

Geomagnetic Factors in Subjective Telepathic, Precognitive, and Postmortem Experiences

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ABSTRACT: This study was designed to test the reliability of the observation that subjective telepathic experiences concerning death and crises have occurred on days when the geomagnetic activity was quieter than the days before or afterwards. Geomagnetic activity (aa index) at the time of three major classes of subjective psi reports (telepathic-clairvoyant [$N = 133$], precognitive [$N = 105$], and postmortem [$N = 140$] experiences) was compared with the activity on the days before or after the experiences. Highly statistically significant ($p < .001$) differences were found between the classes of experiences and for time by class interactions. Telepathic experiences occurred on days when the geomagnetic activity was much less than the days on which the precognitive or postmortem experiences occurred. In addition, the geomagnetic activity on the days of the telepathic experiences was significantly lower than for: (a) the days before or after the experiences, and (b) the average of the months or years in which the cases occurred. This pattern was not found for the other two classes of experiences. The telepathy-geomagnetic pattern was internally consistent and very similar to the results of three other studies. The results strongly suggest that some factor associated with or enhanced by transient, sudden decreases in geomagnetic activity may facilitate the occurrence or the memory of the occurrence of telepathic experiences concerning death and crisis.

Several studies (Persinger, 1985a, 1986; Schaut & Persinger, 1985a) have shown that subjective telepathic experiences tend to occur on days when the geomagnetic activity is quieter than on the days before or after the experiences. The effect is quite strong statistically and is very similar in all three studies. Most of the experiences from the Schaut and Persinger (1985a) study occurred between the years 1920 and 1967, whereas those from the Gurney, Myers, and Podmore analyses (Persinger, 1986) occurred between the years 1868 and 1885. More than 98% of the cases involved episodes of sudden death, crisis, or illness of friends or family members.

The aa (average antipodal) index of global geomagnetic activity has been employed in all of the above studies. Daily or half-daily values refer to the average amplitude (in gammas) of geomagnetic activity (Mayaud, 1973). This measure is derived directly and quantitatively from magnetograms of observatories in England and Australia (hence the term "antipodal"). This particular measure of geomagnetic activity was selected because it provided a homogeneous quantitative series of highly reliable values that begins in the year 1868. In addition, 100 years of the data are easily accessible in the monograph (Mayaud, 1973) or on magnetic tape; subsequent years are also available.

We decided to determine the reliability of the previous studies by ana-

lyzing the remaining cases of subjective telepathic-clairvoyant (T-C) experiences that were available to us. These cases had been reported in *Fate* magazine; its format was considered instrumental for the demonstration of the specificity of the geomagnetic effect on T-C experiences because both precognitive (PC) and postmortem (PM) experiences were also included. Except for the temporal displacement before or after the event, descriptions and details of precognitive and postmortem experiences are similar to T-C phenomena. We considered the PC and PM experiences as both source (from *Fate*) and case controls. If the geomagnetic effect were specific to T-C experiences, then it should not be evident in the PC or PM cases. If it were evident in all three classes, then some nonspecific factor (such as the generalized display of unusual experiences) might be likely.

In the present study, we compared the three major classes of subjective psi phenomena: T-C, PC, and PM experiences, with respect to the geomagnetic activity during the weeks, months, and years in which they occurred. The study was designed to allow comparison with previous analyses and to allow internal comparisons within subcategories of the major classes. Consequently, we also compared the geomagnetic conditions during different modes (impression, image, dream, apparition) of experiences. Although the classification of "mode of experience" does not involve traditional distinctions, we assumed that the four categories would allow us to discriminate any differential effects of geomagnetic activity on the form of the experience. If there were differences, then specific mechanisms by which geomagnetic activity might affect psi phenomena could be postulated more precisely. Conditions of the putative agent (death or crisis) when appropriate and time of day were also differentiated. We were particularly interested in the internal (replication) consistency of the two collections of *Fate* cases.

Our definitions of telepathic, precognitive, and postmortem experiences utilized the following criteria. Telepathic cases were those that involved the experience and the event occurring at more or less the same time (within minutes). Precognitive experiences involved cases where the experience preceded the associated event by at least 1 hour. We found that in fact very few of the cases were ambiguous (potential T-Cs); most of them involved a lag of 12 hours or more between the experience and the event. Postmortem phenomena involved cases where the experience occurred after the death of a person (family or friend). Any experience that occurred more than 1 hour after the actual death of the person was given this designation. Again, there were few ambiguous cases. Most of the PM cases occurred after the person knew about the death of the person. Consequently, the three classes were quite distinct with only one or two ambiguous cases that might overlap two adjacent classes.

One example of cases that were designated as T-C included the following report:

It was 5:45 A.M. that Friday morning of August 26, 1966, when I awoke suddenly from a dream. In the dream I had been walking with my mother

Mary McGourty over some fields and up a steep path that took us to the top of a high mountain. We stood looking down from the hilltop over a lovely green valley. Along the sides of the mountain wild flowers of every description grew and below us lay a peaceful valley dotted with lakes. The sky was blue with a few white billowy clouds.

"Isn't that the most beautiful spot you've ever seen?" my mother remarked.

"Yes," I replied, "I wonder where we are."

Mother was holding my hand as she talked and suddenly, very gently she let go of my hand and said, "I must leave you now, dear. I have to go to that valley right away"

It was when she let go of my hand that I woke up. I lay there for a while, thinking about my dream and about my mother who had been very sick. Then I went back to sleep. I was awakened again by the ringing phone at 7:30 A.M. My husband answered it, and after a few brief words he turned to me and said gently, "Honey, I have some bad news. . . ."

I interrupted him to say, "Yes, I know. My mother died, didn't she?" She had died at about 5:45 A.M. (Meehan, 1980, p. 91)

An example of cases classified as postmortem apparitions included this report:

I experienced my first encounter with the supernatural when we were living in Sioux Center, Iowa. It was a rainy spring day—April 14, 1968—and about 10 o'clock I decided to walk down to the supermarket for a little shopping. I bundled up in my raincoat, picked up my umbrella and started out.

I had walked almost a block when my six-year-old daughter Karen appeared in my path. I was aghast. She had been dead for four months. But this was no illusion. She came quietly toward me, slipped her hand into mine and gave a little tug. Without words we walked on to the store and she stayed close beside me as I shopped.

On the way home with Karen still holding my hand I noticed she was wearing a dress she always had loved. Somehow it came to me that my daughter had come back to tell me she was all right and happy on another plane. When we reached our house Karen said, "Mommy, I have to go now, I love you and tell Daddy I love him too." (Mantel, 1971, pp. 103–104)

An example of a case classified as a precognitive experience follows:

On August 12, 1967, after the rest of the family had retired, Ramon and I stayed up to talk about the train trip we were planning the next day to Guadalajara, Jalisco. We had called earlier that day to reserve Pullman accommodations. About 10:00 P.M. Ramon and I retired but lay awake talking some more about the trip. We also commented on how quiet the city was at night after the roar of traffic had subsided to a distant murmur.

Suddenly Ramon said, "Do you hear that, Robert?"

"Hear what?"

"I can hear the wheels of a train very clearly, quite loud," he exclaimed.

"Now it is going faster and faster, much too fast. I can see it!" he continued. "Ahead is a curve and a little farther on is the mouth of a tunnel. I

can see everything in color! Oh, my Lord, the train is derailed on the curve and overturned. I can hear the passengers moaning and screaming. A lot of them are injured. Oh, no! There's a woman's leg protruding from one of the broken windows. She's losing a lot of blood. Oh, it is terrible!"

We did not know what to make of his vision, neither of us having experienced anything like it before. Ramon said the next morning, "I must have had a nightmare with my eyes open." But the vision disturbed us so much we canceled our reservation on the Aztec Chief Express.

That night, the 13th of August, we went to a late movie and as we stepped into the street afterwards we heard a nearby paperboy crying "Extra! Extra! Read all about the terrible train disaster!" . . . [The paper read:] "Aztec Chief Express Derails and Overturns!" The report went on to say that because of mechanical failure the train had reached an excessive speed and derailed on a curve near a tunnel. (Bound, 1976, pp. 66-67)

The wreck had occurred almost exactly 24 hours after the precognitive experience.

Although none of the subjective telepathic cases from *Fate* magazine were verified by traditional parapsychological methods, we felt that these cases had sufficient superficial similarity to warrant their inclusion. The T-C experiences from the Persinger (1974b) analysis of *Fate* cases showed that 79% of the putative agents were either dying, suddenly sick, or in life-threatening crises at the time of the percipient's experiences. In comparison, 82% of the agents in Stevenson's (1970) sample, 79% of the agents in the Sannwald (1963) sample, and 76% of the agents in the cross-cultural study of Prasad and Stevenson (1968) were in these conditions. Whereas in the Sannwald and Stevenson studies, the putative agent was a member of the immediate family in 50% and 63% of the cases, respectively, 53% of the *Fate* cases showed this pattern. For *Fate* PC cases ($N = 128$), 40% of the events occurred within 1 day of the experience, and 63% occurred within 3 days of the experience. Orme's (1974) analyses of 148 other PC cases showed these values to be 40% and 55%, respectively.

Of course, the similarity of *Fate* cases with respect to temporal-demographic characteristics of verified cases does not demonstrate their equivalence. However, if there were a marked similarity in the geomagnetic effect for both the unverified (*Fate*) and verified (Gurney, Myers, & Podmore, 1886; Stevenson, 1970) cases, an argument could be made for their shared source of variance. Even then, the geomagnetic factor could be something that is merely common to both psi and pseudo-psi without presuming that the two are identical.

The use of *Fate* cases might also suggest the robust nature of any geomagnetic effect. Because these cases are unverified, "error noise" should (if anything) reduce the magnitude of any geomagnetic effect compared to its strength in a verified sample of subjective experiences. Finally, from a strictly behavioral perspective, the critical components of this study are the dates of the experiences and the geomagnetic values rather than the level of construct validity for either measure.

METHOD

Database

Our *Fate* database at present involved every case from the sections "My Proof of Survival" and "True Mystical Experiences" that contained the day, month, and year of occurrence. Of the 234 issues analyzed thus far, a total of 466 cases have met this criteria; 378 (81%) of them involve the three main classes of subjective experiences: T-C, PC, and PM phenomena. Only 2 cases of non-crisis T-C have been encountered, and they were not included in this analysis because of the small size of the group. The other types of cases involve reports of out-of-body experiences ($N = 34$), survival proofs ($N = 36$), spontaneous psychokinetic-like experiences ($N = 12$), and religious visitations ($N = 4$).

All first-person reports concerning T-C, PC, and PM experiences that contained the day, month, and year of occurrence were recorded from our library of *Fate* magazines. Most of the 234 issues were published between the years 1965 and 1985. The collection of reports was completed in two series (replications). The first replication, which was published elsewhere (Schaut & Persinger, 1985b), involved 58 T-C, 56 PC, and 75 PM experiences. The second (present replication) study involved 75 T-C, 49 PC, and 65 PM cases.

Procedure

Each report was coded according to the following parameters: hour (if given), day, month, year, sex of the percipient (reporter), classification (T-C, PC, or PM experience), mode of experience (feeling/impression, image, dream, or apparition), and general geographical location of the percipient (continent). The classification code also indicated if the experience involved sickness, crisis, or death.

Case Characteristics

For the T-C experiences, the putative agent's situations at the time of the experiences were sudden sickness ($n = 12$), life-threatening crises ($n = 27$), and death ($n = 94$). For the PC experiences, crisis was involved in 42 cases and death occurred in 63 cases. Chi-square analyses indicated that there were no statistically significant differences between Study 1 and Study 2 with respect to frequencies of class type, sex of percipient (reporter), crisis/death condition or mode; 81% of the percipients were female. There was a significant ($p < .001$) difference between mode (4 levels) and the class of experience ($\chi^2 = 119.50, 6 df$); this was due to the disproportionate number of apparitional forms (83%) in the PM experiences compared to the T-C (28%) and PC (25%) experiences. However,

there was no significant difference between the proportion of different modes between telepathic and precognitive experiences only. Modes for T-C and PC experiences were not influenced by sex, crisis/death condition, or month of occurrence, but they were associated with time of day ($\chi^2 = 10.16, 3 df, p = .02$). Dreams (62%) and apparitional (75%) experiences were more likely to occur between midnight and 6:00 A.M. (local time) than impressions (36%) or images (31%). Impressions and images were more frequent during the other hours (7:00 A.M. to 11:00 P.M.). Comparisons of all three classes with respect to the temporal specificity of reports (specific hour, day vs. night, or the date) demonstrated no significant ($\chi^2 = 4.30, 4 df$) differences in distribution. Thus, reports of the specific time of the experience did not differ between the three classes of phenomena.

A chi-square analysis indicated significant ($\chi^2 = 5.49, p = .02$, after Yates' correction) distributional differences in the frequencies of death and crisis conditions for T-C ($n = 121$) and PC ($n = 105$) experiences; T-C had more (78%) death references than PC cases (60%). There were no significant sex differences for any of the class, mode, crisis/death or time of the experiences. The median years for the occurrence of the T-C, PC, and PM experiences were 1955, 1964, and 1963, respectively. The ranges for all classes included the years 1890 through 1984. The mean latencies between the occurrence of the experience and its publication in *Fate* were 11 years, 6 years, and 7 years for the three groups. Nonparametric analysis (Kruskal-Wallis) demonstrated that the T-C cases had a significantly ($\chi^2 = 8.87, p = .02$) longer latency of report than the other two classes of cases.

Geomagnetic Activity

AA values for the appropriate hemisphere in which the case occurred (north or south) were coded for the 3 days before, 3 days after, and the day of the experiences. The mean aa values for the month and for the year in which the experience occurred were also coded. For those cases in which there was no hourly specification, simply the value for the day of the experience was used. For those cases in which the specific hour was specified, adjustments were made between local and universal time by using combinations of half-day values. This procedure has been discussed previously (Schaut & Persinger, 1985b).

The primary design employed multivariate analysis of variance (MANOVA), which allows repeated (dependent) measures to be combined with factors (nonrepeated measures). In this instance, the repeated measures were the 7 successive days of aa values *or* the aa values for the day, month, and year in which the experience occurred. The main factors were classes of experiences and replication. Other main factors that were considered before analyses began (for T-C and PC only) were: (a) class of

experience and crisis versus death situations, and (b) class of experience and the mode of the experience.

MANOVA was selected because it allows a dynamic (temporal) comparison of changes over time between geomagnetic conditions for separate classes or conditions of experiences. Our previous analyses (Persinger, 1985a; Schaut & Persinger, 1985a, 1985b) indicated that interactions between the day of the experience and the type of experience were the key phenomena. The rationale for selecting the key day (day of the experience) and the 3 days before and the 3 days after the experience was based upon both theoretical and empirical reasons. First, geomagnetic activity within 1 ± 1 days is usually highly correlated ($\geq .60$) or dependent; beyond 3 days, there is little correlation (days are independent). Second, several previous studies (Persinger, 1985a, 1985b; Schaut & Persinger, 1985a, 1985b) have shown that on any more than ± 3 days from the key day geomagnetic values are usually not significantly different from the mean values of the month.

Because assumptions of homogeneity of variance are occasionally violated with geomagnetic indices (from outlier values, i.e., geomagnetic storms), log transformations of the daily, monthly, and yearly aa values were completed. MANOVA designs were applied to these values. Repeated measures for specific classes of experiences were completed separately to verify the results of the MANOVA and to more clearly delineate the temporal pattern of aa values; a posteriori correlated *t* tests for within class comparisons and independent *t* tests for between group comparisons were used. As an additional verification and data check, nonparametric repeated measures (Friedman's) and nonrepeated tests (Kruskal-Wallis) were completed for the different classes. This is a routine procedure in our laboratory in order to control for possible nonlinearities within data. All analyses were completed with SPSSX software on a Dec 2020 computer.

RESULTS

The means and standard errors of the mean of the daily aa indices for the 3 days before, the 3 days after, and the days of the experiences as well as the averages for the month and year in which the experiences occurred are shown in Figure 1. MANOVA of the seven repeated measures (7 successive daily aa values) and two factors, that is, the three classes of experiences (T-C, PC, and PM) and the two replications (one vs. two) demonstrated no significant difference ($F[1, 372] = 0.56, p > .01$) between replications but a highly significant difference ($F[2, 372] = 11.20, p = 1.9 \times 10^{-5}$) between classes of experiences. The results of the MANOVA were similar for the log (base 10) transformations of the aa values ($F[2, 372] = 10.67, p = 3.1 \times 10^{-5}$).

A posteriori analyses (Scheffe's set at $p < .05$) on both the raw scores and log transformations indicated that the T-C experiences occurred when

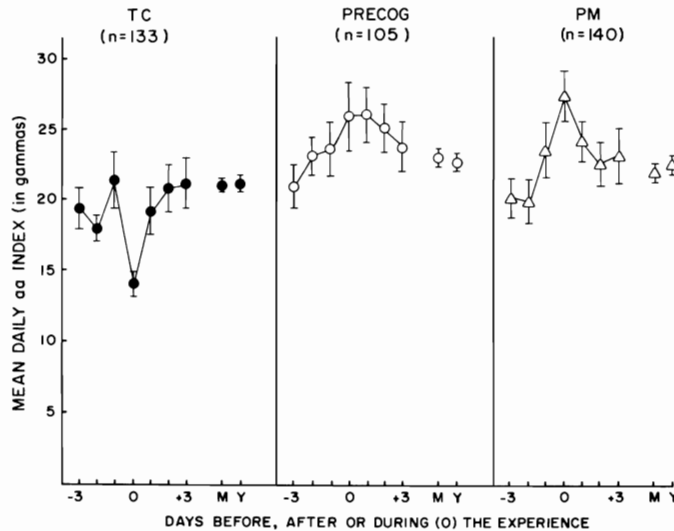


Fig. 1. Mean daily values (in gamma) of the aa (average antipodal) index of global geomagnetic activity for the 3 days before, 3 days after, and the days of T-C, PC, and PM experiences. n refers to the number of cases in each class of experience. M and Y refer to the means of the aa values for the months and years in which the experiences occurred. Vertical bars indicate ± 1 standard error of the mean.

the aa activity of the week ($\bar{X} \pm \text{S.E.M.} = 19.3 \pm 0.9$) was lower than the values for either the PC (24.2 ± 1.1) or PM (22.8 ± 1.0) experiences that did not differ from each other. The results were identical for both absolute values and log transformations. Nonparametric analyses (Kruskal-Wallis) indicated that the geomagnetic activity was also quieter during the week of the T-C cases (mean ranks = 161) than for the other two (ranks 213, 200) classes of experience ($\chi^2 = 15.41, p < .001$).

By far the most striking effect was the statistically significant class by days interaction. This was evident for both normal ($F[12, 2332] = 4.30, p = 88 \times 10^{-7}$) and log-transformed data ($F[12, 2232] = 4.42, p < .001$). A posteriori (mixed correlated/independent tests) contrasts indicated that this interaction was due to the quieter geomagnetic conditions on the days ($\bar{X} \pm \text{S.E.M.} = 13.9 \pm 1.0$) of the T-C experiences compared to the days on which the PC (26 ± 2.2) and PM (27.5 ± 1.9) experiences occurred. None of the other interactions (replication by day; class by replication by day) were significant statistically. There was also no significant difference between days ($F[6, 2232] = 2.50, p = .02$). Differences between normal aa values on just the days of the experiences were highly significant ($F[2, 375] = 28.33, p = 3.5 \times 10^{-12}$). The variance of aa values for T-C cases only was significantly less on the key day compared to the other two classes (Bartlett Box $F = 34.36, p <$

.001). However, a Kruskal-Wallis test indicated a highly significant difference between classes for the mean ranks of the values ($\chi^2 = 59.54$, $p < .001$).

Additional MANOVAs were completed to determine if the days of the experiences for the three classes were different from the monthly and yearly values. MANOVAs for three repeated measures (aa values for the days of the experiences, mean aa values for the months in which the experiences occurred, and the mean aa values for the years in which the experiences occurred) and two factors (the three classes of experiences and the two replications) were completed. There were no replication differences ($F[1, 374] = 0.68$, $p > .01$) or class by replication interactions ($F < 1$); there was a significant class difference ($F[2, 374] = 17.18$; $p = 7.3 \times 10^{-8}$). This was weighted almost exclusively by the extraordinarily significant time by class interaction that was similar for both normal ($F[4, 748] = 17.08$, $p = 2.05 \times 10^{-13}$) and log-transformed data ($F = 22.09$, $p = 1.2 \times 10^{-15}$).

A posteriori correlated t tests indicated that the T-C experiences occurred on days ($X \pm S.E.M. = 13.9 \pm 1.0$) that were significantly quieter than the months (20.9 ± 0.5) or the years (21.3 ± 0.4) in which they occurred; however, there were no significant ($p > .05$) differences ($t = 0.80$) between the aa values for the month and the year in which the T-C cases occurred. Similarly, there were no significant differences between the aa values for the days on which the precognition or apparitional cases occurred and their monthly aa values (22.9 ± 0.8 , 21.9 ± 0.6 , respectively) or yearly aa values (22.6 ± 0.5 , 22.4 ± 0.4 , respectively). The aa values for the months and years in which the T-C experiences occurred were not significantly different ($p > .05$) from the aa values for the months and years in which the PC and PM experiences occurred.

We reasoned that if the relative decreases in geomagnetic activity on the days of T-C experiences were strong, the effect should be evident if we simply compared the differences in aa values between the days of the experiences and the months in which they occurred. Consequently, the absolute aa value of the day of each experience was subtracted from the mean monthly value. The means and standard errors for these differences for each class of experiences were: T-C (-6.8 ± 0.9), PC ($+3.4 \pm 2.0$), and PM (5.6 ± 1.8). One-way analyses of variance indicated a highly significant difference ($F[2, 377] = 17.82$, $p = 4.0 \times 10^{-8}$) between the groups. A posteriori Scheffe's set at $p < .05$ indicated that the effect was due solely to the relative decrease in geomagnetic activity during T-C experiences compared to both the PC and PM experiences that did not differ from each other. Calculations of relative changes for each case ([key day aa value minus the monthly mean] divided by the monthly mean and multiplied by 100) demonstrated values of $-32 \pm 4.1\%$, $14.4 \pm 9.4\%$, and $28.2 \pm 5\%$ for the three classes, respectively ($F = 21.36$, $p < .001$).

To determine the strength of the repeated measure (daily aa values)

differences between days for the classes of experiences separately, both parametric and nonparametric (Friedman) repeated analyses were completed. The T-C cases demonstrated highly significant ($p = 2.4 \times 10^{-4}$) repeated measure differences ($F[6, 792] = 4.36; \chi^2 = 34.33, 6 df$). A posteriori (correlated t tests) tests indicated that only the day of the experiences was significantly different from the other days. For the PM cases, a significant repeated measure effect also occurred ($F[6, 834] = 5.70, p = 8.0 \times 10^{-6}; \chi^2 = 30.32, 6 df, p < .001$). A posteriori (contrast) correlated t tests demonstrated that for apparitional experiences the day of the experience was significantly more active relative to 2 to 3 days before the experience ($2.70 \leq t_s \leq 3.75, 139 df$). There were no significant ($p > .05$) repeated measure differences for the precognition experiences ($\chi^2 = 6.13, 6 df; F[6, 734] = 1.76$).

Further tests were completed to determine the internal consistency and cross-reliability of the results. These analyses were completed as log 10 transformations of the aa values in order to reduce the possible distortions from extreme outlier values. The first step was to determine the internal reliability of the most significant effect: the marked, decreased geomagnetic activity on the days of T-C experiences compared to the days before and after. As shown in Figure 2a, the two replications are almost identical. The experiences occurred when the geomagnetic activity became suddenly quieter compared to the days before and afterwards.

Cross-reliability with other analyses is shown in Figure 2b. Here the

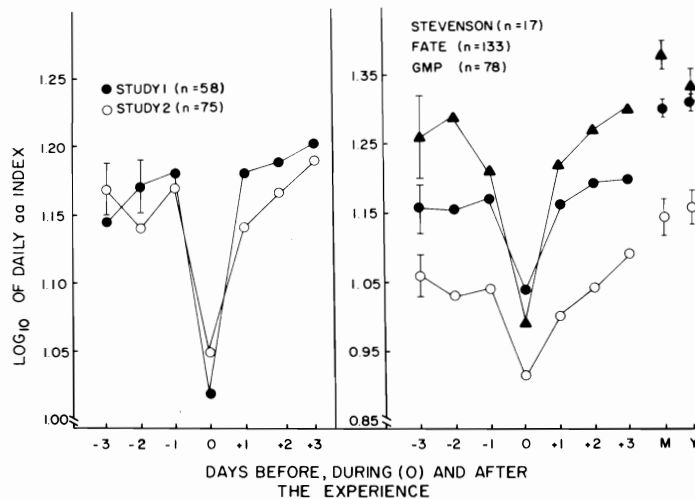


Fig. 2. (a) Log (base 10) transformations of the mean aa values for the 3 days before, 3 days after, and the days of subjective T-C experiences for replication 1 ($N = 57$) and replication 2 ($N = 75$). (b) Log transformations of the mean aa values for the days during, before, and after T-C experiences from the Stevenson, Fate, and Gurney, Myers, and Podmore (GMP) series; the GMP series occurred between the years 1868 and 1885.

geomagnetic activity on the days of, the 3 days before, and the 3 days after the T-C experiences is shown for the 17 new cases that contained specific dates from the Stevenson (1970) collection and for the 78 major cases that contained specific dates (between the years 1868 to 1885) from the Gurney, Myers, and Podmore (1886) series. Monthly and yearly aa values for each of these collections are also displayed. As can be seen, in all three studies, the T-C experiences occurred on days when the geomagnetic activity became suddenly quieter compared to the days before and afterwards. In addition, the days of the T-C experiences were also quieter than the average monthly or yearly aa values. These differences were highly statistically significant (Persinger, 1985a, 1986).

Because the chi-square analyses of T-C and PC cases indicated that more T-C cases involved putative agents who were dying compared to crises/sickness, MANOVA were completed for the 7 days as a function of the two classes of experiences (PC vs. T-C) and whether the agent was dying or ill/in crisis). There was no significant differences between the condition of the agent ($F[1, 222] = 1.80, p > .05$) or class by agent interaction ($F < 1$). Again, there was a highly significant main difference ($F[1, 222] = 11.74, p = .001$) between the two classes of experiences as well as the class by day interaction ($F[6, 1332] = 2.88, p = .009$).

As a final means of determining the internal consistency across the three classes, only the apparitional mode was compared. The aa values for the 3 days before, the days of, and the 3 days after the apparitional experiences involving PC ($n = 27$), T-C ($n = 37$), and PM ($n = 117$) cases are shown in Figure 3. MANOVA for the 7 repeated days and the three classes of apparitions indicated a significant main effect between classes ($F[2, 178] = 7.07, p = .001$). As with the general T-C cases, T-C apparitions occurred during periods when the geomagnetic activity was significantly less than periods in which the PC and the PM apparitional experiences occurred. In addition, there was a highly significant ($F[6, 1068] = 4.58, p < .001$) days by class interaction due to the much less geomagnetic activity on the day of the T-C apparitional experiences compared to the PC and PM apparitional experiences. These results further support the strong tendency of T-C experiences to occur during geomagnetically quieter periods.

Four modes of experiences had been designated in this study: impression/feeling, image, dream, and apparitions. To determine if the modes of the T-C experience were differentially associated with the aa index of geomagnetic activity, MANOVA was completed for the 7 days (key day ± 3 days) and the mode factor (four levels). There was a significant mode difference ($F[3, 129] = 5.06, p = .002$) and not surprisingly a highly significant ($F[6, 774] = 4.60, p = 1.3 \times 10^{-4}$) difference between daily aa values; there was no significant mode by day interaction. The day differences were due solely to the relative decrease in geomagnetic activity on the day of the T-C experiences (regardless of mode) compared to the days before or afterwards.

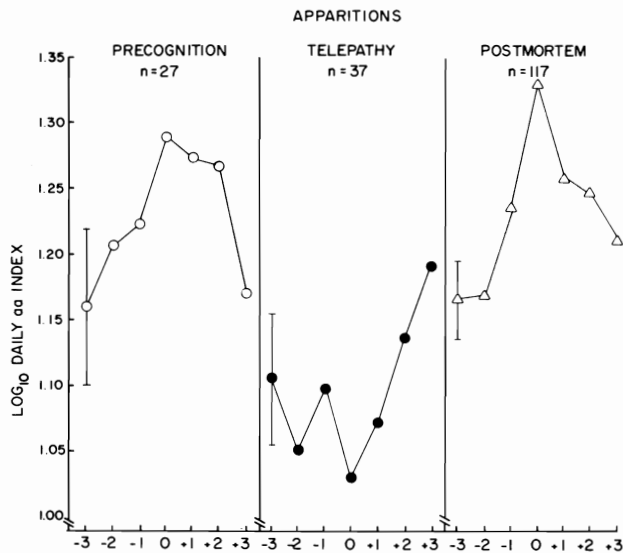


Fig. 3. Log transformations of the mean daily aa values for the 3 days before, 3 days after, and the days of subjective PC, T-C, and PM experiences for the apparitional mode only. Representative standard errors of the mean are indicated by the vertical bars.

The significant effect (Kruskal-Wallis $\chi^2 = 12.40$, $p = .006$) between modes was due primarily to the higher overall geomagnetic activity during the week in which T-C experiences involving dreams occurred relative to those involving apparitional displays. The means of the daily aa values for the day of and the 3 days before and after the experiences for each mode are shown in Figure 4. A similar analysis was completed for the PC experiences between modes: impression/feeling ($n = 25$), image ($n = 9$), dream ($n = 25$), and apparition ($n = 23$). In this instance, there were no significant effects (all F s < 1).

We wondered whether or not T-C cases that contained the specific hour of the experience might demonstrate a more enhanced geomagnetic effect than those that referred to only the date or to a day versus night dichotomy. These results were interesting in light of the hypothesis that the decreased geomagnetic activity might facilitate the perception or the *memory* of having T-C experiences rather than their occurrence (D. Scott Rogo, personal communication, March 3, 1986). In addition, any differences between these two groups of temporal specificity (specific hour, day vs. night, and date) might reflect differences in our calculations of daily aa values. Whereas aa values for most cases (which specified the date or a general day/night description) were simply the aa value for the day within the appropriate hemisphere, those cases that gave the specific hour involved somewhat different calculations based upon the use of half-day aa values that had been adjusted for local vs. universal time. MANOVA

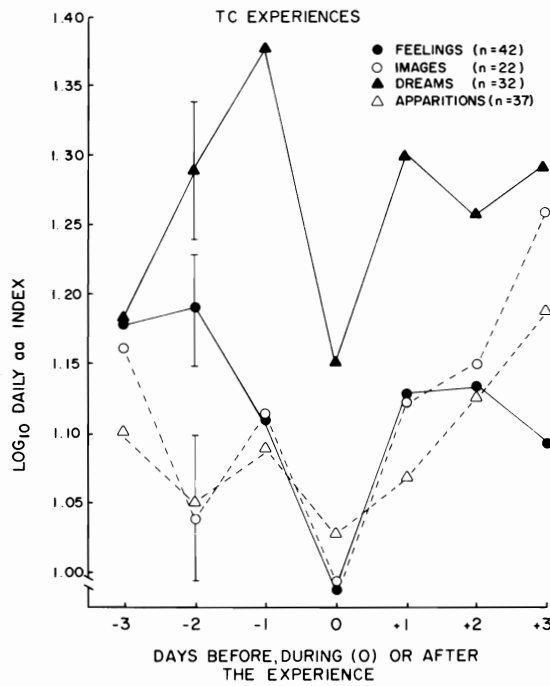


Fig. 4. Log base 10 transformations of the daily aa values for the 3 days before, 3 days after, and the days of subjective T-C (only) experiences as a function of the mode of occurrence: feelings (primarily autonomic changes), images, dreams, and apparitions. n refers to the number of cases in each mode. Representative standard errors of the means are indicated by the vertical bars.

demonstrated no significant difference between temporal specificity ($F < 1$) and no significant day by type interaction ($F < 1$).

DISCUSSION

The results of this study replicate and extend the conclusions of other analyses. Quite clearly, subjective T-C experiences concerning death, crisis, or unexpected illness have tended to occur when the geomagnetic activity was less than the days before or after the experiences. The V-shaped periods of geomagnetic activity during which T-C cases occurred were not evident during episodes in which either the PM or PC apparitions occurred. The geomagnetic activity during the occurrence of the latter two classes of experiences did not differ significantly from each other.

Although the geomagnetic patterns around the days of the T-C, PC, and PM experiences differed markedly, there may be some global geomagnetic factor in the latter two classes. The most obvious possibility occurs with the PM experiences. Both parametric and nonparametric analyses

indicated that PM experiences (which were primarily postmortem apparitions) occurred during periods when the geomagnetic activity was increasing; the days of the experiences were in fact significantly more active than the two to three days before the experiences. However, this elevated activity was not exceptional because there were no differences between these days and the monthly or yearly averages. This means that the PM experiences were more likely to have occurred when geomagnetic activity increased following a lull (a quiet period) in geomagnetic activity.

The significance of this pattern is not clear. It may reflect, as suggested by D. Scott Rogo (personal communication, March 3, 1986) and E. S. Maxey (personal communication, November 13, 1985) that more people die during periods of increased geomagnetic activity. Because more than half of the numbers of PM experiences occur within 3 days of the empirical event (the death) (Persinger, 1974b), these phenomena would simply be more frequent because deaths are more frequent. Indeed there is some evidence that increased incidence of myocardial infarction (Malin & Srivastava, 1979) and crisis/accident-related deaths (Persinger, 1983; Persinger & Nolan, 1984) may occur during increases in geomagnetic activity. This explanation assumes that the PM experiences are independent of geomagnetic activity and that the importance of this global factor is to simply increase the incidence of mortality or crises.

An alternative explanation is that enhanced geomagnetic activity actually contributes to the PM experiences. Several studies suggest that the electrical lability of the human brain may be influenced by some factor associated with geomagnetic activity. Rajaram and Mitra (1981) have shown that epileptic seizures occur more frequently during periods of increased geomagnetic activity; the pattern is obvious for both monthly analyses and during special (eclipse) conditions. The most frequent type of epilepsy in the adult population is temporal lobe or complex partial forms. Even in normal subjects, small microseizures are very likely during sleep, especially during rapid eye movements (REMs) because of the intimate role of the hippocampus in the dream process.

Several empirical studies (Hess, Urech, & Wieser, 1982) involving depth electrical recordings indicate that the temporal lobe is particularly labile during dream periods and hence may become susceptible to environmental factors (Persinger, 1985b); day-night differences in the susceptibility of rodents to magnetic fields are well documented (see Kavaliers & Ossenkopp, 1985, for latest references). It is interesting that the hourly incidence of temporal lobe epileptic seizures is very similar to the occurrence of subjective psi experiences. This pattern is evident even for the hourly occurrence of epileptic seizures (Spratling, 1904) that occurred during the last century, before the introduction of modern anti-convulsant drugs. Factors that are known to exacerbate temporal lobe instability are the corticosteroids and ACTH levels of the blood (Stevens, 1982). They are elevated during periods of stress, such as following the death of a family member or friend.

The latter explanation of PM experiences suggests that they are gener-

ated by the exposure of the sensitized person whose body is dominated by the "biochemistry of grief" to the geomagnetic factor. Although this may be correct, what is not clear is whether: (a) the experience is simply a spurious production or wish-fulfillment in the traditional psychoanalytic sense, or (b) the special conditions of grief plus geomagnetic perturbations allow the person to discern events that he or she might not typically experience. We think both lines of research deserve attention.

A less ambiguous finding is the complete lack of relationship between the occurrence of subjective PC experiences and geomagnetic activity. There were no significant differences between geomagnetic activity on the days of these experiences compared to the days before or after. Similarly, these days were not significantly different from the months or the years in which these experiences occurred. Even though they contained proportional amounts of death and crisis, they did not demonstrate any geomagnetic effect.

There may be a hidden variable. The variance of the daily aa values for the PC experiences was conspicuously and statistically higher than for the T-C and PM experiences. One initial explanation is that the *label* of precognitive experiences contains phenomena of heterogeneous sources. We also suspect (D. Lewicki & M. Persinger, unpublished data) that some accommodation must be made for the geomagnetic activity on the day of the *experience* compared to the day of the *event*. This is an important consideration and will be used to test the hypothesis that PC experiences tend to occur when the geomagnetic activity is similar to what the activity will be on the day of the event. This effect would support a more traditional (temporal dimensional) interpretation of PC experiences.

The general trend of the slope in geomagnetic activity over days for PC experiences is still positive. This may support a second hypothesis that PC experiences tend to occur during slow, gradual increases in geomagnetic activity. These *changes in activity* could have become a learned cue (Persinger, 1979) through processes that facilitate unusual associations between subtle and overt environmental events. The processes would be due to the deepened and widened affect of the experiences because of their enhanced temporal lobe lability (Persinger, 1985b; Persinger & Roll, 1985).

Regardless of the interpretation of these patterns, the results indicate that the T-C geomagnetic relationship is not likely to be an artifact of either general psi "experiences" or reporting. Most of the experiences occurred long before the geomagnetic hypothesis was developed. In addition, the *Fate* cases are remarkably similar in general characteristics to the cases of more accepted databases. The classic argument that *Fate* readers (or publishers) simply reiterated traditional T-C experiences is not supported. The critical data in the present study were the dates of the experiences. Geomagnetic activity on the days of T-C experiences was similar to that of the days of T-C experiences from other sources. These dates were not an experiential artifact because both PM and PC experiences did not demonstrate the pattern.

The next step is to determine the mechanism(s). Living systems can

respond to geomagnetic variations of the magnitude that were involved in the present study. As reviewed by Ossenkopp and Barbeito (1978), homing capacity of pigeons is adversely affected by increased geomagnetic activity; quiet geomagnetic periods facilitate homing and probably migration behaviors. One hypothesis is that sudden, enhanced geomagnetic activity interferes with subtle natural electromagnetic phenomena that act as both directional and informational sources. That sudden enhancement of natural electromagnetic noise can interfere with communication between members of a species is well documented. Fish that communicate by interorganismic emission of extremely low frequency (ELF) and very low frequency (VLF) electric fields demonstrate marked deterioration in social communication and behaviors during local thunderstorms; presumably the sferics generated by the local storms masks the subtle interorganismic signals.

There is strong but not conclusive evidence that human beings may respond to geomagnetic variations or to the stimuli generated by them. Correlations between geomagnetic storms and disruptive behaviors, such as suicides and psychotic disturbances, have been reported for several decades (Friedman, Becker, & Bachman, 1963; Traute & Duell, 1935); such correlations have not always been statistically significant (Pokorny & Mefferd, 1966). Several experimental studies (see Persinger, 1974a) have shown that crude human behaviors, such as reaction time, are influenced by fields of frequencies that are similar to natural sources. Recently, Michaud and Persinger (1985) and Persinger and Nolan (1985) showed that ELF electromagnetic fields could also influence cognitive processes involved with the recall of a complex narrative. However, all of these studies have employed intensities that were several magnitudes higher than those found in nature.

A recent study by Subrahmanyam, Sanker Narayan, and Srinivasan (1985) has suggested that human beings can respond to slow electromagnetic variations that are similar in magnitude (5 or 50 gamma) to the continuous pulsations (Pc) of the geomagnetic field. They found discriminable changes in both electroencephalographic and subjective experiences when field frequencies between 0.01 Hz and 20 Hz were presented; maximum effects were noted with 0.01 Hz and 0.1 Hz fields. Of particular interest was the enhanced effect of these exposures when the volunteers were facing or lying north compared to the other three major directions. Similar patterns were found with nonhuman animals.

If this effect is replicated, then two important and perhaps crucial conclusions are relevant for psi research. First, human beings can respond, both at subjective and objective neurobehavioral levels, to natural-intensity electromagnetic fields. Second, human beings respond to frequencies (or more appropriately, periods) that are commonly associated with geomagnetic fluctuations. They may occur for hours to days (and sometimes weeks), with periods ranging from a few seconds to several tens of minutes.

There is a potentially rich source of signals that are correlated with geomagnetic activity or that occur within these low frequency ranges (Campbell, 1967). In addition to the traditional ELF fields that are generated within the ionosphere-earth cavity, there are ULF (ultra low frequency) stimuli. Many of them occur as Pc. Thus, Pc 4 and Pc 5 variations have defined periods of 45–100 sec (0.01 Hz) and 150 to 600 sec, respectively. Whereas the typical amplitude values of Pc 1 are in the order of 1 gamma, the values for Pc 4 and Pc 5 are 10 and 100 gamma, respectively.

We expect that psi experiences, like other behaviors, should be influenced by the subtle, complex stimuli within the environment. The sensitivity of the living system and the complexity of these stimuli are just now becoming apparent. Even if one assumes that psi potential or experiences are homogeneous in time and space, the role of the human being as the neurobehavioral detection system cannot be ignored. Whereas the occurrence of psi may be independent of the geomagnetic field, the results of the present study suggest that at least the detection of psi stimuli is affected by the geomagnetic condition.

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