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# **SOUTHWEST & GHOST HUNTERS ASSOCIATION**

A 7 year qualitative study to discover if there is an association between A/C (alternating current, 60Hz) Electromagnetic fields and ghostly phenomena.



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# A 7 year qualitative study to discover if there is an association between A/C (alternating current, 60Hz) Electromagnetic fields and ghostly phenomena.

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## **1. Abstract**

This multiphase study was performed to discover if there is an association between A/C (alternating current, 60Hz) Electromagnetic fields and ghostly phenomena. Many hypotheses have been put forth that suggests that A/C Electromagnetic Fields may be somehow associated with perceived ghostly phenomena. The hypotheses suggest that A/C EMF may cause hallucinations in the human brain which are misinterpreted as paranormal phenomena.

Null Hypothesis: There is an association between A/C Electromagnetic Fields and perceived ghostly phenomena.

Alternative Hypothesis: There is not an association between A/C Electromagnetic Fields and ghostly phenomena.

The data collected was analyzed by standard deviation and a two sample (paired) T-Test.

## **2. Methods and Materials**

Researchers were trained in the use multiple A/C EMF meters (K-2, Sperry model 822A, Cellsensor). The meters were used to obtain measures in a total of 60 ghost hunts, 30 in Test sites (positive control), 30 in Control Sites (Negative Control). Individual measures higher than normal background readings were recorded. The test was initiated in February 1995 and concluded in August of 2002.

The results from the experiments in reported haunted places (Test Sites / Positive Controls) are compared against the non-haunted locations (Control Sites/ Negative controls). In other words we are comparing potential paranormal environments against normal environments and trending the



results. Generally speaking, for a null hypothesis to be accepted, it must have few or no positive results in the Control Site.

Additionally, a blind standard is implemented to ensure that the ghost hunters are unaware of which sites are Control Sites and which Test Sites are. This, along with defined operational procedures, ensures that data is collected accurately and consistently in both locations.

## 2.1 Testing the paranormal variables (The Positive Control)

Positive controls are determined using probability theory. This is the branch of mathematics concerned with analysis of random phenomena. The central objects of probability theory are random variables, stochastic processes, and events: mathematical abstractions of non-deterministic events or measured quantities that may either be single occurrences or evolve over time in an apparently random fashion. Although an individual coin toss or the roll of a die is a random event, if repeated many times the sequence of random events will exhibit certain statistical patterns, which can be studied and predicted.

One of the biggest challenges in researching the paranormal is determining where to conduct your research. After all, no one can exactly define what "paranormal" is, much less know of a way to measure it. The simple fact is that everything that has been presented by paranormal researchers is still theoretical in nature and unproven.

One simple way to scientifically prove a variable is to compare a hypothesis against a positive and negative control (comparing paranormal to normal). The problem is how do you provide a positive control if the paranormal has not yet been proven to even exist?

Our answer to that problem was to use probability theory. Although there is room for error, it seems to be the most scientific way to determine a positive control for haunted places. Probability theory is the branch of mathematics concerned with analysis of random phenomena.

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To determine the probability of a location being "haunted" or "not haunted" , we analyze two sets of variables. The variable sets are independent of each other. The first set of variables is known as "EVENT A". This set of variables determines the possibility of a location being haunted by providing a percentage on ten defined aspects.

The second set of variables is called "EVENT B". This set of variables is designed to determine if a location is "not haunted".

After all of the variables in both sets have been determined, they are run through a probability calculator.

## 2.2 Event A (Haunted Probability)

### Variables

#### 1. Obscurity (How well known is the location)

.10	Relatively unknown
.09	Known by its owners, who think it may be "haunted"
.08	Known by only a few people who think it may be "haunted"
.07	Known locally as being "haunted", not indexed in Search Engines, no media coverage
.06	Known locally as being "haunted", not indexed in Search Engines, some media
.05	Known locally as being "haunted", indexed in Search Engines but not easily found
.04	Can be found in Search engines with little effort
.03	Easily found in Search engines, in a published book, referencing it as "haunted"
.02	Advertised as being "haunted" in the local media, newspaper articles, TV



.01	Advertised as being "haunted" in the national media, National TV
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This variable is used to determine the potential and degree of myth building that has taken place at the location. The more renown a location is, the higher the probability that myth building has occurred. Myth building can contaminate any of the data collected at the location in regards to witness sightings and experiences.

## 2. Timeline (How long has "paranormal activity" been occurring)

.10	200 years or more
.09	150 years
.08	125 years
.07	100 years
.06	75 years
.05	50 years
.04	25 years
.03	10 years
.02	5 years
.01	Under 1 year

The timeline variable provides valuable information that can be used in a variety of ways. Locations that have a long history of reported "paranormal" events that can be researched. Prior owners (and their family members) of the "haunted" property can be interviewed and their encounters can be checked against the reports of the current owners. Are the stories consistent? Are there more reports of activity now, compared to a decade ago? Older locations typically have more witnesses whose stories can be compared with stories from other witnesses and the historical record of the location.

On the other hand, older locations are also more prone to myth building (thus a separate variable for that below).

## 3. Historical Accuracy (in accordance to sightings, stories)



<b>.10</b>	<b>Reported accounts and historical records are consistent</b>
.09	Insignificant inaccuracies between the reported accounts and recorded history (small discrepancies in dates, names)
.08	Inconsistencies exist between the reported accounts & the recorded history but not enough to imply myth building.
.07	Inconsistencies exist. Myth building has probably occurred but not enough to be significant. Basic elements are consistent.
.06	Minor inconsistencies between the reports and the historical record. Only a few basic elements are consistent
.05	Major inconsistencies exist. Only half of the reports are consistent with the historical record.
.04	Inaccuracies exist between the reported accounts and recorded history. only one item may be historically accurate (name, date)
.03	Inaccuracies exist between the reported accounts and recorded history. Strong possibility of myth building.
.02	Major inaccuracies between the reported accounts and recorded history. Myth building has occurred.
.01	The Reported accounts and recorded history differ radically

By nature, human beings are story tellers. This is why we write books, make movies and create myths. Most ghost stories are just that, nothing but stories. Sometimes the creation of the story is intentional, sometimes not.

Myth building occurs when a particular event (or story) is re-told over and over by various people over time. Each time the story is told, it is embellished, until eventually the "story" is no longer accurate with what actually happened.

The only way to determine if myth building has occurred is to research the historical records and see if the "story" is consistent with what actually happened (or not). The other way is by interviewing the actual witnesses, not a single person relaying that information (this is covered later). Historical research can also be used as a tool to expose hoaxes and to locate clues that may suggest unintentional myth building (mistaking a normal event for a paranormal one).

#### **4. Degree of reported paranormal activity (types of events, variety)**



.10	<b>All five types</b>
.09	Four different Types
.08	Three different Types
.07	Two different types
.06	<b>Type 5:</b> Perceptual Abnormalities, Interactive (communication with a 'ghost', etc)
.05	<b>Type 4:</b> Perceptual Abnormalities, Visual (Apparitions, unexplainable lights, etc)
.04	<b>Type 3:</b> Environmental abnormalities: (apparent moving of objects, objects breaking, environmental disturbances)
.03	<b>Type 2:</b> Possible extraordinary physical explanations (Strange sensations, feelings of being watched, disembodied voices)
.02	<b>Type1:</b> Possible ordinary physical explanations only (noises, cold spots, unusual odors, etc)
.01	Unmeaningful coincidence - pure chance

By determining the types and variety of reported paranormal phenomena, we are able to make initial assessments. Is the paranormal activity most likely explainable or is there too much going on to simply be myth building, mistaken natural phenomena or coincidence?

#### 5. Frequency of reported paranormal activity (how often does it occur)

.10	<b>Daily</b>
.09	Weekly
.08	Bi-Weekly
.07	Monthly
.06	Every two months (average)
.05	Quarterly
.04	Every 6 months



.03	Annually
.02	Every 13 months or greater
.01	Single known Occurrence

#### 6. Number of witnesses interviewed

.10	<b>15+ Witnesses</b>
.09	10 to 14 Witnesses
.08	9 Witnesses
.07	7 to 8 Witnesses
.06	6 Witnesses
.05	5 Witnesses
.04	4 Witnesses
.03	3 Witnesses
.02	2 Witnesses
.01	1 Witness

The number of witnesses is obviously important as the more witnesses there are, the more data there is to collect and compare.

#### 7. Reliability of witnesses (lie detector, voice stress test, conflicting accounts)

.10	<b>All Witnesses pass lie detector or voice stress tests. All accounts are consistent with each other</b>
.09	All Witnesses pass lie detector or voice stress tests, however accounts between the witness have slight variations
.08	All Witnesses pass lie detector or voice stress tests, however accounts between the witness have substantial variations



.07	Percentile score (75%) based on total # of witnesses passing tests vs those who refuse. Accounts are generally consistent
.06	Percentile score (50%) based on total # of witnesses passing tests vs those who refuse. Accounts are generally consistent
.05	Percentile score (25%) based on total # of witnesses passing tests vs those who refuse. Accounts are generally consistent
.04	All Witnesses refuse lie detector or voice stress tests, however witness accounts are consistent with each other
.03	All Witnesses refuse lie detector or voice stress tests, however witness accounts have slight variations
.02	All Witnesses refuse lie detector or voice stress tests, however witness accounts have substantial variations
.01	All Witnesses refuse or do not pass lie detector or voice stress tests. Witness accounts vary greatly.

The purpose of this probability score is to attempt to establish the burden of proof in the witness testimony. This is then weighed against the testimony of the other witnesses to determine if the observed / sensed phenomena is consistent between the multiple experiences.

#### **8. Probability of unusual events based on Initial Survey Findings (instrumentation)**

.10	<b>200% above expected norm (rare) measurement was repeated with same results</b>
.09	150% above expected norm (rare) measurement was repeated with same results
.08	125% above expected norm (rare) measurement was repeated with same results
.07	Mean differs from expected value by 70%, measurement was repeated with same results
.06	Mean differs from expected value by 60%, measurement was repeated with



	same results
.05	Mean differs from expected value by 50%, measurement was repeated with same results
.04	Mean differs from expected value by 70%, measurement was not repeated
.03	Mean differs from expected value by 60%, measurement was not repeated
.02	Mean differs from expected value by 50%, measurement was not repeated
.01	Small difference in Mean but unable to repeat measurement

This variable covers instrumentation finding of unusual (not necessarily paranormal) phenomena. No measurement is exact . All measurements will have some degree of error or uncertainty, so the measures in this table are gauged significantly to reduce the possibility of a Systematic or Random error. Experiments (readings) are repeated whenever possible in order to determine the average ( mean ) value, which is more accurate .

#### **9. Probability of unusual events based on Initial Survey Findings (Team's opinion)**

This is rated as a percentile, based on the opinion of the Team members conducting the investigation.

#### **10. Monetary gain / Publicity**

.10	<b>Location's owners request confidentiality (no media or on-line report)</b>
.09	Location's owner has no potential to benefit from the location being labeled as "haunted"
.08	Owner is apathetic concerning on-line reports but does not want the media involved
.07	Owner is apathetic concerning on-line reports but does not want the media present
.06	Owner is apathetic concerning the media but does not want an on-line report
.05	Owner is apathetic concerning the media or on-line reports



.04	Location's owner is interested in having the media present during "investigations"
.03	Location or it's owner could potentially benefit from the location being "haunted", not a business
.02	Location is a business. Media has been requested or pre-arranged.
.01	Location is a stop on a ghost tour, a hotel or B&B advertising as being "haunted"

Locations that may potentially benefit monetarily or through publicity are more subjective to myth building, embellishing stories, fraud and hoaxes.

## 2.3 Event B (Non-Haunted Probability)

### 1. Replicated Events (percentage of witness accounts that were replicated and explainable)

Based on a percentage. Take the Sum of reported paranormal events and subtract replicated events from the sum.

### 2. Explainable phenomena (Normal causes contributed to being paranormal)

Based on a percentage. Take the Sum of reported paranormal events and subtract the number of explained events from the sum.

### 3. Subjective Paranormal Experience (SPE)

Determined by performing a Electromagnetic Hypersensitivity Test on witnesses and evaluation through information obtained during the witness interview and event replication. Probability is determined by the sum of positive indicators subtracted from the sum of all of the witnesses. A positive result negates that particular witnesses' testimony.

#### LEVELS OF EXPLAINING SUBJECTIVE PARANORMAL EXPERIENCE

Score	KINDS OF FAMILIARITY	BASIC DESCRIPTION
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mod	A. NON-FAMILIARITY	Unmeaningful coincidence - pure chance
mod	B. REAL FAMILIARITY	Ordinary physical explanations e.g. fraud
mod	C. QUASI -FAMILIARITY	Inclusive term for 6 subtypes below; these require explanations of special kind:

#### SUBTYPES OF QUASI-FAMILIARITY

mod	LATENT FAMILIARITY	Sensory hyperaesthesia explained in ordinary physical framework
mod	PSEUDO-FAMILIARITY	Due to Some brain disturbance in the percipient (experiment)
mod	ANTE-FAMILIARITY	Explainable via unconscious (particularly psychoanalytic explanations)
0	PARA-FAMILIARITY	Modification of conventional physics required
0	META-FAMILIARITY	Modification of conventional physics is insufficient; radical alterations of one's world view are necessary
0	QUERY FAMILIARITY	At this point which kind of quasi-familiarity is involved is uncertain

\*mod = score

### 5.4 Criteria for Low-Score Subjective Paranormal Experience

These criteria have been used in Neppe's research in the area of SPEs.

Low-score SPEs imply SPEs which conform to specific subjective criteria. Thus it is a lower score overall than High-score SPEs which just require the experiment to subjectively perceive the specific experience as of paranormal kind.

1. Veridical Dreams: not symbolic, not intuitive, plus alleged awareness of content of dream prior to knowing of its occurrence in reality.
2. Simultaneous Dreams: allegedly reflects directly in many details a dream another person had, plus claimed confirmation with that person.
3. General ESP: non-symbolic, not intuitive, claimed awareness of content prior to knowing of the occurrence in reality.
4. Mediumship: trance state with loss of consciousness, claimed by subject that he



obtained information that was regarded by sitters as evidential in a factual, non-symbolic sense.

5. Presences: clear visualization with descriptive details as opposed to just 'sensing' or being aware or just an unclear distortion.
6. Out-of-body Experiences: feeling completely outside one's body, seeing one's own body or obtaining information about physical events or places.
7. Psychokinesis: definite claims to have manipulated, moved or levitated physical objects, in which the change was allegedly visualized or confirmed by the subject or another person.
8. Paranormal Auras: spontaneous (non-induced), visualization as opposed to 'sensing' or otherwise detecting.
9. Paranormal Healing: specific claims of definite success in individual cases.
10. Xenoglossy: Speaking in Foreign Tongues: absence of knowledge of a recognized language that is allegedly spoken at the rate of normal conversation, and allegedly involves someone who has authenticated the conversation.
11. Ectoplasmic Materialization: definite claims to have produced physical substances, recognizable as people during trance, with the alleged authentication by others present.
12. Reincarnation Memories: definite claims to have a certain knowledge about non-important people or events acquired through alleged memories or previous lives, occurring at a young age (less than five years).
13. Agent to ESP: the alleged awareness of others of certain facts about the subject when the subject claimed to be in a crisis or actively trying to communicate.
14. Automatic writing: the alleged production of interpretable, legible information, with either hand, while undertaking other tasks.

### 3.0 Assigning a Probability

Once the probabilities of Event A and B are determined, they are run through a Multiple Event Probability Calculator.

#### Multiple Event Probability Formula :

Probability of event A that occurs  $P(A) = n(A) / n(S)$ .

Probability of event A that does not occur  $P(A') = 1 - P(A)$ .

Probability of event B that occurs  $P(B) = n(B) / n(S)$ .

Probability of event B that does not occur  $P(B') = 1 - P(B)$ .

Probability that both the events occur  $P(A \cap B) = P(A) \times P(B)$ .

Probability that either of event occurs  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ .



Conditional Probability  $P(A | B) = P(A \cap B) / P(B)$ .

where,

$n(A)$  - number of occurrence in Event A,

$n(B)$  - number of occurrence in Event B,

$n(S)$  - total number of possible outcomes.

In order for a location to be utilized for a positive control, the conditional probability  $P(A | B)$  must be at least .67 and  $P(A \cap B)$  must be below .50

### 3.1 Control Site (Negative Control)

Control Sites are selected by one of two means.

- A suspected haunted location that has been debunked with 100% certainty or
- A known non-haunted location where the reports "paranormal activity" are created by the President.

## 4.0 The Procedure

All hypothesis tests are conducted the same way. The researcher states a hypothesis to be tested, formulates an analysis plan, analyzes sample data according to the plan, and accepts or rejects the null hypothesis, based on results of the analysis.

1. **State the hypotheses.** Every hypothesis test requires the analyst to state a null hypothesis and an alternative hypothesis. The hypotheses are stated in such a way that they are mutually exclusive. That is, if one is true, the other must be false; and vice versa. For example, suppose we wanted to determine whether dowsing rods could detect ghostly activity. A null hypothesis might be that dowsing rods can detect ghostly activity. The alternative hypothesis might be dowsing rods cannot detect ghostly activity or ghosts do not exist. Symbolically, these hypotheses would be expressed as

$H_0: p = 0.5$

$H_a: p \neq 0.5$



Suppose we tested the dowsing rods in Test and Control Sites 50 times, resulting in 40 positive results in Control sites and 10 positive results in Test Sites. Given this result, we would be inclined to reject the null hypothesis and accept the alternative hypothesis.

**2. Formulate an analysis plan.** The analysis plan describes how to use sample data to accept or reject the null hypothesis. It should specify the following elements.

**Significance level.** The amount of evidence required to accept that an event is unlikely to have arisen by chance is known as the significance level or critical p-value. The p-value is the probability with which the observed event would occur, if the null hypothesis were true. If the obtained p-value is smaller than the significance level, then the null hypothesis is rejected. Often, researchers choose significance levels equal to 0.01, 0.05, or 0.10; but any value between 0 and 1 can be used.

**Test method.** Typically, the test method involves a test statistic and a sampling distribution. Computed from sample data, the test statistic might be a mean score, proportion, difference between means, difference between proportions, z-score, t-score, chi-square, etc. Predominately, we use a two sample t-test. Given a test statistic and its sampling distribution, a researcher can assess probabilities associated with the test statistic. If the test statistic probability is less than the significance level, the null hypothesis is rejected.

**3. Analyze sample data.** Using sample data, perform computations called for in the analysis plan.

**4. Test statistic.** When the null hypothesis involves a mean or proportion, use either of the following equations to compute the test statistic.

**Test statistic = (Statistic - Parameter) / (Standard deviation of statistic)**

**Test statistic = (Statistic - Parameter) / (Standard error of statistic)**

Parameter is the value appearing in the null hypothesis, and Statistic is the point estimate of Parameter. As part of the analysis, you may need to compute the standard deviation or standard error of the statistic.



P-value. The P-value is the probability of observing a sample statistic as extreme as the test statistic, assuming the null hypothesis is true.

Find degrees of freedom. The degrees of freedom (DF) is the number of independent observations in a sample minus the number of population parameters that must be estimated from sample data.

*For example, the exact shape of a t distribution is determined by its degrees of freedom. When the t distribution is used to compute a confidence interval for a mean score, one population parameter (the mean) is estimated from sample data. Therefore, the number of degrees of freedom is equal to the sample size minus one. If DF does not compute to an integer, round it off to the nearest whole number. Some texts suggest that the degrees of freedom can be approximated by the smaller of  $n_1 - 1$  and  $n_2 - 1$ ; but the above formula gives better results.*

**5. Interpret the results.** If the sample findings are unlikely, given the null hypothesis, the researcher rejects the null hypothesis. Typically, this involves comparing the P-value to the significance level, and rejecting the null hypothesis when the P-value is less than the significance level.

**6. Compute P-value.** The P-value is the probability of observing a sample statistic as extreme as the test statistic. Since the test statistic is a t-score, use a t Distribution Calculator to assess the probability associated with the t-score, having the degrees of freedom computed above.

**7. Evaluate null hypothesis.** The evaluation involves comparing the P-value to the significance level, and rejecting the null hypothesis when the P-value is less than the significance level.

## 5. Study results

### Repeated Measures Analysis Summary

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Number of repeated measures is 2

Number of subjects read in 30

Means and standard deviations for 2 repeated measures:

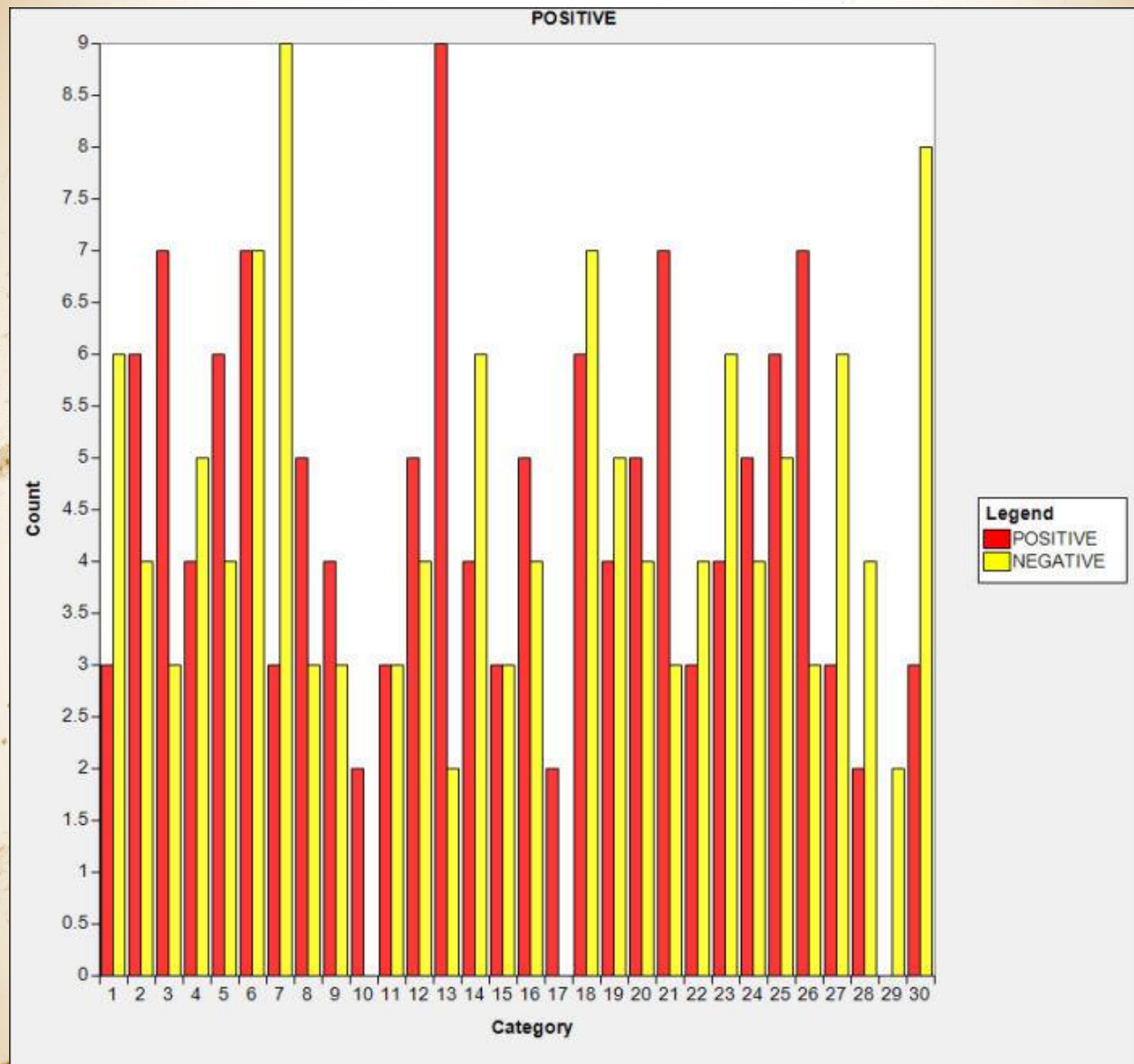
1) POSITIVE: mean = 4.43333 s.d. = 1.95965



2)NEGATIVE: mean = 4.23333 s.d. = 2.06253

Mean Difference = 0.2 s.d.(difference) = 2.75931

95% C.I. about Mean Difference is (-0.83275, 1.23275)



Paired t-test

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**Hypotheses:**

Ho: The mean difference between pairs is 0.



Ha: The mean difference between pairs is not 0.

Calculated  $t = 0.397$  with 29 D.F.  $p = 0.6943$  (two-sided)

Note: For a one-sided test, you must adjust the p-value according to the direction of your alternative hypothesis.

A paired t-test was performed to determine if there was a difference between paired differences of POSITIVE and NEGATIVE.

The mean difference between pairs of POSITIVE and NEGATIVE are not significantly different from 0(zero).

( $M=0.2$ ,  $SD = 2.75931$ ,  $N= 30$ ),  $t(29)=.40$ , two-tail  $p = 0.694$ .

Based on the data obtained during the testing period, the null hypothesis is rejected. The alternative hypothesis, that there is no association between A/C Electromagnetic Fields and ghostly phenomena or ghosts do not exist is accepted.