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REMOTE VIEWING WITH THE ARTIST INGO SWANN: NEUROPSYCHOLOGICAL PROFILE, ELECTROENCEPHALOGRAPHIC CORRELATES, MAGNETIC RESONANCE IMAGING (MRI), AND POSSIBLE MECHANISMS[1,2]

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Summary.—In the present study, the artist Ingo Swann, who helped develop the process of remote viewing (awareness of distant objects or places without employing normal senses), was exposed during a single setting of 30 min. to specific patterns of circumcerebral magnetic fields that significantly altered his subjective experiences. Several times during subsequent days, he was asked to sit in a quiet chamber and to sketch and to describe verbally distant stimuli (pictures or places) beyond his normal senses. The proportions of unusual 7-Hz spike and slow wave activity over the occipital lobes per trial were moderately correlated ($rho = .50$) with the ratings of accuracy between these distal, hidden stimuli and his responses. A neuropsychological assessment and Magnetic Resonance Imaging indicated a different structural and functional organization within the parieto-occipital region of the subject's right hemisphere from organizations typically noted. The results suggest that this type of paranormal phenomenon, often dismissed as methodological artifact or accepted as proofs of spiritual existence, is correlated with neurophysiological processes and physical events. Remote viewing may be enhanced by complex experimentally generated magnetic fields designed to interact with the neuromagnetic "binding factor" of consciousness.

From a psychophysiological perspective, human perception is derived from the intracerebral processing of multiple, parallel sequences of electromagnetic information after transduction of physical stimuli by sensors. In the normal brain interactions between these inputs are filtered and enhanced to generate percepts and their ideations (Norrentranders, 1998). Stimuli correlated with environmental events and processes that cannot be transduced, and thus cannot be integrated into the ongoing neural patterns (John, 1990; Calvin, 1996), are excluded. Examples of these stimuli for most human brains include radio frequencies, gamma rays and the types of very low frequency magnetic fields that precede some earthquakes. Science has developed chemical and electrical technologies to function as additional transducers to facilitate the detection of these stimuli by our sensory systems.

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One logical consequence of the nature of neuroperceptual integration is that people whose brains modulate these interactions differently may also perceive stimuli typically not discerned by most people. Such individuals would be aware of groups of stimuli, always present in the environment, as qualitatively distinctive gestalts. A procedure called "remote viewing" (Puthoff & Targ, 1976) ostensibly incorporates information from the environment that is not normally included into the processes of conscious awareness. The general procedure for remote viewing involves the percipient sitting in a quiet room and drawing shapes or producing narratives about distal, hidden targets not familiar to anyone directly involved with the experiment.

The major anomaly of this stimulus-response that defines remote viewing is the unclear nature of the processes or mechanisms mediating the stimulus-response coupling. However, the "anomaly" may simply reflect perspective. For example, if all human beings could only see but could not experience hearing and the propagation of mechanical energies through air molecules was considered impossible, a person with this sense would appear to have "paranormal" capacities. Within a space filled and juxtaposed with objects that block normal vision, this person could detect the presence, indicate the location, and (with learning) identify complex objects at a great distance, long before they entered the visual field.

We have approached remote viewing as a similar problem. It is a subset of paranormal phenomena that involve the detection of information at a distance through mechanisms not known to date (Persinger, 1974). Instead of dismissing the possibility as untenable, we have assumed that the scientific method is the optimal procedure by which the cerebral and extracerebral correlates of these processes, if they are valid, can be discerned. We contend that mystical assumptions or implicit references to nonphysical or spiritual explanations are not required to study parapsychological experiences.

Our general assumptions are that (1) all experiences are generated by or correlated with brain activity, (2) all experiences (responses) must be evoked by physical events (stimuli), (3) events that are stimuli are an extremely small subset of the myriad of events within the environment, (4) because structure dictates function some individuals with altered cerebral microstructures can detect and experience events most people cannot discern, (5) different information emerges from varied organizations of experiences, (6) the neuroelectrical processes generating consciousness may also function as an insulator for the detection of a subset of events, (7) these events can behave as stimuli if the temporal parameters of consciousness are altered.

The special subject, Ingo Swann, an artist, visited our laboratory to complete neuropsychological testing as a component of our long-term project to establish a data base of the characteristics of people who appear to extract or incorporate recondite information from the environment. Mr. Swann

has been considered one of the most successful remote viewers. His accuracy for detecting and drawing distant places or hidden objects was considered sufficiently potent to be employed as one method of reconnaissance by agencies that collect information maintained as secret or hidden by political groups.

After the neuropsychological data had been collected, Mr. Swann was exposed to six separate patterns of counterclockwise circumcerebral magnetic fields that have been associated with alterations in subjective time (Cook, Koren, & Persinger, 1999). We asked him to participate in this experiment because we assumed that individuals who could discern such subtle differences in introspective states might differentiate the experiential patterns associated with different weak complex magnetic fields. During different temporal-spatial configurations of these fields he experienced the stimulation and suppression of the states he had previously associated with the precision of his experiences during remote viewing. Consequently, the following experiments were designed to discern if (1) the phenomenon of remote viewing could be replicated in our laboratory by this subject, (2) there were any conspicuous electroencephalographic activity associated with periods of remote viewing, and (3) structural anomalies, as reflected by Magnetic Resonance Imaging (MRI), were congruent with any localized electroencephalographic signatures.

Method

Subject

Mr. Swann was a 64-yr.-old artist, psychic, and author who was tested and examined for several years by Puthoff and Targ (1976). For the first two days (11 and 12 August 1998), the subject completed our neuropsychological, cognitive, and personality assessment (Persinger, 1995; Persinger & Richards, 1995). The procedures were similar to those we have administered to approximately 500 patients with acquired mild to moderate brain injuries during the last 10 years. This subject displayed a preference for the right hand, left foot, and right eye.

He was then exposed to counterclockwise circumcerebral stimulation from eight equally spaced solenoids in the horizontal plane. The stimulation was completed while the blindfolded subject was sitting in a comfortable chair within an acoustic chamber. According to a Meda FM 300 vector magnetometer the resultant field in the chamber was approximately 23,100 nT. The subject faced the magnetic east-southeast direction (–110°). The X (east-southeast direction), Y (north-northeast direction), and Z (up-down) strengths of the geomagnetic field were 3,390 nT, 12,000 nT, and 20,000 nT, respectively. The inclination was 57°. The equipment and rationale have been described elsewhere (Cook, *et al.*, 1999).

In summary, complex magnetic fields between 2,000 nT and 5,000 nT (2 microT to 5 microT) in intensity were generated in a counterclockwise direction along the plane supported by a line between the midforehead and above the ears. Two wave patterns (Persinger, Tiller, & Koren, 2000), burst-firing and frequency-modulated (Thomas), with three different parameters for each, a part of our standard protocol (Cook, *et al.*, 1999), were activated for 5 min. each. The parameters are shown in Table 1 and are identified as configurations 1 to 6. The subject's comments were monitored by lapel microphone and recorded on audiotape.

TABLE 1
FIELD PARAMETERS EMPLOYED DURING APPLICATION OF COUNTERCLOCKWISE CIRCUMCEREBRAL FIELDS

Parameter	Configuration					
	1 B1	2 B2	3 B3	4 T1	5 T2	6 T3
	Burst Pattern			Frequency-modulated		
Pixel Duration	1	1	3	1	1	3
Interstimulus Time	1	1	3000	1	1	3000
Commutator Rate	20	100	200	20	100	200
Change in Rate	+2	+20	−2	+2	+20	−2

Procedure

Hidden pictures and objects.—On 13 and 14 August 1998, a total of 20 stimuli were selected by a person who had not met the subject. Sixteen of the stimuli were large colored photographs from weekly magazines; the other four stimuli were objects from the fourth author's office. The numbers of stimuli selected were determined by the number of sessions we planned and the average number of trials (stimulus presentations) per session. The pictures and objects were selected by individuals not involved with the experiment. However, they had been told to select pictures and objects that contained marked emotional themes. The pictures and the objects had been placed in manilla envelopes the night before the experiment. On the day of the experiment the person gave collections of six envelopes to another experimenter who placed the collections in a corner of the stimulus room.

While both the first author and the subject sat in an acoustic chamber, the instruction was given to one of the experimenters to place one envelope (from the stack of six envelopes piled on a filing cabinet in the corner of the room) on a table in the same room. The table and the acoustic chamber were separated by three doors and one hallway with a linear distance through the walls of about 6 m. The resultant strength of the geomagnetic field in the space occupied by the table was 52,600 nT. The X, Y, and Z components were −3,765 nT, −18,680 nT, and 49,100 nT, respectively.

The square table, whose surface was 8,100 cm^2, was placed singly in the middle of the stimulus room. The body of the table was wood covered by mica; the legs were metal. The subject had seen the room before the experiment began and felt comfortable with the placement of the envelope containing the stimulus on that table. He requested that the envelopes be placed such that the long axis was in an E-SE direction and the picture within the envelope was face-up.

After an envelope had been placed on the table, the experimenter returned to the chamber door, stated "picture on table" to another experimenter who then reported this information to the first experimenter seated beside the subject. After requesting the precise time and writing it on the top right portion of the paper, the subject then began drawing. When the "images" were completed (about 2 to 3 min.) for a stimulus he would report "stop," and after a brief period the request for the next trial was given. While sitting in the chamber during both the rest (between targets) and active periods (remote viewing), the subject's bipolar electroencephalographic activity over the frontal (F7, F8), temporal (T3, T4), and occipital (O1, O2) lobes was recorded.

After four to six stimuli had been presented (one at a time) on the table, the electroencephalographic electrodes were removed, and the subject, the experimenters, and four to five students would surround the table upon which the stimuli had been placed. The students were present as observers. The targets were removed from the envelopes and similarities of the targets and the subject's drawings were evaluated and discussed. This period of "reinforcement" allowed the subject to discern the similarities between each stimulus and his response to it. The process was repeated four times, once in the morning and once in the afternoon, on two successive days, after each block of experiments. These students did not rate the accuracy of congruence between the stimuli and the drawings for the analyses and were present as motivational stimuli for the subject.

Outbound Experiments

Nine potential stimulus locations, all within 20 min. of the university, had been selected by a member of a local hiking team several days previously. A Polaroid picture of the location and its street address was marked on the picture. Each picture was placed in a manilla envelope and was stored in the office of a person who had not met Mr. Swann.

On the morning of the experiment (14 August, 1998) a person, not related to the experiment but simply walking through the hallway in another building, was asked by the fourth experimenter to select one of the nine envelopes. This envelope was given to two experimenters who, after entering their automobile, opened the envelope, identified the location, and drove to

it. Upon arrival, (0930 hr.) at the prescribed time, the two experimenters began viewing the area for 15 min. During the afternoon of the same day another randomly selected envelope from the pool of nine envelopes was opened by the same two experimenters. They drove to the area (1410 hr) and observed the surroundings for 15 min. This duration was selected because it was considered sufficient time to allow experiences to occur without the complications of fatigue or habituation. The two areas were Science North (a local science center) and one of more than a dozen elementary schools in the city.

During the same two periods, ensured by synchronized watches for all experimenters, Mr. Swann sat in the chair within the acoustic chamber. Sensors (silver electrodes) had been attached with EC2 cream to areas F7, F8; T3, T4; and O1, O2. EEG activity was completed before, during, and after he engaged in remote viewing. Occasional comparisons were made to discern any hemispheric asymmetry for the electroencephalographic activity.

The drawings and written descriptions of the 16 photographs and four objects were rated on a Likert scale with anchors of 1 to 7 where 1 was no information or totally inaccurate, 4 was ambiguous but possible, and 7 was identical or obvious congruence. There were three categories: (1) rating of actual drawings compared to the stimuli, (2) ratings between the denotative definitions of the words employed to describe the stimuli and the targets, and, (3) ratings of the emotional meanings or connotations of the words or the metaphorical quality of the words employed to describe the targets.

Three raters were not familiar with the experiment and had not been present at the feedback sessions during the experiments. The median values of the rating for each of the three categories for each picture and object were employed as the scores. In addition, the descriptors for stimuli that contained at least three words (in addition to drawings) were analyzed automatically by Whissell's Dictionary of Affect (1994) for pleasantness, activity, images, word frequency, and length. A total of 15 of the 20 stimuli met this criterion.

For the two outbound experiments, transparencies of the drawings for the two targets: the science center and a grade school, were shown to 47 students who were enrolled in a first-year psychology course at the university during the following fall semester. They were asked to record how long they had lived in the city. After the class had seen the drawings for each of the two outbound experiments, they were given a list of 10 key landmarks that included the two stimulus areas. These landmarks included the giant stack from a local mining industry, city structures, high schools, and other grade schools.

Electroencephalographic recording during Mr. Swann's behavior that he labeled as remote viewing was associated with bursts of paroxysmal 7-Hz

spike and slow wave-like activity over the occipital lobes. This specific activity was *never* present during baseline measurements or when he was not engaging in the behavior: Consequently, the following measurements were recorded: (1) total number of seconds of record containing this signature, (2) the proportion of the record displaying this pattern during his drawing of each target, (3) the numbers of separate episodes defined as numbers of episodes separated by at least 10 sec. of no 7-Hz activity, and (4) the longest period of sequential 7-Hz spiking.

Magnetic Resonance Imaging

During the last part of the last day of the experiments, Mr. Swann volunteered for Magnetic Resonance Imaging at a local hospital (Laurentian Site). T1 and T2 measurements were obtained for 19 horizontal sections, 15 coronal sections, and 16 sagittal sections at 1.5 T.

Results

Neuropsychological Assessment

The subject's standardized (z) scores for verbal intelligence, performance intelligence (Wechsler Adult Intelligence Scale–Revised), and the Wechsler Memory Scale were 0.9, 2.3 (above normal), and 1.6, respectively. His most exceptional score (2.9) was for the Peabody Picture Vocabulary which required selecting the appropriate picture (of four pictures) for a specific word. The Halstead-Reitan Impairment Index was 0.1 (normal).

Although most of his neuropsychological test scores were within the average to above average range (between $z = -1.0$ and $z = +1.0$), he displayed below normal scores for toe gnosis (–2.2), toe graphaesthesia (–2.1) for the right foot (primarily the middle toe), manipulative dexterity for the left hand (–2.1), reconstruction (after 30 min.) for the Rey-Ostereith Figure (–2.4), and the Category Test (–2.0). Despite his artistic background and above average verbal fluency (+1.6) and vocabulary (+1.7), his scores for Design Fluency and Conditioned Spatial Association were –.8 and –1.8, respectively. The time required for his left hand during haptic discrimination (Tactual Performance Test) was longer (4.7 min.) than for his right (dominant) hand (3.4 min.). Scores for short-term visual memory and coordination such as Block Design (+2.0), and Digit Symbol (+2.0) were above average.

His z score for Roberts' Inventory for Complex Epileptic-like Signs (Roberts, Varney, Hulbert, Paulsen, Richardson, Springer, Shepherd, Swan, Legrand, Harvey, Struchen, & Hines, 1990) was –1.2. All scaled scores for the Minnesota Multiphasic Personality Inventory (MMPI) were within the average range (all z scores between –1.0 and +1.0). According to the Cattell 16 PF, his scores for abstract thinking, calmness, seriousness, reservation, assertiveness, boldness, and self-sufficiency were within the upper 5% of the

population. Bipolar activity over the frontal, temporal, and occipital regions was normal. Qualitatively, bursts of fast beta activity, that independent measures suggest are in the gamma (35 to 40 Hz) range, were intermixed with bursts of alpha rhythms over the temporal lobes while he rested in the acoustic chamber. Algebraic summation indicated that bursts of high frequency beta activity occurred primarily over the right occipital region. His heart rate ranged between 95 and 97 beats per min. with no evidence of periodicity.

Subjective Experiences During Circumcerebral Magnetic Field Stimulation

The primary experiences during the sequential presentations of the three burst-firing patterns (Configurations 1 through 3) were (1) nothing, except purple lights like mist coming and going, (2) the experience of seeing inside of his brain: "it's like a black field with lots of lights in it, but I don't see the lower right back of my brain," and (3) experience of pleasure and the sense of a reddish stone, glasses (spectacles), and "something greenish" in holographic form.

However, when the frequency-modulated (Thomas) pattern was presented through the same three phases (Configurations 4 through 6), the experiences were enhanced. During Configuration 4 he experienced the feeling of floating in and out of his body and a picture of a three-dimensional apple, and some kind of whispering. The word "planar" was suddenly experienced although he did not know what it meant. During the fifth configuration, he experienced an enhanced pressure in his ear and a marked suppression of what he has experienced as mental images or pictures during remote viewing. He reported "it's very nice not to have all of these pictures . . . (remote viewing) . . . going on." During the final sequence, he suddenly experienced the thoughts of water and began to perceive the three experimenters, outside of the chamber as skeletons. The position of the skeletons reflected the positions and relative locations of the three experimenters as observed by the first and second authors.

Behavior of Subject During Remote Viewing

During the remote viewing periods Mr. Swann sketched and wrote information on sheets of paper. His verbal behavior alternated between asking specific, very creative questions concerning the brain (in which he was interested) and silence during which time he slowly sketched or wrote on the sheets of paper. These behavioral oscillations occurred frequently.

His responses included both drawings and words. The drawings ranged from small points or curves to complex structures. When he drew he appeared to be copying a mental image. His facial expressions, including perioral asymmetric movements and his ocular positions, were consistent with attempts to draw or to reproduce his perceptions directly in a manner similar

to a person drawing complex shapes on a paper while viewing a blackboard. However, whereas this person would glance between the board and the page for feedback, Mr. Swann stared just above the drawing and appeared to employ proprioceptive feedback from his hand and input from his peripheral visual fields to facilitate the coordination between image and drawing.

Intermittently while drawing Mr. Swann wrote a word that contained marked emotional features, such as death, happy, or joyful, on the right side of the page. He attributed this to trained differentiation of visuospatial pat-

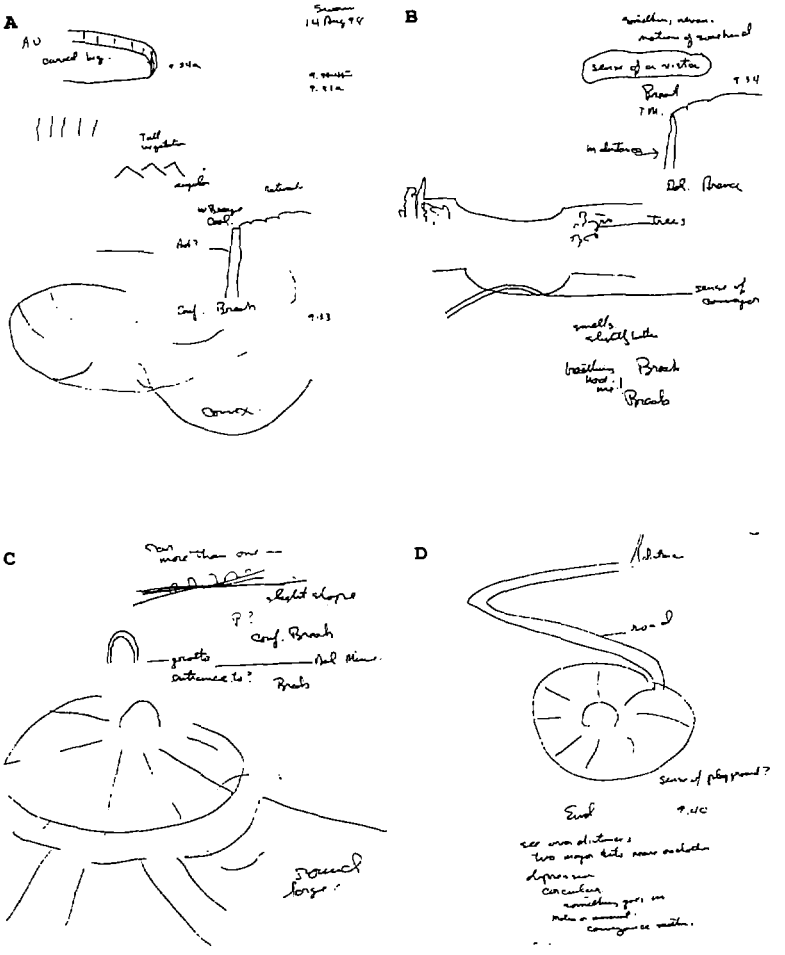

FIG. 1. Sequential sheets of drawings (A through D) by Mr. Swann while two experimenters were viewing the first randomly selected stimulus site. See Table 2 for the clarifications of the words indicated on each sheet.

terns from linguistic sequences. The ideograms and words alternated temporally. Words and phrases usually occurred after fragments of an ideogram.

Remote Viewing: Outbound Experiments

The subject's drawings of what he experienced while the two experimenters were facing the first spatial target are shown in Fig. 1. The specific words and phrases, except for his indicators describing the end of a "flood of experiences," i.e., "break," are listed in Table 2. The general shape, theme, and descriptions of the drawings were sufficiently congruent with the locations being perceived at the time by the experimenters that the locations could be identified by blind raters. For example, when these drawings and words were given to the 34 first-year university students who had lived in the city for more than five years and who were not familiar with the experiment, 32 of them identified the structures and the orientation over the lake as Science North (the actual stimulus).

TABLE 2
WORDS WRITTEN ON PICTURES DURING EXPERIENCES BY SUBJECT ASSOCIATED WITH EXPERIMENTERS' PRESENCE AT STIMULUS 1: SCIENCE NORTH

Drawing A
1. curved building
2. tall vegetation, something angular, natural
3. a cool breeze
4. a convexity
Drawing B
1. sense of a vista
2. smoke stack in the distance
3. there is a sense of a motion . . . a conveyer?
4. smells slightly bitter
Drawing C
1. car, more than one
2. slight slope
3. a grotto, entrance to? . . . a mine
4. round large object
Drawing D
1. a road between the distant stack and the circular object
2. sense of a playground
3. see over distances
4. depression, circular goes in motion or movement
5. conveyance, cars

The details of the drawings and written descriptions during the second experiment are shown in Fig. 2 and Table 3. The description of the odd shape of the roofs, the multiple windows and the bicycle racks, and the track were consistent with the observations of the experimenters reported by them before they saw the subject's drawings. Of the 34 raters, 25 indicated it was a grade school. The other nine reported it was a high school.

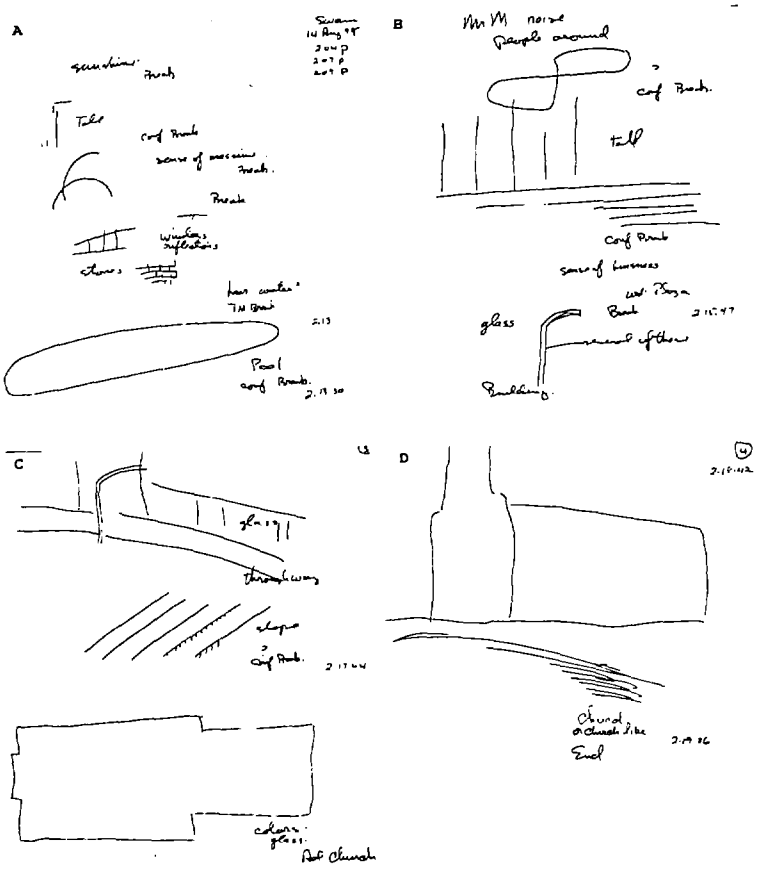

FIG. 2. Sequential sheets of drawings (A through D) by Mr. Swann while two experimenters were viewing the second randomly selected stimulus site. See Table 3 for the clarifications of the words indicated on each sheet.

While drawing and talking during the two 15-min. intervals associated with the two locations, the electroencephalogram was dominated by a specific form of 7-Hz spike and complex slow wave activity over the occipital regions but not over the prefrontal and temporal lobes. These signatures were not present during the baseline before the subject began to engage in his experiences nor were they present during the postbaseline periods when he stopped these activities. For the two stimuli (Science North and the elementary school), the proportions of the total record (780 sec. and 560 sec., respectively) which displayed the paroxysmal activity were 40% and 14%, respectively.

TABLE 3
WORDS WRITTEN ON DRAWINGS OF SUBJECT WHILE EXPERIMENTERS WERE PROXIMAL TO STIMULUS 2: AN ELEMENTARY SCHOOL

Drawing A
1. sunshine
2. sense of something massive
3. windows, stones, reflections
4. hear water?
Drawing B
1. people around
2. sense of business
3. several (drawing) of railing-like objects
4. glass
5. building
Drawing C
1. glass
2. a through way or hallway
3. slope . . . colors . . . glass . . . like a church
Drawing D
1. church or church-like

The occurrence of these patterns was not qualitatively associated with either talking or drawing as surmised by muscle artifacts and conspicuous patterns from temporalis and frontalis muscles. Close inspection of the inflections of the 7-Hz spikes and hemispheric comparisons indicated they emerged over the right hemisphere. Examples of these patterns are shown in Fig. 3. However, most of the 7-Hz spike and slow wave-like activity occurred over both occipital regions as indicated by simultaneous ipsilateral recordings.

Remote Viewing of Photographs and Correlates With 7-Hz Spiking

The means and standard deviations for the ratings of the congruence between the drawings and the stimuli were, for picture 3.5, 2.3, for denotative measure 3.7, 2.3, and for connotative measure 4.1, 2.4. The means were for total time (in sec.) for each trial 229 ($SD=54$), the total number of 7-Hz sec. 10.7 ($SD=12.2$), the percentage of 7-Hz sec. per trial 4.8 ($SD=6.2$), the numbers of separate episodes of 7-Hz 1.9 ($SD=1.8$), and the longest train of 7-Hz spikes 1.6 ($SD=1.3$).

One-way analysis of variance and a nonparametric analysis of variance (Kruskal-Wallis) all indicated no statistically significant difference ($F_{3,16}=1.25$, $p>.05$) between any pair of the EEG measures or the rank-ordered measures of congruence between the stimuli and the descriptions as a function of the four episodes of testing. Consequently, analysis of all 20 stimuli as a group was considered appropriate. The values of Spearman *rho* between the measures of congruence and the durations of 7-Hz activity are shown in Table 4.

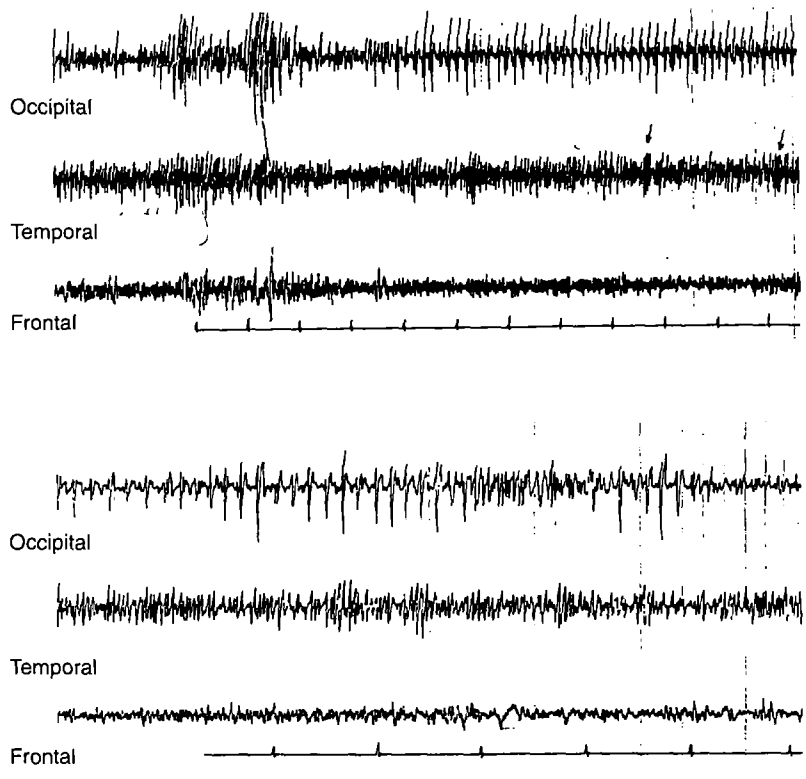

FIG. 3. Bipolar electroencephalographic recordings over the occipital (01-02), temporal (T3-T4), and frontal (F7-F8) lobes during two separate segments with different paper speeds (upper and lower panel) while Mr. Swann engaged in remote viewing. The 7-Hz complex spike and slow wave activity over the occipital regions is conspicuous. Short vertical lines indicate 1-sec. increments.

There were statistically significant ($p < .05$) positive correlations between the congruence between pictures or objects and their drawings and the total numbers of seconds containing 7-Hz spikes, the percentage of these spikes per trial, and the numbers of separate episodes of trains of these spikes per trial. Only the numbers of separate episodes of 7-Hz spikes per trial were correlated significantly with the ranked congruence between the words written to describe the stimulus and the actual stimulus.

An example of a stimulus (photograph) in this series and the response (drawing) whose ratings for the drawing, verbal descriptions (word), and meaning were between 6 and 7 is shown in Fig. 4. The words recorded by Mr. Swann on this drawing were "deep feelings," "dark but airy," "gloomy," "building," "stars or points of," "clandestine romance," "feelings

of seeds," "struts," "electricity," "feeling of awesome," and the letters "TKP."

The means and standard deviations for the various dimensions of the words employed during the descriptions, as measured by the Whissell Dictionary, were for pleasantness 1.66 ($SD = .27$), activation 1.89 ($SD = .19$), images 2.16 ($SD = .28$), frequency of occurrence 737.1 ($SD = 754.13$), and length 5.68 ($SD = .83$). The percentage time of 7-Hz spike and slow wave activity was positively correlated with the pleasantness scores for the words employed (.43) and negatively correlated with the activation scores for the words employed (–.55). Correlations with the other variables were weaker than the absolute value of .28.

TABLE 4

SPEARMAN RHO CORRELATION COEFFICIENTS BETWEEN VARIOUS MEASURES OF 7-HZ SPIKE AND SLOW WAVE ACTIVITY OVER THE SUBJECT'S OCCIPITAL LOBES DURING DETECTION OF STIMULI AND RANKING OF ACCURACY ACCORDING TO BLIND RATINGS

EEG Measure	Picture Rank	Word Rank	Meaning Rank
Total Time	–.03	.20	.22
Total 7 Hz sec.	.55†	.31	.43*
Percent 7 Hz	.59†	.29	.42*
Separate Episodes 7 Hz	.52*	.51*	.51*
Longest Train	.37	.30	.21

*$p < .05$. †$p < .01$.

Magnetic Resonance Imaging

Examination of the MRI indicated no gross or even mildly discernable structural anomalies. Multiple small, bright objects or periventricular hyperintensities, typical of the aged brain, were noted around the ventricles and within the white matter in both hemispheres. The ventricles were symmetrical in size. There were no discernable asymmetries that could not be accommodated by orientation artifact. There were three or four significant clusters of bright objects within the subcortical white matter within the occipital lobe of the right hemisphere. Four punctate signals, evenly spaced midway between the cortical grey and ventricles, comparable to axial horizontal image O (just above the corpus callosum) in Nolte and Angevine (2000), were noted beneath the parietal and frontal lobes in the right hemisphere.

The major concentration of the clusters of unidentified bright objects were observed in several slices (coronal, sagittal, and horizontal) and followed the expansion of the axonal tracts as they exited the parietal and occipital cortices. The clusters of anomalous signals were at the level of the axial horizontal image M (level of the midthalamus) in Nolte and Angevine (2000) and occupied about one-third of the white matter caudal to the splenium of

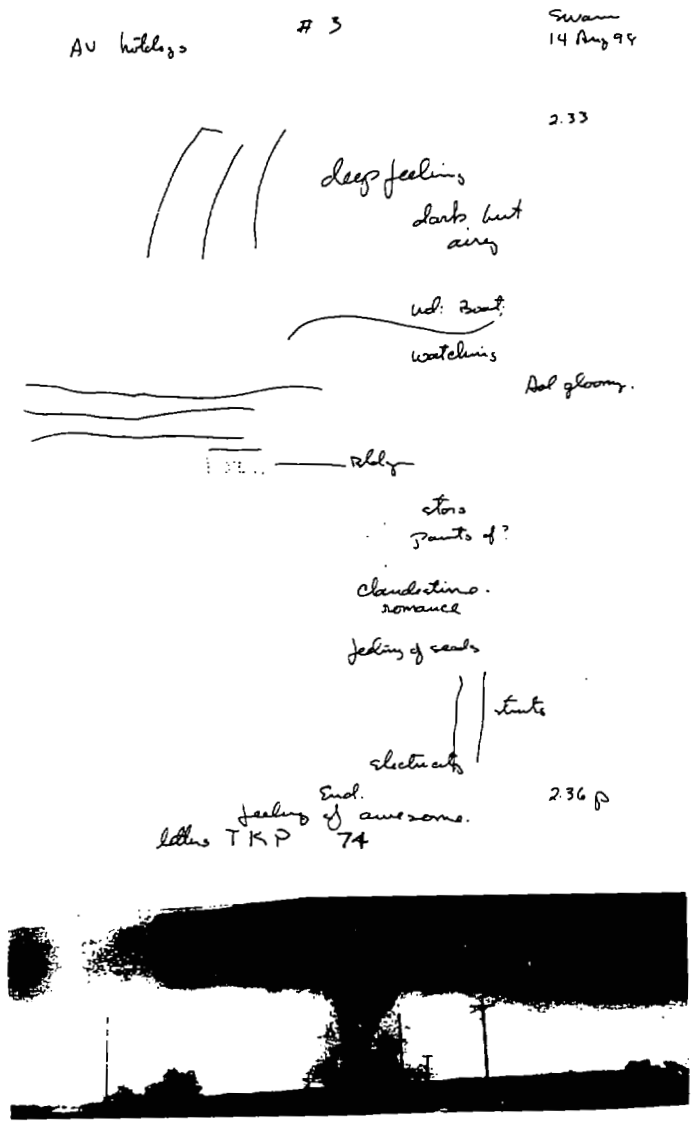

FIG. 4. An example of the images drawn by Mr. Swann during his remote viewing of a stimulus is shown in the top panel. The actual stimulus is shown in the bottom panel. See text for clarification of the words.

the corpus callosum. Sagittally, the anomalies were evident in the white matter below the parieto-occipital sulcus. This concentration of unusual signals was verified under blind interpretation by a qualified radiologist.

Discussion

The results of the present study suggest that the organization of the brain of Ingo Swann may allow the representation of information at a distance through processes correlated with clear physical and neurophysiological measurements. The accuracy of this information was significantly correlated with the proportion of 7-Hz paroxysmal activity over the occipital regions. We have employed the same montage during our assessment of approximately 500 patients who had sustained various types of brain injuries but have not observed this particular pattern.

If we assumed that the ordinal rankings of accuracy were interval scales, then about one-third of the variance in the percentages of 7-Hz spikes and the scores for accuracy was shared. This magnitude would be too small to reflect a causal relationship and suggests a third factor (or a factor occurring intermittently during the 7-Hz periods) was responsible for the association. The numbers of separate episodes of 7-Hz spikes were correlated significantly with the similarity of the drawing to the stimulus and the words employed to describe the stimulus.

According to the general data base from the Whissell Dictionary, the words employed by Mr. Swann were unpleasant, active, and involved highly imagined or concrete images. However, we did not compare these scores with scores from a control population who described the same pictures during direct visual inspection. We cannot exclude the possibility that the language employed by the subject may have reflected the stimuli rather than any underlying process involved with the detection of the stimuli.

The concurrence of the 7-Hz spike-like activity within the left and right occipital regions would be more consistent with a subcortical source rather than a cortical focus. Because it did not generalize and remained within the occipital region, a traditional thalamic etiology from the midline and reticular nuclei is not likely. One possible neuroelectrical source would be the hippocampal-amygdaloid transition area. The hippocampal complex is known to generate two major frequency peaks around 7 Hz and 40 Hz. If there were reduced inhibitory processes within the occipitoparietal cortices of Mr. Swann's brain, then access to these regions by subcortical afferents would be more probable.

This pattern might suggest that modulation by the pulvinar, a major associative input into the parieto-occipital region, has been altered in this artist's brain. This could allow the direct influence upon the EEG signatures of paroxysmal discharges from the hippocampal formation through the nucleus reuniens (thalamus) into the respective cerebral cortices or from the anterior temporal cortices via the temporopulvinar bundle. This sheet of fibers connects the posterior temporal and inferior parietal cortices, two areas adjacent to the occipital cortices, with the pulvinar. Unlike an absence sei-

zure that would interfere with consciousness, the pattern generated by Swann's brain might allow access to right hemispheric spatial information involved with meaning and affect while second-order consciousness or awareness remained unimpaired. Consequently, he could experience an inundation of images and affects.

This same region was associated with anomalous signals within the white matter, as discerned by Magnetic Resonance Imaging completed within two days after the last experimental tests. The specific pattern of deficits for toe gnosis, haptic discrimination for the left hand, and manipulative dexterity for the left hand in the context of average to above average scores for other sensory and motor functions of these appendages would be consistent with an anomaly within the medial parietal (paracentral) lobe of the right hemisphere or the associated components of the corpus callosum. A second area of hypofunction, functionally and anatomically associated with the superior parietal lobule, would be the right prefrontal cortices. The latter conclusion would be supported by his specific deficits (even when age adjusted) for toe graphaesthesia, conditioned spatial association, and spatial reasoning.

These weaknesses for specific functions associated with the tract systems subserving the right parietal and occipital lobes and these specific radiological anomalies would not necessarily represent pathology or damage. Similar "deficits" displayed by another special subject, Sean Harribance, were associated with marked increases in the uptake of tracer as defined by Single Photon Emission Computed Tomography (SPECT) during these processes (Roll, Persinger, Webster, Tiller, & Cook, 2002). Mr. Harribance, throughout his adult life, has shown a capacity to discern "memories" and vital conditions accurately, perceived as brief "images" frequently localized to his left peripheral visual fields, when he is proximal to people (Persinger, 2001).

For both Mr. Swann and Mr. Harribance specific psychometric weaknesses and the results of computerized imaging could indicate different organizations of these or correlative brain regions which might allow the detection of different gestalts within sensory arrays. If the reasoning by Norretranders (1998) is generalizable, then different "neuromicrocircuitry" might allow transduction of stimuli not discerned by most sensory systems *and* the integration of these stimuli into different classes or gestalts of information. The "sensory system" could be the microstructural organization of the *intracerebral* neurons themselves. For example, the pulvinar of humans appears to have a commutation or switching function between modalities such that information from one modality can be transferred to and matched with information in another mode (Armstrong, 1981).

The physical processes by which the information is extracted from the environment have not been measured. We suggest the following hypothesis that we expect to be testable within this decade. First, all objects, including

human beings, are immersed within the geomagnetic static field. Second, each object might produce specific interference or some variant of birefringence patterns within this field. Third, these patterns when subtracted from the more or less constant static geomagnetic field would be the electromagnetic units distributed within three-dimensional space that could be integrated into another form of perception of space and time as yet not detected by instrumentation.

Although information is most frequently defined as digital phenomena, representations might be encoded by juxtaposing images induced by birefringence with chaotic signals. Recent engineering developments by Garcia-Ojalvo and Roy (2001) have indicated that chaotically optimal signals for conventional images are resistant to noise, thus minimizing the requirement for error-correction. They are difficult to obscure or to disrupt by traditional sources of electromagnetic noise. These signals can be considered naturally camouflaged.

If these patterns contain the information involved with Mr. Swann's accuracy, then enhanced geomagnetic activity would be a primary candidate to mask but not eliminate the contrast (acuity) and shape of these patterns. The frequent observation that global geomagnetic activity exceeding about 20 nT is associated with a decreased likelihood of spontaneous psi experiences (Persinger, 1993) and less congruence between experimental stimuli and experiences during dreams monitored in the laboratory (Persinger & Krippner, 1989; Krippner & Persinger, 1996) would be consistent with this prediction. Stated alternatively, the refringent signatures around objects would be equivalent to averaged energies of less than 20 nT displayed within temporal intervals of decasec to kilosec.

The human brain, specifically through right hemispheric processes, could experience this form of stimuli as meaning and emotional significance. The spatial extent of these stimuli would far exceed the limits of most acute senses. From this perspective the limbic system could have evolved because of its capacity to discern directly the organization of meaning as an additional dimension within the distal physical environment. This would include the spatial location or the state of individuals emotionally significant to the animal. Attribution of reward and punishment to stimuli perceived through classical sensory modalities, a more accepted limbic property, may have coevolved with this process.

Stimuli that evoke similar perceptual patterns or constancies (John, 1990) in all or most normal human brains should be more accurately detected once these patterns have been associated with images or verbal labels. Natural objects and discrete processes that exist in larger increments of space and time, such as tornados or volcanoes, would be more optimal for discrimination because cerebral representation of the percept would be more

intense (such as the detection of the moon by the normal visual system) and would be less affected by culture and language (such as the subtleties of the patterns of stars, the constellations). This speculation would be consistent with the subject's experiences during the last three decades that "archetypes" and related images are one of the keys to accurate remote viewing.

If there is an organization of physical meaning or affect within the geophysical environment that is coupled to the birefringence patterns generated by objects and events embedded within a space, then the organization could involve much longer time frames than conventional perception. Houses, structures, and natural places that exist for decades would constitute a stable meaning structure, analogous to the fixed positions of pixels within a photographic array that allows the perception of the picture. Because the human being is more mobile, stable positions within this spatial configuration would be less probable. Mr. Swann's drawings during the outbound experiments involved the locations of large objects or historically protracted processes rather than the movement of people or their biological structure.

The physical mechanism by which information at a distance could be discerned would require a holographic-like representation within space rather than the propagation of information that would be attenuated over space. The information might be contained within the geomagnetic field itself and would be associated with processes within and around the energy now described as flux lines. Access to distal information by a reference because of its immersion within a field is not a novel concept within neuroscience. Glial cells within brain space are functionally related by a syncytium by which each glial cell has the potential to respond to the subtle changes in levels of potassium and steady potentials from anywhere within the volume. These distances are in the order of 10,000 times greater than the width of the cell.

Extraction of the information would be analogous to a holographic process (Bentov, 1977) through the volume of space contained within the subject's brain. Theoretically, the entire "image" could be reproduced from this subset of the entire space. Similar to other holographs, as more "sections" were obtained the pattern or image would not necessarily change qualitatively. Instead, the details and accuracy of identifying the object would increase. If the information was limited then only larger, more conspicuous structures, such as the outline of a building, would be discerned.

During the two outbound trials the subject drew the key structures of the major stimulus first, sometimes repeatedly. As time progressed, the "spatial perspective" or aperture of his pictures or viewing widened and the details increased. From a strictly behavioral perspective, the pattern would exhibit the properties of fractals. As the pattern is amplified or focused a similar pattern emerges at each level of spatial organization *ad infinitum*.

In the outbound studies, the people observing the targets would have

passively generated the neural patterns that code their brains as they perceived the stimuli. From the perspective of this model, Mr. Swann would *not* be discerning the highly idiosyncratic, linguistic, and quasirandom processes that likely defined the individual's thoughts. Instead, he would have been experiencing the perceptual constants and shared algorithms for emotional meanings associated with the right hemispheric activity at the times of the observations by those perceivers. He would have been discerning the perceptions of the spatial emotional patterns from the brains of the observers rather than the left hemispheric ideas or thoughts of the observers.

The pattern of Mr. Swann's responses to the pictures hidden in an envelope in an adjacent room suggested a systematic process that emphasized the distinct intrinsic perceptual patterns of the stimuli as well as their affective themes. The observable components of the stimuli were the thickness of a page in a typical book, constructed of cellulose, chemical developers, and ink. For such detection to occur the density of meaningful information should be large because the birefringence patterns would be expected to be weak. If this narrow range of chaotic patterns were discerned by the subject, then weak complex magnetic fields applied across the stimulus area should produce competing interference patterns that could distort the stimulus or mask its intrinsic characteristics. Our experiments conducted during a second visit in July 2000 by this subject (Persinger & Koren, 2002), supported this prediction.

If remote viewing involves brain activity, then it should be influenced by perhaps the most powerful process involved in the adaptation of mammalian adults to their environment: learning. Mr. Swann's preferred procedure of observing the targets after a few trials (about 15 min.) would be consistent with the concept of reinforcement or feedback. In fact, he repeatedly emphasized that the process was most effective when the remote viewer learned to discern when to disengage at the peak of the accuracy.

One qualitative feature of the temporal sequence of Mr. Swann's descriptions and the likely activity of the stimulus sources (the behavior of the people observing the objects during the outbound experiments) was the weakened concurrence of the serial order of the events. His images and words during the 10- to 15-min. periods of "reception," although accurate for the entire trial as a unit, contained details that would have more likely occurred several minutes before or several minutes after the experiences of the observers at the stimulus sites. Considering the relationship between increments of time and space (Persinger, 1999b) in the perception of phenomena and the existence of more than one binding factor (the process that integrates transcerebral electroencephalographic activity) for human consciousness (Persinger, 1999a), an as yet unknown change in time perception may be possible.

If the concept that remote viewing involves access of a holographic-like process containing spatial relationships of meaning is approximately valid, then large amounts of information regarding the earth and its surface configurations must be contained within this hologram. Individuals with specific alterations in right hemispheric function, which emphasizes spatial and emotional relationships of stimuli discerned through more known modalities, might discern this information.

Consciousness may be considered a type of insulation from the myriad stimuli within our environment. Edelman (1989) has hypothesized that consciousness is constantly recreated every 20 to 40 msec. as fields of activity within re-entrant cerebral pathways. Llinas and Pare (1991) have indicated that cohesive neuroelectromagnetic fields exhibit an approximately 10- to 20-msec. phase shift between the rostral and caudal poles of the brain. One obvious question concerns what occurs between the end of one phase or packet and the beginning of another. Because the sense of "now" is longer than the continuous recreations of these "quanta" of transcerebral fields, the phenomenology of consciousness would be experienced as a Jamesian "continuous stream."

We suggest that the transient separation of these quanta for a brief amount of time, given electrical seizures within the right hemisphere, functional hemispheric asymmetry due to mismatches of reciprocal interhemispheric inhibition through corpus callosal pathways, or to specific experimentally applied electromagnetic fields may allow access to environmental information normally insulated by these successive reactions. Information extracted during this "temporal dilation" between adjacent phases or serial quanta would be included into the normal stream of consciousness in a manner analogous to the inclusion of exteroceptive stimuli into a concurrent dream.

From this perspective the generation of 7-Hz spike and slow wave activity over the occipital lobe while Mr. Swann was experiencing and drawing images attributed to distant information may have reflected this separation of the serial generation of these temporal quanta of cohesive cerebral activity that defines normal consciousness. The quantitative relationships between the numbers of these spikes and the accuracy of the drawings would be consistent with this argument. We have suspected that these spikes might also be related to pontine-geniculo-occipital transients that precede the onset of normal dream sleep. Were this assumption correct, then the images reported by Mr. Swann would be analogous to a special variant of waking dreams.

The potential interaction between specific brains of members of the human species and components within the geomagnetic field may occur because of the shared mode of frequencies between the brain and the geomagnetic field. The fundamental mode frequency for the earth (the Schumann Resonance) is about 7 to 8 Hz given the radius of the earth-ionospheric shell

and the speed of electromagnetic propagation (Koenig, Krueger, Lang, & Soenning, 1981). The fundamental mode frequency for neocortical resonances would be similar if we assume the radius of the brain was on the order of 10 cm and the average peak for corticocortical propagation was on the order of 10 m/sec. (Nunez, 1995). It may be of interest that if we solve for the radius of the system for the dominant frequency (7 Hz) displayed by Mr. Swann's brain during remote viewing, for corticocortical velocities of 6 m/sec., 8 m/sec., and 10 m/sec., the radii of the system supporting these nondispersive fields would be 19 cm, 26 cm, and 32 cm, respectively. These values would involve distances around but outside of the skull.

The energies that compose the stimuli involved with remote viewing could be extremely small. For example, as suggested by Jibu and Yasue (1995), an infinitesimal amount of energy is sufficient to create a Goldstone boson. Within macroscopic orders these bosons can be regarded as waves with very low frequencies. The wave motions of aligned electric dipoles would exhibit coherence lengths on the order of about 50 micrometers. According to Jibu and Yasue, no microscopic physical phenomena other than the Goldstone boson could manifest a macroscopic electromagnetic wave within electroencephalographic ranges.

The idea that brains might access components within the whole of the field generated by the billions of human brains immersed within the geomagnetic field is similar to the concept of the Geopsyche (Persinger & Lafreniere, 1977) and to the eastern description of the Akashic Record. Whereas the Geopsyche is contingent upon large numbers of human brains with similar brain structures (and hence memories) functionally coupled by their immersion within the static component of the geomagnetic field that produces a temporospatial gestalt beyond the individual elements, the eastern concept appears to presume a representation dependent upon both contemporary living and previously living brains. However, these ideas do not require nonphysical or spiritual assumptions but may reflect an intrinsic feature of the natural environment that can be experimentally manipulated and reproduced within the laboratory.

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