GENDER DIFFERENCES IN A MAGNETIC FIELD

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ABSTRACT

A Tibetan meditation system of 1882 suggested a way in which self awareness in student monks could be facilitated by using a bar magnet suspended NORTH UP over the crown of the head. This suggestion led to the design, in the present study, of a double-blind test of magnetostatic perception in meditators using a bar magnet oriented either NORTH UP, SOUTH UP, or ABSENT. Effects were evaluated with a questionnaire having five experiential categories, physical, emotional, mental, extrapersonal (parapsychologic), and transpersonal.

Two weak magnetostatic fields with strengths of 14 gauss (1.4 milliTeslas) and 140 gauss (14 milliTeslas), measured at the crown of the head, were used. Analysis of experiential data collected in three experiments revealed significant and consistent differential patterns of gender-related responses. Experiential subcategories which showed gender by magnetic field interactions included:

Experiment 1: (1) Physical Energized, 92) Physical Sensory Perturbations;
Experiment 2: (1) Physical Energized, (2) Emotional Energized;
Experiment 3: Using a different protocol and analysis procedure, similar results were found. Major contributors to the interaction were: (1) Physical Energized, (2) Physical Body Perturbation, and (3) Physical Passive.

The consistency of gender-related differential response patterns in these three investigations raises a question of gender based differential responses to "electromagnetic environmental pollution."

INTRODUCTION

In recent years interest has developed in the effects of electromagnetic fields on humans. The main focus has been on medical rather than psychological consequences, for as physicians accumulated health data a number of deleterious effects of what has been called "*electromagnetic* environmental pollution" surfaced.[1-4] Rather than a medical study, however, the present research focussed on states of consciousness associated with weak magnetostatic fields.

The present investigation was stimulated by a letter written by an Indian guru in 1882, proposing to A. P. Sinnett, editor of *The Pioneer*, the best-known English-language newspaper of India at the time, that an overhead magnet during meditation would enhance psychological effects. Specifically:

> The methods used for developing lucidity in our chelas [student monks in Tibet] may be easily used by you. Every temple has a dark room, the north wall of which is entirely covered with a sheet of mixed metal, chiefly copper, very highly polished, with a surface capable of reflecting in it things, as well as a mirror. The chela sits on an insulated stool, a three-legged bench placed in a flat-bottomed vessel of thick glass. . . A magnet with the North Pole up is suspended over the crown of the chela's head without touching it . . . [the chela is left] alone gazing on the wall. . .[5]

The above idea of using a NORTH UP magnetic field during meditation led to the design of double-blind research, the so-called Copper Wall Project, in which both men and women meditated beneath a magnet oriented either NORTH UP, SOUTH UP, or ABSENT, in which case the bar magnet was replaced by a lead foil weight.[6]

A search through several hundred journal articles, abstracts, and titles on meditation, biomagnetic and bioelectrical phenomena, biology and psychophysiology, found no previous study relating to the above magnetostatic and electrostatic procedure, though *indirectly*-related research has focussed, for example, on (1) the effects of geomagnetic fluctuations and mechanically-pulsed magnetic fields on animals and humans;[7,8] and (2) the effects on operant behavior in rats of a low-frequency (60 Hertz) magnetic field coupled with a weak magnetostatic field (0.26 gauss, 26 microTeslas).[9]

A more-*directly*-related report concerns the effects of weak magnetostatic fields (10-20 gauss, 1-2 milliTeslas) on humans. Michael Fuller and his colleagues found, in three epileptic patients with *brain-implanted* electrodes (prior to surgery), that epileptiform brain patterns were produced by a magnetostatic field.[10]

Concerning the suggestion quoted above for meditating under a magnet, a few questions that have been raised are:

1. Is the body isolated from ground in order to conserve an electrostatic charge that builds up during meditation?

2. If so, can a technology be developed (instrumentation, procedures, data handling, etc.) for detecting body-potential phenomena in and around the bodies of experimental subjects?

3. What does the NORTH UP magnet do?

4. What would happen with the magnet oriented SOUTH UP?

5. With the magnet ABSENT would meditation experience be different from both NORTH UP and SOUTH UP?

6. Would a range of magnet strengths have a corresponding range of experiential effects?

7. What do students see when gazing at their reflection in the wall?

8. Under the prescribed conditions, what are the characteristics of meditative "lucidity" in Westerners?

The present report focuses only on Questions 3-6 above. Questions 1 and 2 were considered previously in a report titled "Anomalous Electrostatic Phenomena in Exceptional Subjects." The bodies of nationally-known "healers," isolated from ground during "healing" sessions with patients, showed, on occasion, unexplained body-potential surges reaching over 200 volts.[11] A third report on Questions 7-8, concerning what students see, and concerning the nature of "lucidity" in Westerners, awaits *content analysis* of experiential questionnaires and verbal reports.

Background and Hypotheses

In an effort to answer Questions 3-6, listed above, three experiments were designed and conducted to test with an Experiential Questionnaire (EQ), 7 hypotheses as follows:

Experiment 1. It was hypothesized:

1. That a magnetostatic field of 14 gauss at the crown of the head would produce effects in humans that could be detected with an EQ.

2. That different experiences would be associated with each of three magnetic conditions, NORTH UP, SOUTH UP, and ABSENT.

3. That experiential effects would be the same for both sexes.

In 1983-1985 a study with 19 subjects, supported primarily by the Menninger Clinic and in part by The Fetzer Institute of Kalamazoo, Michigan, was conducted in our Psychophysical Lab with a single copper wall[12] to test the above hypotheses. *See Experiment 1 center page heading below.*

Experiment 2. The Copper Wall Lab was redesigned and rebuilt into a four-wall system in 1986-1987,[13] and in 1988-1989 ten of the original subjects participated in 15 additional double-blind copper-wall meditation sessions identical with those of Experiment 1 except that the overhead magnet produced a field of 140 gauss at the crown of the head rather than the previous 14 gauss. It was hypothesized in Experiment 2:

4. That a 140 gauss magnet would produce significant experiential effects.

5. That the experiential effects of the 140 gauss magnet would be stronger than the experiential effects of the 14 gauss magnet.

This research and its results are detailed below under EXPERIMENT 2 *(center page heading below).*

Experiment 3. At the conclusion of Experiment 2, 14 special subjects, sometimes called "sensitives" in parapsychological literature, participated individually for a week of research trials. A section of the work with these subjects consisted of 5 blind copper-wall meditation sessions in which 5 different magnetic conditions (140 gauss NORTH UP, 14 gauss NORTH UP, MAGNET ABSENT, 14 gauss SOUTH UP, and 140 gauss SOUTH UP) were quasi-randomly distributed so as to give each session a unique magnetic condition, the experiential correlate of which was to be sensed. Subjects answered the EQ after each session and, also, were *interviewed* and recorded for a verbatum description of experiences. In Experiment 3, in addition to the previous 5 hypotheses, it was hypothesized:

6. That "sensitives" would be affected in 5 different ways by the 5 different magnetic conditions.

7. That experiential affects would be the same for both sexes.

Implicit in the above hypotheses is the basic theoretical concept that because of a unique sensitivity to subtle cues, "sensitives" would be differentially affected

by the 5 different magnetic conditions *in spite of the fact that they had only one experience with each condition,* rather than the 5 sessions of each condition experienced by "regular" subjects.

This experiment and its results are detailed below under EXPERIMENT 3 *(center page heading below).*

EXPERIMENT 1
MULTIVARIATE ANALYSIS OF EXPERIENTIAL QUESTIONNAIRE: NINETEEN MEDITATORS, 14 GAUSS MAGNET

Nineteen subjects (10 women, 9 men) meditated once a week for 45 minutes in the copper wall environment, for a total of 30 sessions. At the end of each session the EQ was answered. With the subject's knowledge, the first 15 sessions of Experiment 1 were conducted with the magnet NORTH UP. The next 15 sessions were conducted double-blind in regard to three randomized magnetic conditions, NORTH UP, SOUTH UP, or ABSENT. Questionnaire data only from these 15 double-blind sessions are reported herein. Additional analyses, however, were made of EQ's obtained in the first 15 NORTH UP sessions.[14]

RESEARCH ROOM AND COPPER WALL

Full details of construction of the copper wall room are available,[12] but the main features are as follows. The room, located in the basement of the Gardner Murphy Research Building, is entirely below ground. It measures 9' (north-south) by 19' (east-west). Another room, across a hallway to the north, is used as the control room. In it are located most of the electronic instrumentation and data handling equipment, polygraphs, computers, video and audio communication and recording devices, etc.

Interior walls of the copper wall lab are constructed of clay tile cores, expanded metal lath, concrete and plaster. Grounded conduit carries AC and DC power, and metal ductwork serves heating, air conditioning, and humidity control. The lab has its own temperature and humidity control systems, separate from the rest of the building.

Material used in the fabrication of the copper wall's supporting structure was non-ferrous, aluminum, brass, copper, nylon, wood, etc. Smooth roofing copper 0.024" thick was chosen as the "copper" material, and our local supplier cut three 7' x 3' panels. These sheets were mounted on three side-by-side plywood frames, and when the sheets were bonded together the result was a single 7' x 9' copper surface. Looking at the center of the wall from the subject's position gave peripheral left and right visual angles of about 42 degrees. To obtain a reflecting surface, the copper wall was hand rubbed with a polishing product called Never-Dull. The final luster was not especially brilliant but the copper had a clear mirror-like quality.

Subject's Chair and Platform

Figure 3.7 shows the layout of the single-wall research room with glass blocks supporting the wall and subject's chair. To provide electrical isolation of the chair, a base platform was constructed of plywood with glass construction blocks adhesively bonded below each corner.

Magnet and Magnet Support

In Experiment 1, the magnet was made from four Beckman polygraph pen-motor magnets stacked in a pine and masonite case.[12] Outside dimensions of the magnetic stack were 8.75" x 2.62" x 0.62". In a pine and masonite case, dimensions were 9.63" x 3.38" x 1.38". During use, the magnet case was positioned 2" from the scalp, where the field density measured 14 gauss ($\pm$0.28 gauss, ambient earth field), approximately 2 gauss at ear level.

To insure double-blind conditions during sessions with the magnet ABSENT, a similar case having the same dimensions was packed with lead foil, producing the same weight and weight distribution. A piece of colored tape was stuck to the magnet to indicate its north pole. This enabled a researcher to orient the magnet during double-blind trials (NORTH UP, SOUTH UP, or ABSENT), that were conducted by a second researcher blind to the content of the case.

In use, the magnet or its lead-foil similacrum was suspended overhead in an opaque holster-like container made from hard cardboard and packaging tape. The magnet container was hung from an adjustable wooden structure that made

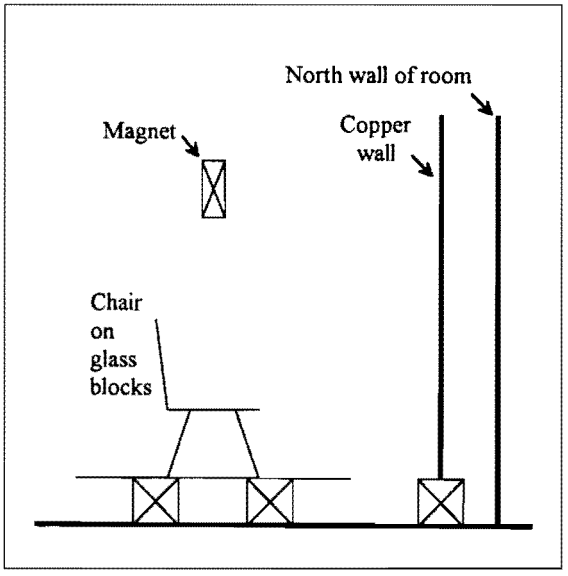

Figure 3.7. Schematic arrangement of the copper wall milieu in Experiment 1. The overhead magnet produced a nominal 14 gauss at the crown of the subject's head and about 2 gauss at ear level.

it possible to move the magnet vertically to accommodate height differences in subjects. The magnet holder was suspended from the ceiling 59" from the wall, and the subject's chair was slid forward or backward to accommodate posture after a comfortable meditation position was found.

Subjects

Subjects, selected from volunteers, were mostly Menninger psychologists and physicians and their spouses, each of whom had previously meditated for a minimum of two years. Ages ranged from 35 to 65 years.

Experiential Questionnaire

The EQ was adapted from an imagery classification system originally proposed by Wallach and Kogan.[15] They were interested in creativity and hypnagogic imagery, but we wished also to include an opportunity for subjects to report on Extrapersonal (psychic) and Transpersonal (spiritual) experience. This need first became apparent to us in 1973 when we attempted with Q-Sort methodology to classify 2200 verbal reports from college students in a research project called "Alpha-Theta Brain Wave Feedback, Reverie, and Imagery." As a result of 40 hours of alpha-theta feedback training (learning to increase the percentage of theta), some students had extrasensory experiences, and some had experiences that they described as "spiritual,"[16] and for that research it was useful to expand the Wallach and Kogan system.

In the present project, however, the task of evaluation of experience was shifted from the researcher to the *experiencer*. Not only did this eliminate a questionable "intervening variable" (the researcher), but it was expeditious, for analysis of experience was completed at the end of each session.

The subject rated 411 EQ items at the end of each session on a 5-point scale ranging from 0, "Not at all" to 4, "Very Much." (see Figures 3.8-3.12 below). This usually took from 15 to 30 minutes. Though they understood that they were scoring 5 categories of experience, subjects were *unaware* of the fact that statistical analysis would be based only on responses to 13 *experiential subcategories* comprised of 180 embedded items.[17]

The 180 analytic items were distributed as shown below.

Physical Events (P)

(1) Passive	5 items
(2) Energized	5 items
(3) Body Perturbations	6 items
(4) Sensory Perturbations	11 items

Emotional Events (E)

(5) Passive	4 items
(6) Energized	7 items
(7) Positive	22 items
(8) Negative	15 items

Mental Events (M)

(9) "Right Cortex"	16 items
(10) "Left Cortex"	7 items
(11) Images & Actions	52 items

Extrapersonal Events (X)

(12)	10 items

Transpersonal Events (T)

(13)	20 items

The titles of Subcategories (9) and (10) are metaphoric shorthand for differentiating between gestaltish, poetic, intuitive, contextual experience

I. PHYSICAL EVENTS

General Characteristics

1.	sleepy	4	3	2	1	0
2.	tired	4	3	2	1	0
3.	full of energy	4	3	2	1	0
4.	vigilant	4	3	2	1	0
5.	alert	4	3	2	1	0
6.	tense	4	3	2	1	0
7.	relaxed	4	3	2	1	0
8.	heaviness	4	3	2	1	0
9.	lightness	4	3	2	1	0
10.	uniqueness-total	4	3	2	1	0
11.	uniqueness-element	4	3	2	1	0
12.	vivid	4	3	2	1	0
13.	hypnagogic	4	3	2	1	0
14.	archetypal	4	3	2	1	0
15.	detailed	4	3	2	1	0
16.	ambiguous	4	3	2	1	0
17.	dimensions	4	3	2	1	0
18.	Other_____	4	3	2	1	0
19.	Other_____	4	3	2	1	0

Content

20.	warmth	4	3	2	1	0
21.	cold	4	3	2	1	0
22.	largeness	4	3	2	1	0
23.	smallness	4	3	2	1	0
24.	expanding	4	3	2	1	0
25.	shrinking	4	3	2	1	0
26.	elongation	4	3	2	1	0
27.	tingling	4	3	2	1	0
28.	buzzing	4	3	2	1	0
29.	vibrating	4	3	2	1	0
30.	itching	4	3	2	1	0
31.	twitching	4	3	2	1	0
32.	tumbling	4	3	2	1	0
33.	tipping	4	3	2	1	0
34.	whirling	4	3	2	1	0
35.	rocking	4	3	2	1	0
36.	floating	4	3	2	1	0
37.	sexual	4	3	2	1	0
38.	lust	4	3	2	1	0
39.	dizziness	4	3	2	1	0
40.	Other_____	4	3	2	1	0
41.	Other_____	4	3	2	1	0
42.	whole body	4	3	2	1	0
43.	top of head	4	3	2	1	0
44.	forehead	4	3	2	1	0
45.	eyes	4	3	2	1	0
46.	ears	4	3	2	1	0
47.	neck	4	3	2	1	0
48.	throat	4	3	2	1	0
49.	shoulders	4	3	2	1	0
50.	arms	4	3	2	1	0
51.	hands	4	3	2	1	0
52.	chest	4	3	2	1	0
53.	heart	4	3	2	1	0
54.	solar plexis	4	3	2	1	0
55.	abdomen	4	3	2	1	0
56.	pelvis	4	3	2	1	0
57.	back	4	3	2	1	0
58.	spine	4	3	2	1	0
59.	legs	4	3	2	1	0
60.	feet	4	3	2	1	0
61.	Other_____	4	3	2	1	0

Figure 3.8. Physical Items of the Experiential Questionnaire

II. EMOTIONAL EVENTS

General Characteristics

1.	tired	4	3	2	1	0
2.	full of energy	4	3	2	1	0
3.	excited	4	3	2	1	0
4.	elated	4	3	2	1	0
5.	active	4	3	2	1	0
6.	passive	4	3	2	1	0
7.	receptive	4	3	2	1	0
8.	tense	4	3	2	1	0
9.	peaceful	4	3	2	1	0
10.	uniqueness-total	4	3	2	1	0
11.	uniqueness-element	4	3	2	1	0
12.	hypnagogic	4	3	2	1	0
13.	archetypal	4	3	2	1	0
14.	happy	4	3	2	1	0
15.	sad	4	3	2	1	0
16.	joy	4	3	2	1	0
17.	enthusiasm	4	3	2	1	0
18.	boredom	4	3	2	1	0
19.	primary process	4	3	2	1	0
20.	expansion	4	3	2	1	0
21.	contraction	4	3	2	1	0
22.	time analysis	4	3	2	1	0
23.	detailed	4	3	2	1	0
24.	ambiguous	4	3	2	1	0
25.	meaningful	4	3	2	1	0
26.	nonsensical	4	3	2	1	0
27.	abstract	4	3	2	1	0
28.	concrete	4	3	2	1	0
29.	Other_____	4	3	2	1	0
30.	Other_____	4	3	2	1	0

Content

31.	love of others	4	3	2	1	0
32.	hate of others	4	3	2	1	0
33.	caring for others	4	3	2	1	0
34.	caring for self	4	3	2	1	0
35.	forgiveness of others	4	3	2	1	0
36.	forgiveness of self	4	3	2	1	0
37.	affection	4	3	2	1	0
38.	generosity	4	3	2	1	0
39.	greed	4	3	2	1	0
40.	envy	4	3	2	1	0
41.	jealousy	4	3	2	1	0
42.	kindness	4	3	2	1	0
43.	irritation	4	3	2	1	0
44.	anger	4	3	2	1	0
45.	distress	4	3	2	1	0
46.	tolerance	4	3	2	1	0
47.	sexual	4	3	2	1	0
48.	curiosity	4	3	2	1	0
49.	disgust	4	3	2	1	0
50.	fear	4	3	2	1	0
51.	defensiveness	4	3	2	1	0
52.	openness	4	3	2	1	0
53.	eagerness	4	3	2	1	0
54.	protection of others	4	3	2	1	0
55.	motherly	4	3	2	1	0
56.	fatherly	4	3	2	1	0
57.	brotherly	4	3	2	1	0
58.	sisterly	4	3	2	1	0
59.	loyalty	4	3	2	1	0
60.	intrigue	4	3	2	1	0
61.	pleasure	4	3	2	1	0
62.	pain	4	3	2	1	0
63.	sadism	4	3	2	1	0
64.	sympathy	4	3	2	1	0
65.	empathy	4	3	2	1	0
66.	masochism	4	3	2	1	0
67.	lust	4	3	2	1	0
68.	rescue of others	4	3	2	1	0
69.	Other_____	4	3	2	1	0
70.	Other_____	4	3	2	1	0

Figure 3.9. Emotional Items of the Experiential Questionnaire.

III. MENTAL EVENTS

General Characteristics

1.	tired	4	3	2	1	0	10.	vivid	4	3	2	1	0	23.	limited	4	3	2	1	0
2.	energized	4	3	2	1	0	11.	hypnagogic	4	3	2	1	0	24.	rational	4	3	2	1	0
3.	active	4	3	2	1	0	12.	daydream	4	3	2	1	0	25.	arational	4	3	2	1	0
4.	passive	4	3	2	1	0	13.	archetypal	4	3	2	1	0	26.	irrational	4	3	2	1	0
5.	receptive	4	3	2	1	0	14.	time emphasis	4	3	2	1	0	27.	abstract	4	3	2	1	0
6.	uniqueness-total	4	3	2	1	0	15.	detailed	4	3	2	1	0	28.	concrete	4	3	2	1	0
7.	uniqueness-element	4	3	2	1	0	16.	ambiguous	4	3	2	1	0	29.	metaphor or analogy	4	3	2	1	0
8.	primary process	4	3	2	1	0	17.	about self	4	3	2	1	0	30.	symbolic	4	3	2	1	0
9.	secondary process	4	3	2	1	0	18.	about other	4	3	2	1	0	31.	Other_____	4	3	2	1	0
							19.	meaningful	4	3	2	1	0	32.	Other_____	4	3	2	1	0
							20.	nonsensical	4	3	2	1	0							
							21.	gestalt-like	4	3	2	1	0							
							22.	graceful	4	3	2	1	0							

Content

33.	water	4	3	2	1	0	63.	lions	4	3	2	1	0	93.	machine	4	3	2	1	0
34.	fire	4	3	2	1	0	64.	tigers	4	3	2	1	0	94.	health	4	3	2	1	0
35.	winds	4	3	2	1	0	65.	wolves	4	3	2	1	0	95.	insight	4	3	2	1	0
36.	earth	4	3	2	1	0	66.	birds	4	3	2	1	0	96.	relative	4	3	2	1	0
37.	clouds	4	3	2	1	0	67.	fish	4	3	2	1	0	97.	Other_____	4	3	2	1	0
38.	storm	4	3	2	1	0	68.	color	4	3	2	1	0	98.	Other_____	4	3	2	1	0
39.	rain	4	3	2	1	0	69.	Other_____	4	3	2	1	0	99.	black & white	4	3	2	1	0
40.	scenery	4	3	2	1	0	70.	Other_____	4	3	2	1	0	100.	USA	4	3	2	1	0
41.	cave	4	3	2	1	0	71.	Other_____	4	3	2	1	0	101.	other country	4	3	2	1	0
42.	lake	4	3	2	1	0	72.	past	4	3	2	1	0	102.	church	4	3	2	1	0
43.	ocean	4	3	2	1	0	73.	present	4	3	2	1	0	103.	building	4	3	2	1	0
44.	island	4	3	2	1	0	74.	future	4	3	2	1	0	104.	elevator	4	3	2	1	0
45.	sunrise	4	3	2	1	0	75.	sexual	4	3	2	1	0	105.	self	4	3	2	1	0
46.	sunset	4	3	2	1	0	76.	city	4	3	2	1	0	106.	climbing	4	3	2	1	0
47.	sun	4	3	2	1	0	77.	farms	4	3	2	1	0	107.	swimming	4	3	2	1	0
48.	moon	4	3	2	1	0	78.	books	4	3	2	1	0	108.	flying	4	3	2	1	0
49.	stars	4	3	2	1	0	79.	man	4	3	2	1	0	109.	sleeping	4	3	2	1	0
50.	meteor	4	3	2	1	0	80.	woman	4	3	2	1	0	110.	falling	4	3	2	1	0
51.	lightning	4	3	2	1	0	81.	child	4	3	2	1	0	111.	chasing	4	3	2	1	0
52.	trees	4	3	2	1	0	82.	door	4	3	2	1	0	112.	escaping	4	3	2	1	0
53.	fruit	4	3	2	1	0	83.	home	4	3	2	1	0	113.	airplane	4	3	2	1	0
54.	vegetables	4	3	2	1	0	84.	stairs	4	3	2	1	0	114.	railroad	4	3	2	1	0
55.	Other_____	4	3	2	1	0	85.	window	4	3	2	1	0	115.	automobile	4	3	2	1	0
56.	Other_____	4	3	2	1	0	86.	attic	4	3	2	1	0	116.	teaching	4	3	2	1	0
57.	dog	4	3	2	1	0	87.	cellar	4	3	2	1	0	117.	learning	4	3	2	1	0
58.	cats	4	3	2	1	0	88.	energy	4	3	2	1	0	118.	healing	4	3	2	1	0
59.	horses	4	3	2	1	0	89.	combat	4	3	2	1	0	119.	graduating	4	3	2	1	0
60.	elephants	4	3	2	1	0	90.	mirror	4	3	2	1	0	120.	science	4	3	2	1	0
61.	insects	4	3	2	1	0	91.	poetry	4	3	2	1	0	121.	Other_____	4	3	2	1	0
62.	snakes	4	3	2	1	0	92.	music	4	3	2	1	0							

Figure 3.10. Mental Items of the Experiential Questionnaire

IV. EXTRAPERSONAL EVENTS

General Characteristics

1. beyond normal limits of ego and personal unconscious, into cosmic (non divine) awareness 4 3 2 1 0
2. in world 4 3 2 1 0
3. out of world 4 3 2 1 0
4. planetary 4 3 2 1 0
5. beyond planetary 4 3 2 1 0
6. metaphysical 4 3 2 1 0
7. vivid 4 3 2 1 0
8. active 4 3 2 1 0
9. passive 4 3 2 1 0
10. receptive 4 3 2 1 0
11. form 4 3 2 1 0
12. formless 4 3 2 1 0
13. tired or weak 4 3 2 1 0
14. energized 4 3 2 1 0
15. hypnagogic 4 3 2 1 0
16. primary process 4 3 2 1 0
17. archetypal 4 3 2 1 0
18. detailed 4 3 2 1 0
29. ambiguous 4 3 2 1 0
20. meaningful 4 3 2 1 0
21. nonsensical 4 3 2 1 0
22. beauty 4 3 2 1 0
23. grace 4 3 2 1 0
24. abstract 4 3 2 1 0
25. concrete 4 3 2 1 0
26. metaphor or analogy 4 3 2 1 0
27. symbolic 4 3 2 1 0
28. permissive 4 3 2 1 0
29. authoritative 4 3 2 1 0
30. Other_____ 4 3 2 1 0
31. Other_____ 4 3 2 1 0

Content

32. in body 4 3 2 1 0
33. out of body 4 3 2 1 0
34. emotional 4 3 2 1 0
35. mental 4 3 2 1 0
36. psychic 4 3 2 1 0
37. extrasensory perception 4 3 2 1 0
38. cosmic beings 4 3 2 1 0
39. UFO's 4 3 2 1 0
40. advise 4 3 2 1 0
41. awe 4 3 2 1 0
42. wonder 4 3 2 1 0
43. cosmic insight 4 3 2 1 0
44. science 4 3 2 1 0
45. machines 4 3 2 1 0
46. nature 4 3 2 1 0
47. animals 4 3 2 1 0
48. sky 4 3 2 1 0
49. stars 4 3 2 1 0
50. planets 4 3 2 1 0
51. sun 4 3 2 1 0
52. moon 4 3 2 1 0
53. gems 4 3 2 1 0
54. gods 4 3 2 1 0
55. goddesses 4 3 2 1 0
56. angels 4 3 2 1 0
57. demons 4 3 2 1 0
58. energy 4 3 2 1 0
59. light 4 3 2 1 0
60. color 4 3 2 1 0
61. Other_____ 4 3 2 1 0
62. Other_____ 4 3 2 1 0
63. Other_____ 4 3 2 1 0
64. danger 4 3 2 1 0
65. threat 4 3 2 1 0
66. goodwill 4 3 2 1 0
67. hostility 4 3 2 1 0
68. war 4 3 2 1 0
69. benign 4 3 2 1 0
70. friendliness 4 3 2 1 0
71. Other_____ 4 3 2 1 0
72. Other_____ 4 3 2 1 0

Figure 3.11. *Extrapersonal Items of the Experimental Questionnaire*

V. TRANSPERSONAL EVENTS

General Characteristics

1.	beyond normal limits of ego and personal unconscious, into universal (divine) awareness	4	3	2	1	0	17.	uniqueness-total	4	3	2	1	0
2.	in world	4	3	2	1	0	18.	uniqueness-element	4	3	2	1	0
3.	out of world	4	3	2	1	0	19.	hypnagogic	4	3	2	1	0
4.	planetary	4	3	2	1	0	20.	primary process	4	3	2	1	0
5.	beyond planetary	4	3	2	1	0	21.	archetypal	4	3	2	1	0
6.	metaphysical	4	3	2	1	0	22.	detailed	4	3	2	1	0
7.	sacred	4	3	2	1	0	23.	ambiguous	4	3	2	1	0
8.	unlimited	4	3	2	1	0	24.	meaningful	4	3	2	1	0
9.	vivid	4	3	2	1	0	25.	beauty	4	3	2	1	0
10.	active	4	3	2	1	0	26.	grace	4	3	2	1	0
11.	passive	4	3	2	1	0	27.	abstract	4	3	2	1	0
12.	receptive	4	3	2	1	0	28.	concrete	4	3	2	1	0
13.	form	4	3	2	1	0	29.	metaphor or analogy	4	3	2	1	0
14.	formless	4	3	2	1	0	30.	symbolic	4	3	2	1	0
15.	tired or weak	4	3	2	1	0	31.	authoritative	4	3	2	1	0
							32.	permissive	4	3	2	1	0
							33.	Other_____	4	3	2	1	0
							34.	Other_____	4	3	2	1	0

Content

35.	in body	4	3	2	1	0	62.	demons	4	3	2	1	0
36.	out of body	4	3	2	1	0	63.	wise old man	4	3	2	1	0
37.	emotional	4	3	2	1	0	64.	wise old woman	4	3	2	1	0
38.	mental	4	3	2	1	0	65.	spiritual teacher	4	3	2	1	0
39.	mystical	4	3	2	1	0	66.	book of knowledge	4	3	2	1	0
40.	spiritual	4	3	2	1	0	67.	advice	4	3	2	1	0
41.	extrasensory perception	4	3	2	1	0	68.	church or temple	4	3	2	1	0
42.	divine being	4	3	2	1	0	69.	building	4	3	2	1	0
43.	divine self	4	3	2	1	0	70.	mountain	4	3	2	1	0
44.	awe	4	3	2	1	0	71.	light	4	3	2	1	0
45.	wonder	4	3	2	1	0	72.	sky	4	3	2	1	0
46.	spiritual insight	4	3	2	1	0	73.	planets	4	3	2	1	0
47.	all embracing love	4	3	2	1	0	74.	sun	4	3	2	1	0
48.	unity with all life	4	3	2	1	0	75.	moon	4	3	2	1	0
49.	awareness of group	4	3	2	1	0	76.	stars	4	3	2	1	0
50.	truth for all	4	3	2	1	0	77.	goodwill	4	3	2	1	0
51.	justice for all	4	3	2	1	0	78.	benign	4	3	2	1	0
52.	freedom for all	4	3	2	1	0	79.	color	4	3	2	1	0
53.	dignity for all	4	3	2	1	0	80.	Other_____	4	3	2	1	0
54.	compassion	4	3	2	1	0	81.	Other_____	4	3	2	1	0
55.	meaning of life	4	3	2	1	0	82.	Other_____	4	3	2	1	0
56.	animals	4	3	2	1	0	83.	energy	4	3	2	1	0
57.	gems	4	3	2	1	0	84.	prayer	4	3	2	1	0
58.	gods	4	3	2	1	0	85.	Allah		4	3	2	1
59.	goddesses	4	3	2	1	0	86.	Christ	4	3	2	1	0
60.	religion	4	3	2	1	0	87.	Buddha	4	3	2	1	0
61.	angels	4	3	2	1	0							

Figure 3.12. Transpersonal Items of the Experiential Questionnaire

(Subcategory 9) and logical, discursive, rational, deductive and inferential experience (Subcategory 10). Subcategory (12) included extrasensory (psychic awareness) experiences, while Subcategory (13) included experience of a transpersonal nature (spiritual oneness, higher self, divinity, etc.).

Numerical scores of experience were obtained in the manner shown in the following example. For Subcategory 10 above, the maximum possible score is 28 (4 x 7 items). The score used in analysis, however, was the mean. If the total score in Subcategory 10 for a particular subject was 19, the mean was 19/7 = 2.714, and that number alone characterized the subject's experience in Subcategory 10 for a given session. Consequently, each subject had 13 means that characterized his or her experience in a given session.

Experiential Training

Trained observers are considerably more useful in psychophysical research than naive responders.[18-19] Therefore: (a) Subjects first were asked to participate in a group question-and-answer session with Elmer Green to learn about and discuss the 411-item EQ, which was clearly divided on their answer sheets into the 5 main experiential categories noted above. (b) Subjects then meditated *at home* five times in one month (using whatever meditation system they preferred) and filled out a questionnaire at the end of each session. (c) They then attended a second group meeting (another question-and-answer session) to which they brought their home-generated EQs. (d) *At the end of each of the first three copper wall sessions,* which were part of the series of 30 weekly sessions, each subject discussed his or her experiences with EG while answering the questionnaire. After the third session, however, no further discussion was permitted with investigators, nor with other subjects, nor with spouses.

Magnet Orientations

The 30 copper wall sessions were conducted in two sequences of 15 sessions each. During the first sequence, the overhead magnet was always oriented NORTH UP, and *subjects were informed* that this was the situation. The second group of 15 sessions had the magnet oriented either NORTH UP, SOUTH UP, or ABSENT, in a typical quasi-random double-blind sequence. Subjects were also told of this situation.

In respect to magnet condition, the double-blind series was necessarily quasi-random for only those randomly-generated sequences could be used in which *each* of the 3 magnet orientations appeared *5 times.* Totally random sequences were ruled out for statistical reasons, for by chance alone it would be possible for a given subject to experience only one of the three magnet conditions.

Protocol

With few exceptions, sessions for a given subject were always scheduled for the same time of day on the same day of week. Scheduling made it necessary for some subjects to meditate in the morning, some in the afternoon, and some in the evening. (Up to the present, time-of-day effects have not been examined.)

On arrival at the lab, the subject was met by an experimenter who conducted him or her to the copper wall room, seated the subject in the chair and adjusted the overhead magnet case (blind to magnet orientation) to the level above the scalp, 2 inches, at which the field density would measure 14 gauss if the magnet were present. Then, after turning the lights down to the prescribed level (approximately 4 lux), the experimenter moved to the control room and started the meditation period with an intercom announcement. After 45 minutes, end-of-session was announced and the subject moved to a table in the copper-wall room at which the EQ was answered.

Multivariate Analysis

Multivariate profile analysis was conducted on subject's EQ responses after the 15 double-blind sessions were completed for all subjects. Each MANOVA looked first to see if there was an *interaction of magnet orientation with gender,* indicating a different result on that variable for men and women. The *main effect of magnet orientation* on the particular experiential category was then examined to determine this effect for both genders combined.

For analysis, the 15 lab sessions were divided into 3 sets, based on magnet condition:

Number Of Sessions	Magnet Orientation
5 of 15	NORTH UP (N)
5 of 15	SOUTH UP (S)
5 of 15	ABSENT (A)

Thirteen separate multivariate analyses of variance (MANOVAs) were computed for comparison of the three magnet conditions. Tables of results are included below, following descriptions of ANOVAs. The focus of the analysis and the associated null hypothesis were:

> Comparison of N, S, and A. This comparison was calculated using 2 contrasts (2df):
>
> 1. N minus A (N-A);
>
> 2. S minus A (S-A).
>
> **Null Hypothesis.** There will be no differences found in the comparison of the magnet ABSENT (A) condition compared to NORTH UP (N) and SOUTH UP (S) conditions.

Definition of Statistical Significance

It is widely accepted that in the use of multivariate analysis (MANOVA), there is a need to compensate for reduced degrees of freedom as compared to single variable analyses.[20-22] In 9 of 27 recent articles (1986-1991) examined from *Behavior Research and Therapy, Health Psychology, Journal of Consulting and Clinical Psychology,* and *Journal of Psychopathology and Behavioral Assessment* multivariate analysis was used. In these 9 articles it was found that $p < .10$ was used in the text and/or in a table. Authors usually describe such results as "somewhat weakened," but Wittrock *et al.*[23] said, ". . . several of the correlations did approach significance (p's < .10)."

In Experiment 1, therefore, multivariate statistical significance was thought of as follows:

1. Probability values less than .10 were considered to fall along a continuum of significance.

2. Probability values between .10 and .15 were considered of borderline significance. These values are included, however, as they suggest a *trend* in the data.

3. Probability values greater than .15 were considered non-significant and were omitted.

Scores

Analyses were performed as follows. Item scores for a subject (in a given session) were sorted into the 13 subcategories described above and averaged. Thus, each session resulted in 13 means, one for each subcategory. At the end of all 15 double-blind sessions, means were averaged across sessions to provide a *mean of means* for each Subcategory for each set of 5 sessions (N, S, A). These 195 (13 x 3 x 5) mean-of-mean scores for each subject were the only numbers used in subsequent analyses.

Discriminant Function Coefficients

When a significant result emerges from a multivariate analysis (MANOVA), the investigator often wants to know the *relative contribution* of each variable to the differences between the various groups or categories. Discriminant Function Coefficients (DFCs) are used to determine the extent of contribution of each variable to the overall significance of results. In the present study, Discriminant Function Coefficients (DFCs) were used to determine which of the statistical contrasts contributed to the overall significance of the comparison. By common convention, DFCs were interpreted in the following manner: (1) A contrast in an analysis was considered to contribute to the overall significance when the DFC was greater than .500 in absolute value, and (2) DFCs with values below .500 were omitted because the associated contrasts were not considered to have contributed substantially to the finding. Only those MANOVAs showing significant results are reported.

Results

In addition to the following *discursive* outline of results, for convenience and summary, F values, p values, degrees of freedom, and Discriminant Function

Coefficients, are listed below in Table I.

Subcategory Physical Passive (MANOVA). There was a borderline significant interaction of magnet orientation with gender for subjects' average responses to **Physical Passive** items for the MANOVA comparison of N to S to A ($F = 2.46$; $df = 2, 16$; $p < .117$). Contributing to this interaction, men on the average reported a less **Physically Passive** experience in NORTH UP than in ABSENT, while women on the average reported a more **Physically Passive** experience in NORTH UP than in ABSENT (DFC = .817).

Subcategory Physical Energized (MANOVA). There was a significant interaction of magnet orientation with gender for subjects' average responses to **Physical Energized** items for the MANOVA comparison of N to S to A ($F = 3.96$; $df = 2, 16$; $p < .040$). Contributing to this interaction men on the average reported being more energized in NORTH UP than ABSENT, while women on the average reported being less energized in NORTH UP compared to ABSENT (DFC = -1.588). Also contributing to this interaction, both women and men on the average reported being more energized in SOUTH UP compared to ABSENT (DFC = 1.261), but women were somewhat more so.

Subcategory Physical Sensory Perturbations (MANOVA). There was a significant interaction of magnet orientation with gender for subjects' average responses to **Physical Sensory Perturbation** items for the MANOVA comparison of N to S to A ($F = 2.92$; $df = 2, 16$; $p < .083$). Contributing to this interaction, women's mean scores *more* strongly endorsed **Physical Sensory Perturbation** items in SOUTH UP than ABSENT while men's mean scores *less* strongly endorsed **Physical Sensory Perturbation** items in SOUTH UP than ABSENT (DFC = .975).

Subcategory Emotional Passive (MANOVA). There was a borderline significant interaction of magnet orientation with gender for subjects' average responses to **Emotional Passive** items for the MANOVA comparison of N to S to A ($F = 2.42$; $df = 2, 16$; $p < .121$). Contributing to this interaction, men's mean scores *less* strongly endorsed **Emotional Passive** items in NORTH UP compared to ABSENT and women's mean scores *more* strongly endorsed **Emotional Passive** item means in NORTH UP compared to ABSENT (DFC = 1.148).

Post Hoc Analysis. Due to the fact that (1) some interesting and significant results emerged from the multivariate analyses described above and (2) one of the key comparisons of interest (N vs S) could not be performed in the

Table 1

Summary of Results in Experiment 1, 14 Gauss.

Multivariate Gender Interaction — Comparison of N to S to A

F Table	F	*df*	*p*	DFC N - A	DFC S - A
Physical Passive	2.46	2, 16	0.117	0.817	
Physical Energized	3.96	2, 16	0.040	-1.588	1.261
Physical Sensory Perturbation	2.92	2, 16	0.083		0.975
Emotional Passive	2.42	2, 16	0.121	1.148	

Tables of Means	Male		Female	
	N - A	S - A	N - A	S - A
Physical Passive	-0.129	-0.104	0.056	0.054
Physical Energized	0.102	0.049	-1.012	0.054
Physical Sensory Perturbation	-0.010	-0.029	0.008	0.049
Emotional Passive	-0.033	-0.025	0.075	0.013

Univariate Main Effect — Comparison of N to S

F Table	F	*df*	*p*
Physical Energized	7.75	1, 17	0.013
Emotional Passive	3.07	1, 17	0.098

Table of Means	Male	Female
	S - N	S - N
Physical Energized	-0.053	0.066
Emotional Passive	0.008	-0.063

analyses described above, a univariate post hoc Analysis of Variance (ANOVA) was performed to compare subjects' responses to the NORTH UP and SOUTH UP conditions. Because there is no loss of power as compared with MANOVAs above, statistical significance, for this univariate analysis, was handled as follows:

1. Probability values below .05 were considered significant.

2. Probability values between .05 and .100 were considered to be of borderline significance.

3. Probability values greater than .10 were considered non-significant, and omitted.

For each of the thirteen independent ANOVAs performed on this data, no significant main effects (data from men and women combined) were observed in the comparison of EQ responses to NORTH UP and SOUTH UP conditions. However, significant gender-related differences were found, as shown below.

Subcategory Physical Energized (ANOVA). There was a significant interaction of magnet orientation with gender for subjects' average responses to **Physical Energized** items with respect to the N to S comparison ($F = 7.75$; $df = 1, 17$; $p < .013$). This interaction was due to men's stronger mean endorsement of **Physical Energized** items in the NORTH UP condition than in the SOUTH UP condition and women's sttonger mean endorsement of **Physical Energized** items in the SOUTH UP condition than in the NORTH UP condition.

Subcategory Emotional Passive (ANOVA). There was a borderline significant interaction of magnet orientation with gender for subjects' average responses to **Emotional Passive** items for the comparison of N to S ($F = 3.07$; $df = 1, 17$; $p < .098$). This interaction was due to women's stronger mean endorsement of **Emotional Passive** items in the NORTH UP condition than in the SOUTH UP condition while men's responses were virtually identical in these two conditions.

EXPERIMENT 2

MULTIVARIATE ANALYSIS OF EXPERIENTIAL QUESTIONNAIRE: TEN COPPER WALL MEDITATORS, 140 GAUSS MAGNET

Ten subjects from Experiment 1 (5 women and 5 men) meditated once a week for 45 minutes in the redesigned 4-wall environment, for a total of 15 research sessions. Sessions were *double blind* in respect to the orientation overhead of a bar magnet, NORTH UP, SOUTH UP, or ABSENT. When present, the magnet produced a magnetostatic field of *140 gauss* at the crown of the head (rather than 14 gauss, as in Experiment 1) and approximately 20 gauss at ear level.

Subjects

Subjects were volunteers who had participated previously, but in the present work, the group was considerably reduced. Two of the original group of 19 had left Kansas in the two-year interim between Experiments 1 and 2, three who lived over 50 miles from Topeka were not asked to make the effort to participate in 18 additional weekly sessions, three of the locals were busy with other activities and couldn't participate, and since we wished to work with an equal number of men and women, the remaining group of 11 was reduced to 10.

Experiential Questionnaire

The EQ was computerized for Experiment 2. Paper and pencil procedures were eliminated. The Structure of the EQ was the same as outlined in Experiment 1, but in Experiment 2 some of the items were dropped. Originally, the EQ contained 411 items, but in 570 lab sessions of Experiment 1, some content items were used less than 10 times. Being of little importance to subjects, these items were deleted. Although the EQ set was reduced to 349 items, *the 180 items used for experiential analysis did not change.* They were distributed, as before, throughout the five major Experiential Categories. And, as in Experiment 1, the 5 major experiential categories were divided into 13 subcategories.

Experimental Procedure

In Experiment 2, each subject was wired for physiological measures (EKG, monopolar EEG from the left and right occiput relative to linked earlobes, galvanic skin potential between right ear and left wrist, and respiration). In addition, each subject had a Keithley single-ended electrometer attached to the right ear for the measurement of *body potential relative to ground.*

This wiring procedure is mentioned because in Experiment 1 we made no physiological or body-potential recordings for later comparison with copper-wall potential records. In the present report, though, neither body potential data nor physiological data are discussed.

Because wiring-up was a new experience for the 10 subjects, we conducted 18 sessions, rather than the 15 required for experiential comparison with the final

15 sessions of Experiment 1. The first 3 sessions were conducted with the magnet ABSENT to provide familiarization with wiring up procedures and with the four-wall copper wall milieu.[13] Subjects were blind to the fact that the magnet was ABSENT in the first 3 sessions, and only the EQ data of the remaining 15 sessions was used in analysis.

Magnet Orientations

In the 15 data-producing sessions of Experiment 2, the 140 gauss magnet was oriented either NORTH UP, SOUTH UP, or ABSENT in a typical quasi-random double-blind sequence. Subjects were told of this arrangement.

Multivariate Analysis

Multivariate profile analysis[24] was conducted on responses to items in the 13 experiential subcategories previously named. As before, each MANOVA looked first to see if there was an *interaction of magnet orientation with gender,* indicating a different result on that variable for men and women. The *main effect of magnet orientation* on the particular experiential category was then examined to determine this effect for both genders combined.

Thirteen separate multivariate analyses of variance (MANOVAs) were computed for the present analysis. The analysis focused on comparisons of N, S, and A. These comparison were calculated using 2 contrast (2df):

1. N plus S divided by 2 minus A ([(N+S)/2]-A), in other words PRESENT minus A (P-A).

2. N minus S (N-S).

Null Hypothesis. There will be no significant differences found between NORTH UP, SOUTH UP and magnet ABSENT conditions on the averaged subcategory scores of the experiential questionnaire. In other words there will be no treatment effect.

Definition of Statistical Significance

Statistical significance, calculation of scores and Discriminant Function Coefficients had the same meanings and uses as in Experiment 1. In

determining effect size, the cannonical correlation coefficient represents a measure of strength of association between discriminant functions and grouping variable. The square of the cannonical correlation coefficient, a measure of effect size, is equivalent to the "percentage of variance accounted for" as indicated below.

RESULTS

As in Experiment 1, F values, p values, degrees of freedom, and Discriminant Function Coefficients, have been listed below (see Table II).

Subcategory Physical Energized (MANOVA). A significant interaction of magnet orientation with gender was observed on subjects' mean responses to **Physical Energized** items in the MANOVA comparison of N to S to A ($F = 6.77$; $df = 2, 7$; $p < .023$). Approximately 66% of the variance is accounted for in this comparison. Contributing to this interaction, men on the average reported being *more* physically energized in the PRESENCE of the magnet than in the magnet ABSENT condition while women on the average reported being *less* **Physically Energized** in the PRESENCE of the magnet than in the magnet ABSENT condition (DFC = .826). Also contributing to this interaction, men on the average reported being *more* **Energized** in the NORTH UP condition than in the SOUTH UP condition while women on the average reported being *less* **Energized** in the NORTH UP condition than in the SOUTH UP condition (DFC = .812).

Subcategory Physical Sensory Perturbations (MANOVA). A borderline significant interaction was observed between magnet orientation and gender on subjects' mean responses to **Physical Sensory Perturbation** items in the MANOVA comparison of N to S to A ($F = 3.17$; $df = 2, 7$; $p < .104$). Approximately 48% of the variance is accounted for in this comparison. Contributing to this interaction, women had a lower mean score on **Physical Sensory Perturbations** in the PRESENCE of the magnet than in ABSENT while men had a slightly higher mean on **Physical Sensory Perturbations** in the PRESENCE of the magnet than in ABSENT (DFC = .987).

Subcategory Emotional Passive (MANOVA). There was a borderline significant main effect for subjects' mean responses to **Emotional Passive** items for the MANOVA comparison of N to S to A ($F = 2.75$; $df = 2, 7$; $p < .132$). Approximately 44% of the variance is accounted for in this comparison. Contributing to this main effect, subjects' (men and women combined)

Table II

Summary of Results in Experiment 2, 140 Gauss.

Multivariate Main Effects — Comparison of N to S to A

F Table	F	*df*	*p*	DFC P - A	DFC N - S
Emotional Passive	2.75	2, 7	0.132	-0.581	1.034

Tables of Means	Total	
	P - A	N - S
Emotional Passive	0.045	-0.170

Multivariate Gender Interaction — Comparison of N to S to A

F Table	F	*df*	*p*	DFC P - A	DFC N - S
Physical Energized	6.77	2, 7	0.023	0.826	0.812
Physical Sens. Perturbation	3.17	2, 7	0.104	0.987	
Emotional Energized	3.43	2, 7	0.091	0.975	0.868

Table of Means	Male		Female	
	P - A	N - S	P - A	N - S
Physical Energized	0.176	0.256	-0.204	-0.152
Physical Sensory Perturbation	0.024	-0.018	-0.133	-0.040
Emotional Energized	0.195	0.126	-0.020	-0.052

mean score more strongly endorsed **Emotional Passive** items in SOUTH UP than in NORTH UP (DFC = 1.034). Also, relative to the main effect, subjects' scores more strongly endorsed **Emotional Passive** items in the PRESENCE of a magnetic field than in ABSENT (DFC = -.581).

Subcategory Emotional Energized (MANOVA). There was a significant interaction of magnet orientation with gender for subjects' average responses to **Emotional Energized** items for the MANOVA comparison of N, S, and A ($F = 3.43$; $df = 2, 7$; $p < .091$). Approximately 50% of the variance is accounted for in this comparison. Contributing to this interaction, men's

mean score *more* strongly endorsed **Emotional Energized** items in NORTH UP compared to SOUTH UP and women's mean score *less* strongly endorsed **Emotional Energized** items in NORTH UP compared to SOUTH UP (DFC = .868). Also contributing to this interaction, men's mean score *more* strongly endorsed **Emotional Energized** items in the PRESENCE of a magnetic field than in the ABSENT condition while women's mean score *less* strongly endorsed **Emotional Energized** items in the PRESENCE of a magnetic field than in the ABSENT condition (DFC = .975).

EXPERIMENT 3

MULTIVARIATE ANALYSIS OF EXPERIENTIAL QUESTIONNAIRES: FOURTEEN "SENSITIVE" COPPER WALL MEDITATORS, 14 GAUSS MAGNET AND 140 GAUSS MAGNET

The present analysis concerns the *experiential* effects found in a group of 14 exceptional subjects known as "sensitives" (in the parapsychological literature). We were not studying them as "percipients of targets," but as individuals who might be unusually sensitive to magnetic-field effects. In addition to being "sensitives," 9 of the 14 were also known as "healers," but Experiment 3 was not concerned with "healing" attempts. A review of that research, *electric field phenomena* associated with "healing" attempts, has been discussed separately.[11]

The plan to work with "sensitives" developed as follows. In reviewing the results of Copper Wall Experiment 1, in which 19 "regular" subjects (non-"sensitives") had differential experiences during meditation in a *14 gauss* magnetostatic field, a question was raised concerning the possible experiences of "sensitives." From theoretical considerations, might not "sensitives" experience more sharply than "regular" subjects, the different magnetostatic conditions of the copper-wall milieu?

Subsequently, plans were made to recruit a group of *nationally-known* "sensitives" to participate in the Copper Wall Research. NOTE: It was not a purpose, however, either to define "sensitive" or to determine who was a "sensitive." If the person had a known reputation as a "sensitive," that was sufficient for copper wall purposes.

Participants

Two of the criteria for invitation to participate as "sensitives" in Copper Wall Research were:

1. They must already be widely *known* for their parapsychological "sensitivity."

2. They must be interested in "healing" and willing to make "healing" attempts on volunteer "patients" whom we would recruit from the Menninger staff.

Of 15 "sensitives" who were contacted by EG for participation in the research, 14 accepted (7 women and 7 men). The one who turned down the offer said that the magnetic field might interfere with the cherished state of "sensitivity" and with "healing power."

Nine of the "sensitives (6 women and 3 men) were already known on the national scene as "healers." The remaining 5 "sensitives" were willing to make "healing" attempts, but made it clear that they did not think of themselves as "healers."

The 14 "sensitives" individually participated in a research week in which the first part consisted only of magnetic sessions similar to those of Experiments 1 and 2. Since only one week was available for trials, 5 meditation sessions were run with 5 different magnetic conditions (140 gauss NORTH UP, 14 gauss NORTH UP, MAGNET ABSENT, 14 gauss SOUTH UP, and 140 gauss SOUTH UP). These magnetic states were quasi-randomly distributed so as to guarantee that *each session had a unique magnetic condition.*

Magnet Orientations and Procedures

After a familiarization tour and explanation of instrumentation in the Copper Wall Lab, the 5 copper-wall magnetostatic experiential sessions were conducted in a continuous sequence covering the first 2 and 1/2 days of the participant's research week. Participants were wired-up for physiologic recording by Peter Parks and Stacy Anderson and then conducted to the copper room by EG.

By inadvertence, this magnetostatic experiment was not run completely double-blind. EG was aware of the fact that Session 4 was run in the ABSENT condition. Findings were not as "expected," however, indicating that the single-

blind condition was adequate. In a planned replication of this experiment with the same 14 "sensitives," three trials will be run under each of three magnetic conditions, thus considerable additional data, fully double blind, will give a check against present findings.

To mitigate against the "first session effect," ever present in psychophysiologic research, a "first session" was run in which, though wired up for physiological recording, the overhead magnet was ABSENT, replaced with the lead foil weight. Subjects were not appraised of this "first session" arrangement, of course, and their EQ responses were not used.

What *was* explained was that a quasi-random arrangement of magnetic conditions would be present during their meditations, namely, 140 gauss NORTH UP, 14 gauss NORTH UP, ABSENT, 14 gauss SOUTH UP, and 140 gauss SOUTH UP. It was explained that sessions were quasi-random in the sense that only those random sequences of magnetic conditions were used in which each of the five conditions was present only once. The items of the EQ and "scores" were the same as in Experiment 2. Also, Discriminant Function Coefficients were used as before.

Experiential Training

As noted before, trained observers are considerably more useful in psychophysical research than naive responders, but in the present research with "sensitives" there was no opportunity to train them with the EQ in advance of their using it. Therefore, at the end of each of the 5 meditation sessions, EG accompanied the "sensitive" through the entire questionnaire, answering only on request, questions that arose concerning the meaning of individual items.

Multivariate Analysis of Variance

Multivariate profile analysis was conducted on responses to EQ items in the 5 major experiential categories.[25] The subcategories were grouped to allow 3 separate MANOVAs to be performed. One MANOVA was performed including all the subcategories of the items in the **Physical** category, one MANOVA for all of the subcategories in the **Emotional** category and one MANOVA for the combined **Mental, Extrapersonal and Transpersonal** categories.

Each MANOVA looked first to see if there was an *interaction of magnet direction and strength with gender,* indicating a different result on that set of variables for men and women. The *main effects* of magnet PRESENCE, magnet **Direction**, magnet **Strength**, and the *interaction* of magnet **Direction** with magnet **Strength** on the particular experiential category, were then examined to determine if these effects were significant for both genders combined.

Results are listed in Table III below, following descriptions of those MANOVAs which revealed significant findings.

The focus of the overall analysis was the comparison of magnet *presence* (PRESENT/ABSENT), magnet *direction* (NORTH UP/SOUTH UP), and magnet *strength* (140 gauss/14 gauss), and the interaction of magnet *direction* with magnet *strength.* These comparisons were calculated using 4 contrasts (4df):

1. N plus S divided by 2 minus A ([(N+S)/2]-A), in other words PRESENT minus A (P-A).

2. N minus S (N-S).

3. 14 gauss minus 140 gauss (14G-140G).

4. Interaction of magnet **Direction** with magnet **Strength** (N14G + 140G - N140G - S14G).

Null Hypothesis. There will be no significant differences found in the MANOVA comparisons of magnet PRESENCE, magnet **Direction**, magnet **Strength** or the interaction of magnet **Direction** with magnet **Strength** for 13 subcategories of the EQ.

Results

The limited number of participants prevented the use of a doubly-multivariate MANOVA. Therefore, 3 MANOVAs were performed for this analysis. Of the three, 2 revealed significant findings and are described below.

Category Physical (MANOVA). When the data of men and women were combined, there were no significant findings (main effects) for the compar-

Table III
Summary of Results in Experiment 3

Multivariate Magnet Condition (Present-Absent) by Gender Interaction

F Table	F	df	p	Present — Absent DFC Passive	DFC Energized	DFC Body P.
Physical	4.02	4, 9	0.039	0.964	-1.093	-1.399

Table of Means	Male	Female
Physical Passive	0.457	0.800
Physical Energized	0.086	-0.486
Physical Body Perturbations	1.026	-1.040

Univariate Magnet Condition (Present-Absent) by Gender Interaction

F Table	F	df	p
Emotional Positive	4.84	1, 12	0.048

Table of Means	Male	Female
Emotional Positive	-0.391	1.079

isons of magnet PRESENCE, magnet **Direction**, or magnet **Strength**. In addition, there were no significant interaction effects for the comparison of magnet **Direction** by magnet **Strength**.

However, this MANOVA revealed a significant gender interaction with magnet PRESENCE ($F = 4.02$; $df = 4, 9$; $p < .039$). Approximately 64% of the total variance is accounted for in this *gender-presence* comparison. Contributing to this result:

1. Although both men and women responded with greater mean item scores in the **Physical Passive** subcategory in the PRESENCE of the magnet compared to magnet ABSENT, women had a stronger response (DFC = .964).

2. Men responded with *greater* mean item scores in the **Physical Energized** subcategory in the PRESENCE of the magnet compared to the magnet ABSENT condition, while women responded with *lower* mean item scores in this subcategory in the PRESENCE of the magnet compared to the magnet ABSENT condition (DFC = -1.093).

3. Men responded with *greater* mean item scores in the **Physical Body Perturbation** subcategory in the PRESENCE of the magnet compared to the magnet ABSENT condition, while women responded with *lower* mean item scores in this subcategory in the PRESENCE of the magnet compared to the magnet absent condition (DFC = -1.399).

Category Emotional (MANOVA). When the data of men and women were combined, there were no significant findings (main effects) or interaction effects for the comparisons of magnet PRESENCE, magnet **Direction**, or magnet **Strength**. However, because the contrasts were orthogonal, it was appropriate to look at the univariate ANOVAS for each contrast.

A significant univariate gender interaction was found for **Emotional Positive** in the comparison of magnet PRESENT with magnet ABSENT ($F = 4.894$; $df = 1,12$; $p < .048$). This interaction was due to women's *higher* mean item scores in the PRESENCE of a magnet compared to magnet ABSENT, while men responded with *lower* mean item scores in the PRESENCE of a magnet compared to magnet ABSENT.

SUMMARY

Since data from only 19 subjects were available for calculation of effects in MANOVAs and ANOVAs, they could not be of "high power." This tends to enhance the likelihood of making a Type II error, that is, not detecting an effect that truly exists. If an effect *is* detected with low power, it suggests that (1) the independent variable has a very strong effect, or (2) the assessment instrument is extremely sensitive, or both.

In addition, the limited number of participants prevented the use of a doubly multivariate MANOVA. Thus, thirteen MANOVAs were performed for the

analysis in Experiment 1. Despite the fact that, when a large number of analyses are performed, this tends to inflate the likelihood of making a Type I error, that is, of detecting an effect when none truly exists, it was considered that the commonly used Bonferoni correction would be too severe in this instance due to low sample size and low power. Replication of results observed across experiments strengthens the argument that the results reported here are not due to chance, but rather represent *bona fide* effects.

The 7 hypotheses of our 3 experiments, and our findings, *printed in italics,* were:

EXPERIMENT 1 (14 gauss magnet, 19 regular meditators, 15 double-blind test sessions).

1. That a magnetostatic field of 14 gauss at the crown of the head would produce effects in humans that could be detected with an Experiential Questionnaire. *This was supported.*

2. That different experiences would be associated with each of three magnetic conditions, NORTH UP, SOUTH UP, and ABSENT. *This was partially supported.*

3. That experiential effects would be the same for both sexes. *This was negated.*

EXPERIMENT 2 (140 gauss magnet, 10 regular meditators from the previous group of 19, 15 double-blind test sessions).

Though only 10 subjects participated in this experiment, a gender-based differential magnetostatic effect was found. Averaged EQ responses from men and women regarding experiences associated with magnet conditions NORTH UP, SOUTH UP and ABSENT reveal two significant *gender-magnetostatic* interactions. Most notably, men's mean response to **Physical Energized** items (MANOVA 2) was much different than women's mean response to these items. This result *duplicates* the pattern of response found in Experiment 1 at a highly significant level.

In summary, the hypotheses and findings of Experiment 2 were:

4. That a 140 gauss magnet would produce significant experiential effects. *This was supported, again with gender-related differential responses.*

5. That the experiential effects of the 140 gauss magnet would be stronger than the experiential effects of the 14 gauss magnet. Since effects were detected at least as sensitively with only 10 subjects at 140 gauss as with the larger sample of 19 subjects at 14 gauss there is some preliminary indication that effects of the stronger magnet were indeed more potent than effects of the weaker magnet. Eventually we will directly compare results with these two magnet strengths by examining effects seen in *only* the 10 subjects who participated in both Experiments 1 and 2. Those findings, when obtained, are expected to give a better comparison of the relative effects of the two magnets.

Experiment 3 (140 gauss magnet, 14 "sensitive" meditators, 5 double-blind test sessions).

Again, a gender-based differential effect is found, in spite of the fact that each of the 14 "subjects" had only 5 experiential sessions in the copper wall milieu. When results from Experiment 3 are compared with results from Experiments 1 and 2, the similarity of patterns are striking. In particular, the differential pattern of responses of men and women to **Physical Energized** items seen in the **Physical MANOVA** of experiment 3 closely *parallels* the pattern of responses observed in the subcategory **Physical Energized** MANOVA of Experiment 2.

In summary, the hypotheses and findings of Experiment 3 were:

6. That "sensitives" would be affected in 5 different ways by the 5 different magnetic conditions. *This was not supported in its simplistic form. "Sensitives" were affected in only one significant way by the different magnetic conditions. Namely, the PRESENCE of a magnet was different from the ABSENCE of a magnet.*

7. That experiential affects would be the same for both sexes. *This idea was definitely negated. Gender-related responses were considerably different. In some cases the sex differentiation was great*

enough to nullify main effects (in which data from the two genders were lumped). In all, it was striking to find significant results in Experiment 3, for with only 5 trials per subject and 5 different magnetic conditions, there was little data grist for the statistical mill.

In final summary, it seems reasonable to conclude, from a finding of consistent results in PHYSICAL subcategories in all experiments, that a significant magnetostatic sensitivity exists in humans, and it is not the same for the two sexes. The consistency of gender-related differential response patterns in these three investigations raises a question of gender based differential responses to "electromagnetic environmental pollution."

Discussion

There is a possibly important industrial implication from Experiment 1. The magnet which was used produced only 14 gauss at the crown of the head. This field strength is considered by biologists and physicians to have no important significance for humans, and, in fact, is 3 gauss weaker than the field strength considered low enough for safety for the perimeter of SMES, the superconducting magnetic energy storage system being studied by Bechtel, Inc. According to *Machine Design*,[26] scientists of Bechtel, Inc. have considered the feasibility of using superconducting electromagnetic coils "from 100 yards to half a mile in diameter" for storing excess electric power, with a "restricting fence at the 17-gauss line."

Also, according to the *Machine Design* report, at the 1987 Joint Power Generation Conference at which superconducting magnetic energy storage was discussed, Dr. Susan Schoenung of Bechtel said, "Near-constant magnetic fields up to about 20,000 gauss have no known negative biological effects on humans." In the research reported herein, however, a field of 14 gauss significantly perturbed human awareness. In view of present findings, industrial designs involving magnetic fields and health may need reconsideration.

In 1882 a possible scientific rationale for magnetic effects of the meditation procedure suggested above was unavailable. In 1992, however, it was found by Joseph Kirschvink and his colleagues that the brain is permeated with crystals

of magnetite.[27] In addition, the pineal, positioned on the centerline of the brain just a few centimeters below the crown of the head, has unique *magnetostatic sensitivity.* Also, it is now recognized that the pineal gland, not the pituitary as formerly thought, is the "king gland" of the endocrine system. Consider the following:

> Its primary action [the pineal], in most cases, appears to be to govern or to restrict the production and/or the secretion of hormones from other endocrine glands. In effect, it seems to function as a *regulator of regulators.* . . the pineal serves as an intermediary between the *environment,* especially the photoperiod, and the endocrine system. In this regard, it exerts control. . . on the functions of virtually every other organ of internal secretion.[28] (italics added)

> During the past decade, a number of reports indicated that the mammalian pineal gland is magnetosensitive in terms of spatial orientation. This indication is based on observations that artificial alterations of the direction of the earth's magnetic field (MF) markedly decreased the gland's capabiliry to synthesize melatonin.[29]

In other words, a scientific rationale is developing which in a few years can be expected to explain human sensitivity to weak magnetostatic fields. To the best of our knowledge, however, the explanation of gender differences in magnetostatic sensitivity will require information which possibly has not yet been considered, or at least has not been published.

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naire, Experiment 1 subjects responded to the full pool of 411 questions, seeing that these questions were divided into 5 major experiential categories. They *did not know* of the 13 subcategories, or that only 180 items were used for analyses from the full pool. Each subcategory and its corresponding items are listed below.

(1) **Physical-Passive** includes "sleepy, tired, relaxed, heaviness, and warmth."
(2) **Physical-Energized** includes "full of energy, vigilant, alert, tense, and cold."
(3) **Physical Body-Perturbation**s includes "largeness, smallness, expanding, shrinking, elongation, and twitching."
(4) **Physical Sensory-Perturbation**s, includes "lightness, tingling, buzzing, vibrating, itching, tumbling, tipping, whirling, rocking, floating, and dizziness."
(5) **Emotional-Passive** includes "tired, passive, receptive, and openness."
(6) **Emotional-Energized** includes "full of energy, excited, elated, active, tense, enthusiasm, and eagerness."
(7) **Emotional-Positive** includes "peaceful, happy, joy, expansion, meaningful, love of others, care of others, care of self, forgive others, forgive self, affection, generosity, kindness, tolerance, protect others, motherly, fatherly, sisterly (brotherly was deleted because it was not used by subjects on whom the questionnaire was based), loyalty, pleasure, empathy, and rescue of others."
(8) **Emotional-Negative** includes "sad, boredom, contraction, hate of others, greed, envy, jealousy, irritation, anger, distress, disgust, fear, defensiveness, intrigue, and pain."
(9) **Mental Right-Cortex** includes "hypnagogic, daydream, archetypal, ambiguous, nonsensical, gestalt-like, graceful, arational, irrational, metaphor or analogy, symbolic, past, present, future, music, and insight."
(10) **Mental Left-Cortex** includes "time emphasis, detailed, limited, rational, abstract, concrete, and science."
(11) **Mental** Images-and-Actions was originally two subcategories, but our MANOVA could handle only a total of 13 subcategories, so "images" and "actions" were combined to include "water, fire, wind, earth, clouds, storm, rain, scenery, cave, lake, ocean, sun, moon, stars, lightning, trees, fruit, vegetables, dogs, cats, insects, snakes, birds, fish, color, city, farm, books, man, woman, child, door, home, stairs, window, mirror, machine, relatives, USA, other country, building, self, swimming, flying, sleeping, falling, airplane, automobile, teaching, learning, healing, and graduating."
(12) **Extrapersonal** includes "cosmic knowing, out of world, beyond planet, meta-physical (psychic), out-of-body, ESP, cosmic beings, cosmic insight, demons, and energy."
(13) **Transpersonal** includes "spiritual,divine awareness, metaphysical (spiritual), sacred, ultimate, mystical, divine Being, divine Self, spiritual insight, loving all, unity of all life, truth for all, dignity for all, compassion, meaning of life, wise old man, wise old woman, spiritual guide, prayer, and Buddha."

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