measured with T4) seemed to support this idea. Because of the dielectric properties of the body, no e.m. radiation can penetrate it or come out of an internal region of it at frequencies higher than 10GHz. Therefore it was thought that with the use of a lower frequency radiometer (as T3) we would be able to monitor the emission inside the body. As Table I shows, radiometer T4 showed very clearly the absence of any emission from the body that could be other than the normal black-body level at that temperature. The radiometry results agree with the findings of Enander and Larson (Royal Institute of Technology, Sweden)⁷ who studied the range of frequencies 100MHz-2.3GHz extensively with subjects inside a screened room, both when they were in a normal state or, alternatively, in a deep sleep, and found no indications whatsoever of any signal different from the black-body level.

1.3 Experiments with strain-gauges.

Experiments were carried out with metal specimens onto which different types of strain-gauges were fixed. These were placed either at the ends of a specimen or in the middle of it, both on top and underneath each metal strip. The strain-gauges were connected to a strain-gauge amplifier (sensitivity 1 microstrain) and the output was taken either to a chart recorder (frequency response up to 10Hz) to an FM tape recorder (audio range) or to the oscilloscope (E1).

1.4 Experiments with an accelerometer

Further tests were done using a B&K accelerometer (frequency response DC-35KHz) and a preamplifier. The purpose was to establish whether resonance effects might be being set up in the metal corresponding to transverse or longitudinal modes of vibration) which could cause it to bend.

The accelerometer was fixed onto the specimen, its output being taken to the oscilloscope E1. Although bending never occurred in this situation, there was never an indication as to resonance effects being set up in the metal.

1.5 Tests in the lab to reproduce metal-bending

Attempts were made to cause bending of a strip of metal or plastic, by feeding e.m. energy into the strip at its lowest resonance frequency for either longitudinal or transverse vibrations. Typical transverse frequencies were about 100-200Hz whereas longitudinal frequencies were about 1-2KHz; LiF crystals were also exposed to the same radiation, the resonant frequencies of the crystals being about 350-400Hz (transverse) and 3-4KHz (longitudinal). Direct high voltage fields were used, any motion of the specimen being measured by the accelerometer/preamplifier/oscilloscope system. A field of 400V/cm was used for a strip of aluminium which had a 20Hz transverse and 200Hz longitudinal resonant frequency; no effect was observed on the accelerometer using such a field at those frequencies or even over the range 0.01Hz to 1MHz. To achieve greater focussing of power, a Paradyamics X-band microwave source was then used (50kW peak power, 0.6 μ sec or 2.1 μ sec pulse, variable p.r.f. with external modulation). The beam, at a frequency of 10GHz, was pulsed for 2 μ sec duration and the pulse repetition frequency could be modulated, though over a restricted range. When used to irradiate specimens (strips of various metals, plastic and various crystals), vibration of the specimen was observed at the modulation frequency in agreement with the surface acoustic wave generation considered as the basis of the hearing effect in radar beams. However, no resonance effect was observed since the available power at appropriate modulation frequencies near resonance frequencies of the specimens was very likely too low. Such was not the case for strips of brass, copper or aluminium cut to lengths appropriate to the internal modulation. Thus 0.2 x 0.6cm cross section strips of brass, copper and aluminium of respective lengths 51.6, 39.8 and 63.4cm were irradiated by being inserted in the waveguide of the X-band source; the appropriate frequency was expected to vary from 1 to 3KHz. No gross effects were observed here again, though again energy was being absorbed in the strip as was observed on the output of the accelerometer as displayed on the oscilloscope.

1.6 Conclusions of the metal-bending tests

The overall results are that no e.m. emission from the subject's body was observed over nearly the whole e.m. frequency spectrum. The occasional signals observed at the lower end of the spectrum clearly cannot account for the phenomenon as (i) their focussing power is very poor (ii) the energy transfer is very inefficient and (iii) the signal levels observed are too low. Moreover, there is no mechanism which, on a theoretical basis could be responsible for the effect. The best candidate, as far as conditions (i), (ii),

and (iii) are concerned would be the microwave range, from 1–5GHz. For radiation at these frequencies, if emitted at all by the body, can well be focussed and the energy transfer can be efficient. But condition (iii) was never fulfilled, and no microwave emission higher than black-body radiation at the same temperature was ever detected. We thus conclude that no e.m. radiation of any frequency could explain metal-bending. Indeed if the power required to cause the effect is in the MW range we are out by a factor of at least 10^9 .

However, there are still cases of bending occurring while a strip was fixed on the GPO balance, with no e.m. radiation detected, or cases such as subjects J. P. Girard and Silvio which remain puzzling.

II. PSYCHIC HEALING

II.1 Introduction

“Psychic,” “faith,” or “spiritual” healing has a tradition going back to ancient times in history; in fact, all civilisation from different parts of the world possess records of such healing as practised in many different ways. There is a great deal of interest and activity in this form of healing presently though, as in other areas of ESP there is apparently fraud occurring in some cases. This is particularly prevalent in the “psychic surgery” practised in the Philippines and South America. The patient’s body is apparently penetrated by the healer’s hands without the use of a knife, diseased tissue being removed again without incision, and the holes in the patient’s body closing up as the healer’s hands are removed. Fraud has been detected in this phenomenon, especially after analysis of tissue or blood removed from patients showed that it was definitely non-human in certain cases. It has been admitted by one of the leading healers in the Philippines that a good proportion of such psychic surgery is fraudulent.

In the U.K., as in other parts of Europe and the U.S.A., the practice is that of the “laying-on of hands,” which is a less dramatic technique. Yet, healers claim that cures of terminal cancer and other diseases apparently inaccessible to standard medicine have been effected. There are also sensations that are said to occur during the laying-on of hands, felt either by the healer or the patient or both, which would warrant investigation. Thus the healer may say that his hands are becoming very hot when held near a diseased part of the patient’s body, and the patient may also state that he has this sensation of heat radiating from the healer’s hands. There is also a sensation of cold experienced by healer and/or patient in a similar situation. Vibrations of the healer’s hands have also been remarked on as occurring quite frequently.

A certain number of healers (about 50 percent of the total) claim also that they can achieve “healing at a distance,” i.e. that they can heal a patient from a distance; in some cases, all the healer claims to need is a photograph of the patient in order to perform this feat; in other cases, not even the photograph is needed. Miraculous cures have also been claimed to have occurred without the help of any external healer. For example, there have been several hundred cases of spontaneous cancer recession. Thus it may well be that the main value of a healer is to promote the correct psychological state in a patient to bring about such a cure. Therefore, in order to proceed to investigate this phenomenon, the first question to be answered is: does a healer emit any form of radiation or use any other physical effect so as to transmit energy to the patient directly or indirectly?

We investigated altogether six healers over a period of 15 months; these were: Rose and Peter Gladden, John Cain, Bruce McManaway, Olga Worrall (U.S.A.) and Tony Chadwick. The protocol for the investigation was that of having e.m. radiation detectors (described below) on the healer’s or the patient’s body. VTR equipment was occasionally used in order to keep a permanent record of the reading of various instruments, when necessary.

In the first subsection we present the results obtained with the various e.m. detectors up to a frequency of 140GHz. These were done both for the situation of the patient being present and for distant healing. The second subsection indicates the results of temperature measurements from the healer’s and the patient’s body, in an attempt to find out whether there was a correlation with the sensations experienced by these and their surface skin temperature. The third subsection describes the tests done with various chemicals, in order to investigate claims as to healers being able to affect the hydrogen bonding. Finally, the fourth subsection presents the sensitivity tests in which we attempted to find out whether human subjects could sense low levels (mW power) of e.m. radiation of frequencies ranging from 200MHz to 16GHz.

II.2 Surface skin temperature measurements

A thermocouple with readout to an electronic thermometer accurate to 0.1°C , was used to check whether the sensations of “heat” or “cold” experienced by either the healer or the patient could be correlated to actual increase or decrease of surface skin temperature in the subjects. The thermocouple had been shown to be insensitive to electric fields of up to 100V/cm and frequencies in the range 0.01Hz to 1MHz .

The protocol of the investigation was to measure the temperature of the healer’s hand as a function of time and to note that sensation of heat or cold the patient was undergoing, and what the healer was attempting (“hot” or

"cold"). The thermocouple was attached to the healer's palm which was placed on the patient's back. At no time during the test were the temperature readings indicated to the healer or the patient.

The table below shows typical sequences obtained in this way:

| | Time | Healer's attempt | T(°C) | Patient's sensation |
|-----|----------|------------------|-------|------------------------------|
| (a) | 2.40 | Heat (P.G.) | 35.5 | Heat building up |
| | 2.43 | Heat (P.G.) | 35.7 | Very hot |
| | 2.44 | Heat (P.G.) | 35.8 | Heat reduced |
| | 2.48 | Heat (P.G.) | 35.9 | Beginning to feel hot |
| | 2.48:20" | Heat (P.G.) | 36.1 | Very hot |
| | 2.48:40" | Heat (P.G.) | 36.2 | Burning hot |
| | 2.49 | Heat (P.G.) | 36.3 | Pretty hot now |
| (b) | 2.57 | Heat (P.G.) | 36.1 | Very hot |
| | 2.58 | Heat (P.G.) | 36.0 | Heat faded away |
| | 2.58:20" | Heat (P.G.) | 35.95 | Suddenly warmer |
| | 2.59 | Heat (P.G.) | 35.9 | Burning heat |
| | 2.59:30' | Heat (P.G.) | 35.9 | Still pretty hot |
| | 2.59:45' | Heat (P.G.) | 36.0 | Cooling down |
| (c) | 3.00 | Cool (P.G.) | 35.6 | Slightly warm |
| | 3.00:45' | Cool (P.G.) | 35.7 | Hot again |
| | 3.00:48" | Cool (P.G.) | 35.6 | Burning hot |
| | 3.02 | Cool (P.G.) | 35.6 | Feels cool |
| | 3.03 | Cool (P.G.) | 35.5 | Warmth from tips of fingers |
| | 3.05 | Cool (P.G.) | 35.5 | No sensation of heat or cold |
| (d) | 4.29 | Heat (R.G.) | 25.55 | None |
| | 4.30 | Heat (R.G.) | 25.7 | Getting warmer |
| | 4.30:25' | Heat (R.G.) | 25.65 | Quite hot |
| | 4.31 | Heat (R.G.) | 25.7 | Getting cool |
| | 4.32 | Heat (R.G.) | 26.2 | Cold |
| | 4.33 | Heat (R.G.) | 26.3 | Still cold |
| | 4.35:10' | Heat (R.G.) | 26.9 | Getting hot |
| | 4.35:20' | Heat (R.G.) | 27.0 | Colder |

The four sequences indicate that neither healer had any clear control of the temperature of their hands. In Peter's case, there was a slight increase of temperature of about 0.8°C from the beginning of session (a), but this could have been caused by contact with the patient reducing cooling of Peter's skin by that amount. In Rose's case, the increase of temperature could be explained by absorption of heat from the patient; Rose's hands were usually 10°C lower than Peter's. The other result evident from the table is that the patient's sensations are in no way correlated with skin surface temperature. These sensations could neither be accounted for by subcutaneous heating, as

this would involve transfer of radiation in the MW or RF range from healer to patient; the previous section shows clearly that, at no time, were any signals detected in those frequency ranges.

II.3 Tests with chemicals

Tests with various chemical compounds were prepared by Prof. A. J. B. Robertson (Dept. of Chemistry, KCL) in order to prove or disprove the claim of the American Olga Worrall that she could affect the hydrogen bonding in water.

(i) *Experiments with gels* Several tubes containing a gel-type of compound of various strengths (1, 1/2, 1/4) were prepared to detect the effect mentioned above. The gel was chosen due to the fact that it needs a very small amount of energy to cause the hydrogen bonding to break. In case this happened, the gel would become liquid inside the tube instead of remaining solid as it is in its natural form. O.W. was first given a tube containing a 1/2 strength gel, which she held in her hands for five minutes, while concentrating on the healing situation (or "healing at a distance"). After the five minutes elapsed, the gel had become liquid. Three further tests were done of five minutes' duration each, one with a 1/4 strength gel and two with a 1 strength gel. No effects were observed on those three tests. After the same, both Prof. Robertson and Mrs. M. McCausland (a healer acting as an observer) held tubes of 1/2 strength gel like the one used with O.W. In both cases, the gel became liquid in both tubes. Therefore, it was concluded that the thermal effect due to the temperature difference between the human body and the ambient temperature was responsible for this effect. This was indeed the case, as the energy associated with the hydrogen bonding to form the gel is roughly 1/10eV and the thermal energy per molecule associated with the temperature difference of ~20° between the human body and the ambient temperature was found to be 1/20eV, which is approximately the same as the former. No e.m. signals were detected with the equipment mentioned in Section III.1 during this test.

(ii) *Viscosity of distilled water* This test had the same purpose as that of (i), this time without direct contact of the healer's hands and the treated specimen so as to reduce direct thermal effects. The viscosity was measured through the velocity of fall of water inside a thin uniform vertical tube. The contents of a test-tube were placed inside a vertical tube and the time that the water column needed to descend 20cm in height was timed with a stop-watch. Before the water had been treated by O.W., the time was found to be 9.4 sec ± 0.1 sec. O.W. then held her hands around the test-tube for

five minutes while concentrating on healing. After this, we measured again the time for the water to descend the same height of the same vertical tube: this was found to be 9.4 sec (± 0.1 sec). Therefore we concluded that there had been no effect on the hydrogen bonding of water. Nor were any e.m. signals detected either from O.W.'s body with the detectors mentioned in Section III.1.

(iii) *Capillary tubes and Na thiosulphate* The tests which involved the use of capillary tubes were designed to compare the surface tension of both treated and untreated distilled water specimens. The procedure was to place a capillary tube vertically on the surface of the water and break the surface very carefully so as to allow the water to rise in the capillary tube. If there was an effect on the hydrogen bonding, it should be seen as a difference in the height of the water level between the treated and untreated specimens.

O.W. held her hands around the test-tube filled with distilled water for five minutes, while concentrating on healing. The table below shows the heights of the water columns inside the capillary tubes in both the control and treated specimens.

| | | | | | |
|--------------|---------|-----|------|------|-----|
| 1st attempt: | O.W. | 1.1 | 1.45 | 1.45 | 1.5 |
| | Control | 1.4 | 1.2 | 1.55 | 1.5 |
| 2nd attempt: | O.W. | 1.3 | 1.7 | 2.6 | |
| | Control | 1.6 | 2.1 | 2.6 | |

As can be seen, the results remained inconclusive. It is to be noted, however, that it is extremely difficult to have two capillary tubes with *exactly* the same diameter, therefore the differences could be due to that variation.

The next set of tests was on the effect on a sodium thiosulphate solution. This solution has the property that, with a very small amount of energy added to it, it will crystallize. This effect could be clearly seen and identified.

In the two tests carried out, O.W. held her hands around two tubes containing the Na thiosulphate solution for five minutes each, while concentrating on healing. Neither test showed crystallization of the solution, therefore no effect was observed. No e.m. signals were detected either while these tests were performed.

II.4 Tests with UV tubes and photographic films

The room was darkened completely to carry out a test with two UV tubes, after a report from the U.S.S.R. which claimed that healers could make UV tubes glow in the dark. Four successive attempts, two with each UV tube, gave negative results, after O.W. held the tubes for three minutes each time. There was no indication whatsoever of UV emission from her.

Also, several tests were conducted with photographic films in order to verify a claim of Dr. T. Moss in the U.S.A. as to O.W. being able to affect the emulsion of a common photographic film by holding it at one of its corners during five minutes. In the same room that had previously been completely darkened, three different photographic films were presented to O.W., one of them being an X-ray film. O.W. held the films between the palms of her hands for five minutes each, while concentrating on healing. The corresponding three control films were kept in a laboratory which was located four floors below. The three control films were treated by one of us (E.B.) for five minutes each, so as to have a proper comparison with the radiation level emitted by an ordinary person. Both the films treated by O.W. and E.B. were strips of films enclosed in cardboard and properly packed to avoid any exposure by means other than by the subjects. The six films were sent to Dr. D. Cash, a chemist expert in photography, and developed by him. His assessment was as follows: no effects were seen in the films treated by E.B.; one of the films treated by O.W. (X-ray film) showed no effect. The second one showed some clear spots and the third one a clear shadow. Dr. Cash's conclusion was that the tests were not conclusive in that the spots and clear shadow could be just artefacts of the processing technique, or heat effects, or even an artefact caused by the handling of the envelope containing the films through the normal GPO procedure.

II.5 Ultrasonics

This test was carried out at the Zoology Dept., KCL, where there exists an ultrasonics detector. O.W. was tested while concentrating on healing, both on a broad band detector and on a tunable one. The detector covered the frequency range 20KHz-120KHz, the tunable setting having a 5Hz bandwidth. After checking for the background noise level (O.W. in a relaxed normal state), O.W. was asked to concentrate on healing. Six attempts altogether were made and all of them showed the absence of any ultrasonics signal over the abovementioned range of the detector.

II.6 Tests on human sensitivity to low levels of e.m. radiation

Tests were carried out to determine whether there exists a threshold of sensitivity of human subjects to low levels of e.m. radiation, over a range of frequencies. J.G.T., E.B. and P.G. (outside observer) were used as subjects, in order to have a control of sensitivity of people who do not claim any ESP abilities. The tests were done with the following healers: John Cain, Tony Chadwick, John Cain Jr. and Mr. J. Stravers, a psychic healer. It was thought

appropriate to perform these tests on the healers as part of their healing consists of diagnosing the illness by "scanning" the patient's body with their hands and, in their own words, "finding a hot or cold spot" in the patient's body which would be the location of the patient's trouble. Also, there have been claims both from Soviet and Western researchers as to the body being able to sense low levels of e.m. radiation, and even that these produce "non-thermal" effects on the body which can manifest as behavioural changes. Therefore, our tests also allowed us to find out experimentally whether these claims could be supported or not.

The protocol of these tests was the following: The subject sat in a room with either a loop antenna (200MHz-950MHz range) or a horn antenna (6GHz-17GHz range) placed at a distance of 50cm from him. The e.m. source, whose output was taken through either antenna depending on the frequency range, was located in an adjoining room to that in which the subject sat. The idea was to randomize (by tossing a coin) the switching on or off of the source, and to ask the subject if he could sense the source being either on or off. The source was in a different room to eliminate any possibility of cueing to the subject, either visually or auditory, either consciously or unconsciously.

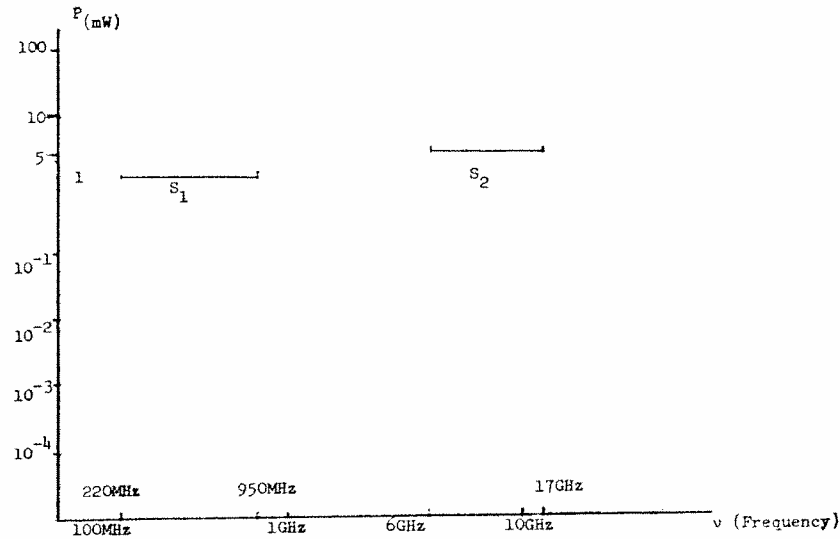


FIGURE 2 The power levels and frequency ranges of the sources used in the human sensitivity tests.

TABLE II
Responses of subjects to the sensitivity tests of e.m. radiation † = direct sensing, ‡ = dowsing.

| | 220MHz | 550MHz | 950MHz | 6.8GHz CW | 6.8GHz Ω | 9GHz CW | 9GHz Ω |
|-------------|--|-------------------------------------|--|--|---|---|---|
| J. Cain | Trials 20 Score 9/20 <>=0.45 | Trials 20 Score 8/20 <>=0.4 | Trials 40 Score 11/20, 11/20 <>=0.55 | Trials 40 Score 6/10, 3/10, 4/10 <>=0.4 | Trials 40 Score 5/10, 6/10 <>=0.625 | Trials 40 Score 4/10, 4/10 <>=0.425 | Trials 40 Score 5/10, 5/10 <>=0.5 |
| J. Cain Jr. | Trials 40 Score 11/20, 9/20 <>=0.5 | Trials 20 Score 14/20 <>=0.7 | Trials 20 Score 4/20 <>=0.2 | Trials 30 Score 4/10, 2/10 <>=0.4 | Trials 30 Score 3/10, 4/10 <>=0.37 | | |
| T.C. | | | | | | | |
| J.S. | Trials 10 Score 5/10 <>=0.5 | Trials 20 Score 10/20 <>=0.5 | Trials 30 Score 4/10, 13/20 <>=0.55 | | | | |
| P.G. | Trials 10 Score 5/10 <>=0.5 | Trials 20 Score 7/20 <>=0.35 | Trials 20 Score 11/20 <>=0.55 | | | | |
| J.G.T. | | | | | | Trials 40 Score 6/10, 5/10, 8/10 <>=0.6 | Trials 40 Score 6/10, 5/10 <>=0.5 |
| E.B. | | | | | | Trials 40 Score 2/10, 3/10, 5/10, 3/10 <>=0.325 | Trials 40 Score 5/10, 3/10, 4/10, 3/10 <>=0.466 |
| B.L.† | | | | Trials 40 Score 7/10, 4/10, 3/10, 4/10 <>=0.45 | Trials 40 Score 4/10, 5/10, 7/10, 3/10 <>=0.475 | Trials 60 Score 5/10, 4/10, 3/10, 4/10 <>=0.466 | Trials 40 Score 6/10, 5/10, 6/10, 4/10, 6/10 <>=0.5 |
| B.L.‡ | | Trials 20 Score 13/20 <>=0.65 | | | | Trials 40 Score 4/10, 7/10, 5/10, 1/10 <>=0.575 | Trials 40 Score 5/10, 1/10 <>=0.4 |

III DOWSING

III.1 Introduction

Dowsing, water-divining, radiesthesia, rhabdomancy (Germany) or "water-witching" (U.S.A.) are some of the many names that have been given to this phenomenon. The most common effect associated with dowsing was the claim to find underground water by unusual means. The tool used by dowsers is a very simple one: a pendulum (made of a wide variety of materials), a forked twig or a pair of forked rods (usually made of copper or steel). The method is the following: the dowser will walk along a field, at a fairly slow pace, holding either tool until he gets a "dowsing reaction," which will indicate to him the presence of an underground stream. In the case of the pendulum the "dowsing reaction" shows as a clockwise (counter-clockwise for some) motion of the pendulum, as opposed to the pendulum swinging back and forth when the subject does not encounter underground water. If he used a forked twig, which has a Y shape, it would show as a sudden flick of the twig, either upwards or downwards, as opposed to the twig being parallel to the ground while held under tension by the dowser's hands if the dowser does not find the underground stream. If the dowser were to use a pair of forked rods, which he would normally hold one in each hand parallel to each other, the "dowsing reaction" would be the crossing of both rods, which would again indicate to him that he has found the desired spot. Apart from the water-finding, dowsers claim to be able to locate electricity or gas leaks in pipes, and to be able to find a great variety of metals underground (gold, silver, copper, iron etc.).

Some dowsers would indicate at which depth the water is located, how many gallons an hour does the water-source provide, what is the width of the underground stream and whether the water is drinkable or not. Also, dowsers tell of their ability to find ancient historical monuments, underground or ancient archeological sites which they can allegedly date. Another claim of dowsers is to be able to locate missing objects or persons in a very similar way to people who can achieve "distant viewing" (see Section IV). Many dowsers claim to be also healers and diagnose an illness by dowsing methods. By far the most remarkable feat that dowsers claim to be able to achieve is "map-dowsing," which is for instance locating underground water by dowsing on a map of the area or the particular land where water is needed. Some dowsers even use the map-dowsing technique for all the other purposes mentioned above, and have claimed fabulous results on this.

Tests have been carried out on dowsers by a number of investigators in Europe, the U.S.A. and the Eastern European countries including the U.S.S.R. The great majority of them have lacked scientific rigour or else

have shown great bias from the investigators, i.e. a prejudice in them being firm believers or extreme sceptics towards the phenomenon. Therefore it was thought appropriate to investigate this phenomenon with the use of the e.m. detectors that were available.

We investigated dowsers, Bill Lewis (from Wales) and Robert Leftwich (Sussex), both for the possibility of e.m. emission while dowsing and for their sensitivity to e.m. radiation as described in Section II. Although it was not always possible to check whether the dowser had succeeded in finding underground water or not, this was not our main concern as we were trying to establish whether the dowsing technique involved the emission of e.m. radiation from the subject's body or else the subject sensing an e.m. field of a certain strength or power level at a given frequency.

The subjects were asked to find underground water so that we could measure any change of their level of e.m. emission from their bodies when the "dowsing reaction" appeared, as opposed to their normal level of emission while not dowsing. Before the beginning of each session, background levels were read on each e.m. detector to account for incoming external signals.

We concluded that no e.m. signals were involved, either on the DD or MD situations, from 1MHz to 22.4GHz. Frequencies lower than 1MHz, i.e. wavelengths greater than 300m, would not be relevant. Such radiation would have little focussing power, i.e. poor resolution, and the poor focussing would mean that the retrieval of information (in a radar-like type of mechanism) to the subject would be very poor.

III.2 Tests on sensitivity to e.m. fields

(i) *Static H fields* Z. Harvalik, in the U.S.A., has investigated dowsing for a number of years and has claimed that dowsers can be sensitive to very low magnetic fields (of the order of 10^{-5} Gauss, i.e. $1/10^5$ of the Earth's magnetic field). This part of the research was conducted at different sites near Abergavenny, South Wales, where there exist ancient standing stones. These stones (and circles of stones) have been a great mystery, and various conjectures have been put forward as to their origin and use. Most of these conjectures have proved to have little or no scientific evidence associated with them, so it was felt that the investigation could have a two-fold purpose: to establish the sensitivity of dowsers to magnetic fields and to try to clarify the archeological significance and purpose of standing stones.

Bill Lewis claimed the existence of what is called "bands of energy" (usually seven of them) along the surface of the stones, and the existence of a spiralling force going from bottom to top of the stones and which could be accordingly a left-hand or right-hand helix. The tests involved Bill Lewis

marking these "bands of energy" on the stones, and our measuring the static magnetic field from top to bottom with a sensitive magnetometer H_1 in order to correlate the readings with Lewis's marks on the stones. An all-wooden frame was built by HTV workshop (in association with Francis Hitching) for this purpose.

The device had a moveable "lift" on which the magnetometer was placed with its output transferred onto a strip chart recorder (frequency response ≤ 10 Hz). The times of ascent and descent of the lift were controlled with a stop-watch (to 1/5 sec) so as to correlate the measurements with the positions where the field had been measured along the stone. The measurements were done by placing the magnetometer probe perpendicular to the surface of the stone in the different NW-SE, SE-NW, SW-NE, NE-SW directions, after having located the true north with a compass.

The results show an indication that seems to validate Lewis's predictions as far as the "energy bands" is concerned, but we feel that an even more sensitive magnetometer would be needed (sensitive to 10^{-6} Gauss, i.e. ten times more sensitive than that used) to make a definite statement. Although there was no clear indication of a spiralling force along either of the stones we again feel that this should be attempted with a more sensitive apparatus.

(ii) *Sensitivity to high-frequency e.m. fields* Tests on human sensitivity to high frequency e.m. fields of low power-level were conducted with both B.L. and R.L., along the lines described in Section II, for both subjects either dowsing the switching on or off of the field, or directly sensing it with no dowsing involved. Control readings were done with E.B. and J.G.T. as subjects. Scores were also counted separately for the subject having sensed either the switching of the source from on to off or off to on, as due to the random procedure used, there were runs where several "on" or "off" followed one after the other one. These were not significantly different. As the table shows, the average scores are within chance level, showing no sensitivity of subjects to these e.m. fields.

IV. TELEPATHY—DISTANCE VIEWING

Telepathy

Telepathy can be defined as the ability of a subject to perceive another subject's thoughts. It involves the transmission of information between the subjects (a sender and a receiver) in a non-verbal fashion in the way of a

direct perception. The other form is thought-reading, this being achieved by the receiver only. Telepathy has been, historically, one of the most investigated ESP phenomena, both in the Western world and in the Eastern European countries. It seemed appropriate for us to investigate, with the e.m. detectors available, whether an increased e.m. emission from the subject would occur during alleged telepathic transmission.

We investigated one subject, A.L. (also a metal-bending subject) who claimed telepathic abilities. Many informal tests, i.e. with no e.m. detection equipment present, were carried out with a number of subjects who claimed similar abilities, but none of them proved conclusive enough in order to support the claims.

The protocol for the telepathy tests was as follows: one subject (the sender) C.L., A.L.'s mother, was in the same room as both J.G.T. and E.B.; one of us would open at random a randomly chosen book and point at a word (sometimes this involved repeating this procedure until a word which could be represented by a drawing was found). Then, the word was shown to the sender, who was asked to draw a picture representing the chosen word. The other subject (the receiver) has been asked, from the very beginning, to stay in a different room so as to avoid any cueing (visual or auditory either conscious or unconscious). Only then, the receiver was told that the drawing had been completed, and that the sender was going to concentrate on sending her the drawing for a period of five minutes.

During those five minutes, e.m. detection measurements were carried out with detector P_2 , in order to establish whether an enhanced e.m. signal was at all present during the transmission.

Six attempts altogether were made, four with C.L. as sender and A.L. as receiver, and two reversing the roles. When compared to the background signals that had been observed on calibration of detector P_2 , no signals were found in any of the six attempts that could be different from those observed during calibration. Also, only two sets of drawings seemed to show some similarity when the matching was done, one with A.L. as sender and C.L. as receiver, and the other one with the roles reversed.

Distant-viewing

This phenomenon (sometimes called "out-of-body experience" in early literature) involves the subject describing accurately a remotely-located site without him being physically present at the site. Experiments carried out by H. Puthoff and R. Targ at SRI with various subjects, and most remarkably with I. Swann and P. Price, claimed that extraordinary success had been achieved. A test was set up by us to attempt to duplicate this with the subject Matthew Manning, the English psychic, in his house near Cambridge.

One of us (E.B.) went out of the house. Standing outside the house, the tossing of a coin indicated to him whether he was to go left or right. This procedure was repeated at each cross-road, so as to randomize the path followed by E.B. Exactly 15 minutes after leaving the house, E.B. was to stop wherever he was and concentrate for five minutes to transmit the details of the site to M.M., who had remained in the house with J.G.T. At that time, M.M. had to concentrate, also for five minutes, in order to attempt to receive the message sent by E.B. and draw a picture of the site at which E.B. was standing. During these five minutes J.G.T. was to attempt the detection of any e.m. emission from M.M.'s body.

Three tests were carried out in this way. The e.m. detectors used were E_1 , E_2 , E_3 , P_1 , P_4 and T_1 . No e.m. signals (other than background noise) were observed during these tests.

V GENERAL CONCLUSIONS

We have investigated several ESP phenomena, during the course of which we attempted to detect any unusual e.m. radiation from subjects achieving or attempting to achieve effects. We conclude that no e.m. signals were seen (higher than black-body radiation levels) throughout nearly the whole spectrum. We also investigated human sensitivity to low-levels of e.m. radiation over a restricted range of frequencies. We found no indication as to humans being sensitive to those e.m. fields. The subjects were not always successful in achieving paranormal effects. However, if they were to be successful at some time we would have expected some enhancement of the natural human e.m. levels during their attempts. Such increased levels were never observed, lending strong support to the conclusion that e.m. is not the cause of the range of paranormal phenomena being investigated. This result can be strengthened in the case of telepathy and distant-viewing where we found that people were not sensitive to e.m. radiation impinging on them from outside at levels 10^9 higher than that normally emitted from the human body. There are, however, other sensitives, such as Kulagina, in other countries, who should be investigated along the above lines before a final conclusion can be reached.

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Section 4

Theories of the Paranormal