

An Analysis of Contextual Variables and the Incidence of Photographic Anomalies at an Alleged Haunt and a Control Site

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Abstract—This field study assessed whether areas in an alleged haunt and a control site, and active and inactive areas within the haunt site, differed with respect to the presence of contextual variables that might contribute to haunt experiences and exhibited differential incidences of photographic anomalies. Contextual (aesthetic, physical, and structural) variables were measured, and randomized photographic (black-and-white, color, digital, infrared, and Polaroid) data were recorded under blind conditions in fourteen representative areas of the two sites. The haunt site displayed lower ambient temperature and higher humidity levels than the control site, but only suggestive differences were found between the active and inactive areas of the haunt site. Ratings from experimentally-blind photographic consultants indicated that the haunt site exhibited a higher incidence of photographic anomalies than the control site, as did the active areas of the haunt site, relative to the inactive areas. Color prints exhibited a higher incidence of photographic anomalies than all other media types. The results are discussed within the context of contemporary theoretical accounts of hauntings and methodological protocols employed in haunt research.

Keywords: hauntings—apparitions—anomalous experiences—contextual variables
photographic anomalies

The term 'haunting' refers to recurrent culturally-sanctioned anomalous experiences that are confined to a particular site or locale. Such experiences may include, but are not limited to, visual apparitions, apparent movements of objects, and the sensing of an unseen presence. The traditional conception of

haunting phenomena, espoused by some contemporary researchers (e.g., Maher, 1999; Stevenson, 1972), is that they result from the parapsychological activity of deceased individuals. Much of the recent research in this area, however, has attempted to understand haunt experiences by recourse to recognized cognitive and social (Lange & Houran, 2001) and neuropsychological processes (Persinger & Koren, 2001). The present research sought to address multiple outstanding issues in the contemporary literature that fall within two different, though related, domains: the role of contextual variables in the mediation of haunt effects and the incidence of photographic anomalies in prints captured at haunt sites.

Contextual variables include a variety of stimuli available to an individual at the time of an anomalous experience or shortly thereafter that purportedly structure, or help structure, that experience. Such stimuli may include environmental cues such as suggestion or the aesthetic features of a locale, or endogenous stimuli such as one's beliefs and expectations about the respective site in particular and/or paranormal phenomena more generally. These and other contextual variables may come to influence the interpretation, incidence, and phenomenology of a variety of experiences. For instance, contextual information may lead one to anticipate certain events or outcomes and thereby inflate the probability of their occurrence, or to color ambiguities in a manner which is consistent with the respective cues. That is, contextual variables may prime an individual towards particular behavioral responses or perceptual experiences. Concurrently, by informing the content of ambiguous endogenous stimuli (e.g., shifts in arousal), contextual variables may function to reduce anxiety concerning the inexplicable nature of an anomalous experience (Zimbardo et al., 1993; see also Bentall, 2000; Houran, 2000).

In the present context of haunt experiences, two highly salient priming variables include prior suggestion that a site is haunted and prior paranormal belief (Lange & Houran, 2001). To the extent that a particular item of contextual information suggests an interpretation of an event or series of events, or exacerbates pre-existing tendencies toward certain experiences or responses, the occurrence of a congruent action or experience may be said to be mediated by the respective contextual cue. Previous research suggests that haunting phenomena are contextually mediated (Lange et al., 1996). Although it is well recognized that hallucinations can be induced in laboratory settings via suggestion (e.g., Barber, 1969), this effect has not been examined in the field until quite recently. Lange and Houran (1997a) found that of two cohorts of individuals touring an abandoned theater, those who were told that the site was haunted reported more anomalous experiences than those who were informed that the site was undergoing renovation. During participants' tours of an alleged haunt, Wiseman and colleagues extended this finding by documenting that the reporting of unusual experiences was related to participants' self-reported paranormal belief and whether or not they had been informed that the site had recently witnessed an increase in parapsychological phenomena (Wiseman et al.,

2002). Other aesthetic and structural variables, such as the presence of reflective surfaces (Kelly & Locke, 1981) and the spatial dimensions of a room (Wiseman et al., 2003), have been found to be associated with the reporting of haunting-type experiences. Furthermore, although few studies have examined the influence of contextual variables upon the *content* of anomalous experience, available evidence is consistent with a contextual mediation hypothesis (Houran, 2000; Skirrow et al., 2002). Given such findings, the relationship between the occurrence of anomalous experiences and the presence of contextual variables requires continued study.

Other physical factors, which may or may not be cognitively registered, yet may play a role in the mediation of haunt perceptions through their tendency to induce various ambiguous experiences, are also worthy of consideration. Nickell (2001) has suggested that haunted locations may be inherently, yet naturally, cold or draughty. Similarly, Wiseman et al. (2003) found that the reporting of anomalous experiences in areas of an alleged haunt positively correlated with the lightings levels of the particular areas in which experiences occurred. Lange and Houran (2001) have argued that ambiguous stimuli such as these may be misinterpreted as haunt effects given cognitive and motivational biases favoring paranormal explanations for inexplicable events (see also Zimbardo et al., 1993).

A considerable amount of attention has been afforded to the causal or mediatory role of contextual physical factors in the induction of haunting-type experiences. While numerous physical variables have been found to be associated with anomalous experiences (e.g., Braithwaite & Townsend, 2006; Radin & Roll, 1994; Tandy, 2000), the influence of magnetic fields upon the incidence of haunt phenomena has received the greatest empirical scrutiny. Persinger and colleagues have hypothesized that haunt experiences result from the interaction of electromagnetic and/or geomagnetic fields with the neuro-electromagnetic patterns within an individual's brain (for a review, see Persinger & Koren, 2001). Support for this account has been provided in field settings, where high peak strength geomagnetic or highly variable electromagnetic (EM) fields have been consistently documented in haunted locales (see Roll and Persinger 2001 and Persinger and Koren 2001 for reviews). In many of these studies, however, the measurement of magnetic fields has not been conducted under blind conditions, formal control areas within a site have been inconsistently utilized, and no study of which the authors are aware has included a second, independent control site (cf. Houran & Brugger, 2000). Although two studies (Maher, 2000; Maher & Hansen, 1997) failed to replicate these effects, both only measured local ambient electromagnetic field magnitudes, which are less likely to demonstrate the hypothesized variability required for the induction of haunt experiences than transient magnetic fields, whose fluctuations can be more sensitively measured over extended periods of time (e.g., Persinger & Cameron, 1986). Multiple experiments have purported to induce the experience of a sensed presence and other anomalous experiences in the laboratory by applying weak (i.e., 500 to 1000 nanoTesla [nT]), complex magnetic fields in a burst-firing

pattern to the temporal and temporal-parietal regions of the cerebral cortex of human participants (Cook & Persinger, 1997, 2001; Persinger & Healey, 2002; Persinger et al., 2000). Conversely, the only study which has attempted to independently replicate this research failed to discern an effect (Granqvist et al., 2005). This experiment was double-blind and its experimenters allege that it adhered to Persinger's protocol specifications. However, the reason(s) for this failure to replicate remain the source of debate (Larsson et al., 2005; Persinger & Koren, 2005).

Despite the utility of conventional psychological explanations, the contention that haunts result from paranormal agency remains ubiquitous. Many findings have been interpreted as supportive of this hypothesis, but the most pervasive by far is the observation that photographic anomalies repeatedly appear in photographs taken at haunted locales (see Lange & Houran, 1997b; Maher, 1999; Nickell, 2001). Reports of the capturing of low-grade anomalies, such as density spots (orbs) or fogging, at sites that have previously played host to haunt effects are rampant in the popular press and on the world-wide-web (Potts, 2004) and are commonly attended by attributions of paranormal agency. High-grade anomalies, such as apparent apparitions or unequivocally paranormal objects, are often compelling enough to invoke either belief in the phenomenon or accusations of fraud. Despite the attention that reports of photographic anomalies draw, these reports are ultimately anecdotal, as there have only been a few empirical studies that have examined and presented evidence for these purported effects.

The most compelling evidence for photographic anomalies thus far was reported by Maher and Hansen (1997). They instructed a 'sensitive' (i.e., someone who professed to have the ability to detect ghosts) to take photographs inside of an alleged haunt site. The sensitive was blind to the identity of the areas in which the photographs were taken. Moreover, his earlier markings on a floor-plan and reports on a checklist did not significantly correspond to the locations of haunt effects, as reported by the inhabitants of the site, or the features of the apparitional experiences, respectively. Approximately one third of the prints exhibited photographic anomalies, described as "translucent, cloud-like aberration (~of a pinkish cast" (Maher, & Hansen, 1997, p. 197). Those with anomalies were found to have been significantly more likely to have been captured in areas in which previous haunt effects had been reported.

Although this study is to be applauded for its ingenuity and its incorporation of statistical analyses, it suffers from numerous methodological limitations, which temper the conclusions that can be drawn from it. First, the photographs were not taken in a randomized fashion, nor were the same number of photographs taken across areas. The incorporation of such methodological features would have allowed the exclusion of potential confounding variables. Second, the individual who assumed the role of the photographer lacked professional training and may have been unaware of various means of preventing inadvertent artifacts.' Third, the photographer was not blind to the context of the

investigation and the hypothesis under test and may have thereby unwittingly caused the occurrence of more anomalies by his conduct. Finally, two other sets of photographs were taken at the site by professional photographers, but excluded from the analysis because of a lack of apparent anomalies. The inclusion of such photographs might have diminished the significance of the results. Given the shortcomings of this study, there are no compelling reasons to believe that Maher and Hansen's (1997) reported anomalies did not result from the inclusion of a novice photographer in the experimental protocol or other methodological limitations of the study. Furthermore, in another study of an alleged haunt, Maher (2000) reported that a photographic consultant was able to provide a conventional explanation for apparent photographic anomalies captured during the course of the investigation.

Although few experiments have tackled the issue of photographic anomalies in a suitable fashion, two other studies are worthy of brief mention. In an analysis of previously published prints documenting photographic anomalies in Fortean contexts, Lange and Houran (1997b) found that the type of photographic effect (light streak, fogging, density spot [orb], amorphous form, shadow, defined image, or other) is artifactual of the type of photographic medium used, that is, certain types of anomalies appear to be unique to, or more commonly found with, certain media types. In a study investigating the possible mechanisms of 'anomalous orbic images' captured with digital cameras, Schwartz and Creath (2005) presented evidence to suggest that anomalous images are commonly caused by stray reflections or diffraction of the flash reflecting off of dust or dirt particles.

The Present Study

This study concerns a residential site, which was home to a male and female occupant in their mid-forties who gave consent to allow an investigation into the phenomena occurring at their home. The couple, and at least one guest who was unaware of the previous reports, reported various anomalous experiences on the grounds of the site over the course of multiple years and attributed these events to a discarnate agent. Experiences included auditory and visual apparitions, a sensed presence, ostensibly precognitive nightmares, object movements, and the display of aberrant behaviors by the couple's pet dog. This set of experiences conforms to the classic symptomatology of haunt or poltergeist-like episodes (e.g., Roll, 1977).

The site (and case) possessed a number of attributes that made it optimal for a field experiment. The two inhabitants were both mental health professionals and thus it was deemed likely that they had considerable psychological knowledge germane to haunt phenomena and that their reports did not result from naïveté or the failure to consider obvious, mundane explanations. The site had received no media attention, thereby allowing the experimenters to ensure that experimental blinds (for experimenters and participants) could be maintained

unlike in investigations of more famous sites in which this is relatively impossible (e.g., Wiseman et al., 2003), nor did it appear that such attention was sought by the inhabitants. Finally, the house next-door to the haunt site was available for use as a control site with the full consent of both families. Given their close proximity to one another, the two sites did not differ in terms of location or other possible mediating variables which may be responsible for haunt phenomena, such as the presence of underground faults or water (Persinger & Cameron, 1986), geomagnetic flux, or proximity to power stations, airports, and other sources of transient electromagnetic fields (Persinger & Koren, 2001), or overt contextual variables in the surrounding neighborhood (e.g., the presence of a graveyard) (see, e.g., Houran, 2000).

The investigation of this haunt site was intended to be exhaustive. It was planned that the investigation would incorporate and improve upon methodological features previously used in both psychological and parapsychological field and experimental studies. In addition, the investigation was to have the rigor of a controlled field experiment while maintaining a case study approach through the collection of interview data from percipients. For reasons discussed below, these intentions were unable to be fully realized.

The present study of this alleged haunting attempted to circumvent confounds which have plagued previous parapsychological field studies (Houran & Brugger, 2000) by incorporating a second (control) site in which no phenomena had been reported. In addition, all experimenters were blind to the identity of the sites and all personnel were blind to the identity of the sites and the nature of the study. Data from a variety of aesthetic, physical, and structural variables were collected at the two sites, and a professional photographer was hired to capture photographs with multiple media types in a randomized fashion. Multiple independent professional photographers volunteered their services and evaluated photographic prints captured at the sites for the presence of potential anomalies and proffered plausible explanations for any that were identified. Groups of participants were to complete a battery of psychological measures, which have been previously used in haunt research (Houran et al., 2002), and an online task of extrasensory perception. Subsequently, participants were scheduled to tour both of the sites while recording any anomalous experiences on an experiential checklist (Houran, 2002). Finally, following the completion of the experimental stage, we intended to conduct interviews with the couple residing at the haunt site about the location, type, and phenomenology of their experiences and have them, and the family residing at the control site, complete the aforementioned battery of psychological instruments.

Contextual variable and photographic data were collected, but the experiment abruptly ended on the first day of the experiment involving participant tours. On this day, one of the residents of the site entered the house and displayed alarmingly aggressive behavior toward the participants and experimenters, which led to the immediate termination of this stage of the experiment. Through brief discussions with the other resident of the site, it was found that haunt effects at

the site had gone into remission in the months leading up to the investigation. However, in the days preceding and during data collection, the two inhabitants of the site had begun to experience a plethora of distressing haunting-type perceptions following the period of quiescence. The inhabitants apparently came to believe that the investigation had directly caused this recrudescence of haunt effects. It is evident that the return of such effects triggered fear and anxiety in the resident culminating in his aggressive outburst. He subsequently claimed amnesia for the event and stated that he believed that he had been possessed by the agencies which he believed were haunting the site. Other than a few brief communications, the inhabitants discontinued all contact with the investigators, seemingly out of fear of further 'reprisals' from these discarnate entities. Given this turn of events, the investigation of this site, as it is presented here, is fragmentary and is not as thorough as initially intended. Despite this caveat, it is worth noting that the occupants of the site were reporting haunting phenomena during the course of the data collection. Therefore, unlike many previous investigations which have concerned historically haunted sites, this site was undoubtedly 'active' at the time of this investigation.

Based on the foregoing and the data available to us, the following hypotheses were generated: (1) the control and haunt sites will differ in terms of the presence of aesthetic, physical, and structural variables; (2) within the haunt site, active and inactive areas will differ in the presence of contextual variables; (3) photographic prints from the haunt site will exhibit a greater number of anomalies relative to the control site; and (4) of the haunt site prints, those taken in active areas will exhibit more anomalies than those taken in inactive areas. Given the germane findings of Lange and Houran (1997b), it was further conjectured that (5) the incidence of photographic anomalies would vary by media type. The direction of this relationship (i.e., which media type(s) would exhibit the greatest incidence(s) of photographic anomalies) was not specified in advance.

Method

The experiment had two stages. The first consisted of the measurement of multiple contextual variables and the completion of randomized photography sessions at an alleged haunting and a control site under blind conditions. The second stage involved the assessment of the catalogued prints for the presence of photographic anomalies by experimentally-blind professional photographers.

Sites

An alleged haunting (henceforth 'target site') and a control site were identified by a colleague of the third author. The sites are located in a middle-class neighborhood of a small city in Illinois, and both were constructed in the mid-twentieth century. Seven matched rooms at each of the two sites were established as experimental areas. Each cohort of representative areas included

a dining room, three common areas (living rooms, hallways, and kitchens), a basement room, and two bedrooms. Haunting-type experiences had previously been reported in three areas of the target site, while no similar reports were made in the remaining four experimental areas. These areas were designated 'active' and 'inactive', respectively. The three authors remained blind to the identity of the sites until the conclusion of the experiment.

Personnel

A professional photographer, Chad Mitchell, was hired to take photographs of the experimental areas. At the time of the experiment (August 2003), he had over six years of photography experience and owned his own professional studio in Illinois.

Eight photographers ($M_{Age} = 30.25$, $SD = 6.43$; one female) consented to volunteer their expertise to assess the presence of anomalies in the print catalog. All photographic consultants were required to have a minimum of 3 years of professional or educational experience ($M = 12.63$, $SD = 6.19$; range: 4–21 years).

Instruments

Physical variable instrumentation

Carbon monoxide. A Nighthawk 60 Hz commercial carbon monoxide (CO) detector (Model No. KN-COP-DP) was used. This instrument provides output in units of parts per million (ppm).

Lighting levels. The F-stop of an Olympus Infinity camera (see below) was used by Chad Mitchell to measure lighting levels.

Magnetic fields. An F. W. Bell (Bell Technologies, Inc.) Model 4080 Triaxial ELF [extremely low frequency] Magnetic Field Meter was used to measure local ambient EM fields. This meter has three internal orthogonal magnetic field sensors (corresponding to the three dimensions). A microprocessor computes and displays the vector magnitude of the magnetic field measured. The measurement range of this meter extends from 0.01 to 51.1 microTesla (μT), and it has a frequency response of 25 Hz to 1 kHz. It has a sampling rate of 0.4 seconds and a typical accuracy error of $\pm 2\%$.

Temperature and humidity. A Radioshack™ model 63–1036 digital indoor thermometer/hygrometer was used to measure ambient temperature and humidity. The instrument has a sensing cycle of 10 seconds, a temperature range of 32° to 122°F ($\pm 1.8^\circ F$), and a relative humidity reading range of 20% to 99% (55%).

Photographic instruments. *Black-and-white* photographs were taken with a Canon Elan 7E 35 mm with a Tamron 28–80 mm lens and Kodak 400 speed film. *Digital* pictures were taken with a Vivitar Vivicam 10, a point and shoot camera with 640 × 480 resolution. An Olympus Infinity camera was used to take

color photographs with a fixed-lens and Kodak Max 800 speed film. *Infrared* photographs were taken with a Canon Rebel 2000 using a Canon 28–80 lens and a Red 25 lens filter (for better infrared reproduction) and Kodak HIE Infrared film. *Polaroid* photographs were taken with a Polaroid camera (# CDI 368LE CA RA). This camera was purchased for the study, and it was tested using two corresponding Polaroid 600 film cartridges.

Psychometric instruments. The *Revised Paranormal Belief Scale* (RPBS) is a twenty-six-item scale with items anchored on a seven-point Likert scale. The original PBS developed by Tobacyk (1988; Tobacyk & Milford, 1983) was subjected to a 'top-down purification procedure' intent on removing items contaminated by age and gender biases (Lange et al., 2000). The RPBS possesses two subscales measuring new age philosophy (NAP) and traditional paranormal belief (TPB). This measure was administered to the photographic consultants.

Procedure

Contextual variables. Multiple covert and overt variables were measured and recorded in all experimental areas at both sites. Variables measured in each room include: lighting levels, spatial dimensions, the number of mirrors, the number of pictures with and without human forms, the number of windows and air vents, humidity, ambient temperature, carbon monoxide (CO), and local ambient EM fields (peak magnitude and field variability).

Photographic print collection. The photographer was hired under the initial information that he would be taking photographs for a psychology experiment. He was responsible for capturing black-and-white, color, and infrared photographs and measuring lighting levels. He was debriefed as to the purpose of the study following the completion of data collection and informed of the identity of the two sites following the return of the film and processed prints. Digital and Polaroid photographs were taken and processed by the experimenters.

Thirty-five photography trials were conducted at each of the two sites. Each room was assigned a number, and the order of the trials was determined by a web-based random event generator. Each trial consisted of the serial acquisition of one photograph of each of the five media types (order: infrared, color, black-and-white, Polaroid, digital) from the same vantage point. The photography trials at the target site preceded those at the control site. A total of 175 photographic prints were obtained at each site. Prints of the exterior regions of the sites were not included in the data analysis, and two infrared prints (one from each site) were destroyed or lost during processing. Consequently, the data set consisted of 169 prints from each site.

The photographic prints were cataloged in serial order by site, trial number, and media type. Photographic consultants were blind to both the purpose of the experiment and the identity of the sites and were told only that the prints were taken within the context of a parapsychological field experiment. Prior to the

assessment of the print catalog, consultants completed a short questionnaire concerning their educational and professional photography experience. They subsequently conducted the print catalog assessment and completed the RPBS in counterbalanced order.

The prints were presented in one of four different counterbalanced order conditions. Consultants began with either trial 1 or 18 of the target site or trial 1 or 18 of the control site and continued through the remaining prints. They were instructed to look over all of the photographs carefully and select those images which they considered anomalous. For the purposes of the study, an anomalous image was operationally defined to consultants in writing as one which contained any obscurities, defects, bizarre images, or the like, which could not be conventionally explained by the presence of natural artifacts present during the actual photography session (e.g., light reflections), or the subsequent processing of the film. Consultants were instructed to rate the degree to which all selected prints matched the aforementioned definition on a four-point Likert-type scale (1: definitely not anomalous, 2: somewhat not anomalous, 3: somewhat anomalous, and 4: definitely anomalous). It was explicitly stated to participants that all prints that were not selected would receive a rating of '1'. Two missing data points (prints selected but not rated) received ratings of '1'. Following the evaluation session, participants were debriefed regarding the purpose of the experiment and the conditions under which the photographs had been obtained.

Results

Statistical analyses consisted of standard univariate techniques including Analyses of Variance and Pearson product-moment correlations. The use of non-parametric statistics indicates that a data set violated the assumption(s) of distribution normality and/or homogeneity of variance.

Contextual Variables

Inter-site analyses revealed that the target site had a significantly lower mean ambient temperature and a greater level of humidity than the control site. In addition, the control site had a suggestively, albeit non-significantly, greater number of mirrors. A floor effect was observed with the CO data. Thirteen of the fourteen areas yielded CO measurements of 0 parts per million (ppm); the remaining area emitted a CO count of 210 ppm. The high CO count was measured in an active area of the target site. Given the negative skew, the small sample size, and apparent uniform absence of CO at the two sites, no analyses were performed. All other analyses were non-significant, indicating that the sites were relatively matched along the respective variables measured (See Table 1).

Intra-site contrasts between active and inactive areas at the target site indicated that other than suggestively greater peak EM field strengths and

TABLE 1
Contextual Variables as a Function of Site [Target ($n=7$) and Control ($n=7$)]

Variables	Target site	Control site	<i>F</i>	<i>p</i>	η_p^2
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)			
Area (sq. ft.)	1914.92 (1789.25)	1628.96 (541.10)	0.16	0.69	0.01
Ambient temperature (°F)	78.30 (1.19)	84.90 (0.57)	175.92	0.0002	0.94
Humidity (%)	49.29 (2.69)	44.29 (1.60)	17.84	0.001	0.60
Windows	3.71 (1.38)	4.29 (3.15)	0.19	0.67	0.02
Mirrors	1.00 (1.41)	3.57 (3.10)	3.98	0.07	0.25
Artwork with human forms	11.43 (22.43)	6.29 (5.44)	0.35	0.57	0.03
Artwork without human forms	3.29 (1.25)	5.57 (6.85)	0.75	0.40	0.06
Peak ambient EM field (μ T)	0.30 (0.32)	0.39 (0.17)	0.47	0.51	0.04
Variability in ambient EM fields	0.26 (0.31)	0.30 (0.17)	0.07	0.80	0.01
			<i>U</i>	<i>Z</i>	<i>p</i>
Lighting level (F-stop)	4.07 (0.19)	4.77 (1.19)	19	0.82	0.41
Air vents	0.71 (0.49)	1.43 (1.13)	14.50	1.35	0.18

Note: All tests are subjected to a Bonferroni correction ($\alpha=0.005$).

variability in EM field magnitudes in active areas, the two sets of areas did not differ according to any of the contextual variables measured (see Table 2).

Photographic Prints

Of the 338 photographic prints, 309 (88.3%) were considered to be non-anomalous by the consultants. Of the remaining twenty-nine prints, eighteen

TABLE 2
Contextual Variables as a Function of Areas of Target Site [Active ($n=3$) and Inactive ($n=4$)]

Variables	Active areas	Inactive areas	<i>F</i>	<i>p</i>	η_p^2
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)			
Lighting level (F-stop)	4.00 (0.00)	4.13 (0.25)	0.71	0.44	0.13
Humidity (%)	48.67 (1.15)	49.75 (3.59)	0.24	0.64	0.05
Windows	3.67 (1.15)	3.75 (1.71)	0.01	0.95	0.00
Air vents	0.67 (0.58)	0.75 (0.50)	0.04	0.85	0.01
Artwork with human forms	1.67 (1.53)	0.75 (0.50)	0.99	0.37	0.17
Artwork without human forms	2.67 (1.53)	3.75 (0.96)	1.36	0.30	0.21
			<i>U</i>	<i>Z</i>	<i>p</i>
Area (sq. ft.)	2539.47 (2772.85)	1446.51 (771.01)	5	0.35	0.72
Ambient temperature (°F)	78.10 (0.35)	78.45 (1.64)	5.50	0.18	0.86
Mirrors	2.00 (1.73)	0.25 (0.50)	2.50	1.38	0.17
Peak ambient EM field (μ T)	0.48 (0.46)	0.16 (0.04)	0.50	1.96	0.050
Variability in ambient EM fields	0.45 (0.45)	0.13 (0.04)	0.50	1.96	0.050

Note: All tests are subjected to a Bonferroni correction ($\alpha=0.005$).

TABLE 3
Anomaly Print Ratings (M (SD) and $[N]$) as a Function of Site, Area, and Media Type

Media type	Target site			Control site	Total
	Active area	Inactive area	Total		
Black & white	1.02 (0.05) [14]	1.00 (0.00) [20]	1.01 (0.03) [34]	1.00 (0.00) [34]	1.00 (0.02) [68]
Color	1.08 (0.14) [14]	1.04 (0.08) [20]	1.06 (0.11) [34]	1.04 (0.10) [34]	1.05 (0.10) [68]
Digital	1.02 (0.07) [14]	1.03 (0.10) [20]	1.03 (0.09) [34]	1.00 (0.00) [34]	1.01 (0.06) [68]
Infrared	1.02 (0.05) [13]	1.00 (0.00) [20]	1.01 (0.03) [33]	1.01 (0.05) [33]	1.01 (0.04) [66]
Polaroid	1.03 (0.07) [15]	1.01 (0.03) [19]	1.02 (0.05) [34]	1.00 (0.02) [34]	1.01 (0.04) [68]
Total	1.03 (0.08) [70]	1.02 (0.06) [99]	1.02 (0.07) [169]	1.01 (0.05) [169]	1.02 (0.06) [338]

receiving one rating of '2', three received one rating of '3', four received ratings of '2' from two consultants, three receiving ratings of '2' and '3' from two consultants, and one print received ratings of '2' and '4' from two consultants. No prints received anomaly ratings (i.e., > 2) from more than two consultants. The ratings of 2, 3, and 4 were individually assigned on twenty-six, six, and one occasion(s). The average intraclass correlation for photographers' anomaly print ratings is 0.29 (95% confidence interval 0.18 to 0.40), and the average kappa statistic and p -value are 0.05 (range: -0.02 to 0.35) and 0.53 (range: 0.96 to 9.36×10^{-14}), respectively. Table 3 presents descriptive statistics for anomaly print ratings.

Both photographic print hypotheses were supported. The prints taken at the target site yielded significantly greater anomaly ratings than those taken at the control site ($U = 13349$, $Z = 2.14$, $p = 0.033$). The intra-site analysis revealed that the prints taken in the active areas of the target site exhibited significantly greater anomaly ratings than those obtained in the inactive areas ($U = 3078$, $Z = 2.20$, $p = 0.028$). Further analyses revealed that the anomaly print ratings did not differ between the inactive areas of the target site and the control site ($U = 8214.50$, $Z = 0.60$, $p = 0.55$), but that the active areas of the target site did exhibit significantly greater anomaly print ratings than those of the control site ($U = 5134.50$, $Z = 3.20$, $p = 0.001$). Although the photography sessions were randomized within each site, the session at the target site preceded that at the control site. It follows that differences between the two sites may have resulted from temporal factors (e.g., differential external lighting). However, anomaly ratings failed to correlate significantly with the temporal order in which prints were captured ($n = 338$, $r = -0.08$, $p = 0.14$).

A Kruskal-Wallis Test found that the anomaly print ratings differed across the five different media types ($\chi^2 = 20.77$, $df = 4$, $p = 3.5 \times 10^{-4}$). Color prints were

assigned greater anomaly print ratings than Polaroid ($U = 1963$, $Z = 2.47$, $p = 0.014$), black-and-white ($U = 1864$, $Z = 3.40$, $p = 6.8 \times 10^{-4}$), digital ($U = 1915.50$, $Z = 2.93$, $p = 0.003$), and infrared prints ($U = 1879$, $Z = 2.68$, $p = 0.007$). None of the other media types exhibited differential ratings (all p values > 0.20). Print anomaly ratings were also found to differ significantly between the five different media types within the target site ($\chi^2 = 9.65$, $df = 4$, $p = 0.047$) and the control site ($\chi^2 = 14.46$, $df = 4$, $p = 0.006$) with color prints receiving the greatest anomaly ratings at both sites.

A series of analyses were conducted in order to see if any of the measured demographic or belief variables correlated with consultants' anomaly print ratings ($n = 8$). Of the demographic variables, anomaly ratings did not correlate with years of professional photography experience ($r = -0.60$, $p = 0.12$), age ($r = -0.47$, $p = 0.25$), or sex ($r_{pb} = -0.45$, $p > 0.10$ [1 = female; 2 = male]). Similarly, consultants' ratings did not correlate with their endorsement of new age (NAP, $r = 0.20$, $p = 0.64$) or traditional paranormal beliefs (TPB, $r = 0.36$, $p = 0.38$).

The relationship between contextual variables and anomaly print ratings was next examined. Print ratings didn't correlate with any of the contextual variables measured ($n = 14$): temperature ($r = -0.35$, $p = 0.23$), humidity ($r = -0.01$, $p = 0.97$), area (sq. ft.) ($r = 0.39$, $p = 0.17$), lighting levels ($r = -0.43$, $p = 0.12$), number of windows ($r = 0.00$, $p = 1.00$), number of air vents ($r = 0.18$, $p = 0.54$), peak EM field ($r = -0.27$, $p = 0.35$), variability in EM field ($r = -0.22$, $p = 0.45$), number of pieces of artwork without human forms ($r = -0.30$, $p = 0.30$), and number of pieces of artwork with human forms ($r = -0.21$, $p = 0.48$).

Discussion

The present study was intended to be a comprehensive, controlled investigation of an alleged haunting which would have included the use of blind personnel, the measurement of a variety of contextual variables, and the assessment of psychological and parapsychological hypotheses through the incorporation of participant tours (see Lange & Houran, 1997a; Maher, 1999; Wiseman et al., 2003). The testing of multiple, and sometimes competing, hypotheses in tandem coupled with the use of heterogeneous methods including advanced instrumentation and psychological inventories represents an advantageous research strategy and one that we hope future researchers will employ. Before turning to a discussion of the results of this study, perhaps it is best to consider first the events that led to its premature termination.

The episode involving the inhabitant at the haunt site, which subsequently led to the cancellation of the remainder of the experiment, highlights the sensitive nature of haunt experiences. It offers a lesson as to the manner in which investigators should approach, and conduct themselves within, field experiments. Haunting experiences can be quite distressing. Unfortunately, this feature is commonly left unaddressed in the parapsychological literature surrounding these phenomena. For this reason, we think that it is critical that investigators of haunt

cases directly involve, or at the very least have immediate access to, a mental health professional. The third author of this study has such qualifications and was available to immediately consult with the resident following his outburst. However, professional clinicians are infrequently involved in parapsychological field studies and probably less so in the case investigations of amateurs, which is a cause for concern. An investigation, in many cases, involves interactions with people who have witnessed some frightening events, which are often interpreted by lay individuals as symptomatic of pathology or as suggestive of the presence of a paranormal agent. That is, experients are often presented with only two negatively connoted explanatory options, neither of which is explicitly more attractive than the other. It should further be recognized that entering one's home for the purposes of investigation can for many individuals be an impingement on one's privacy, and thus might serve to further magnify the unease associated with haunt effects, as appears to have occurred in the present case. Accordingly, this case compels us to remind researchers to be cognizant of ethical issues involved in haunt investigations (Baker & O'Keeffe, 2005), especially with respect to the treatment of experients and experimental participants (American Psychological Association, 2002).

With respect to the mechanisms of haunting-type experiences, this episode is somewhat insightful. First, it exemplifies the fundamental role played by attention in the occurrence of anomalous experiences. It is especially interesting because there is evidence to suggest that poltergeist manifestations often remit when an investigation ensues (Roll, 1977). In this case, the converse was observed (though no objective phenomena were witnessed by, nor experiences reported to, the experimenters), and it thereby demonstrates that there is great variability with respect to the effects of external attention brought to a case. At the individual level, this episode additionally accords with Lange and Houran's (2001) contention that haunt experiences result from a focusing of attention upon certain ambiguous experiences and Brown's (2004) hypothesis that medically unexplained symptoms result from the attention directed toward ambiguous bodily sensations. In this sense, it is plausible that the impending investigation led to the increased attention to haunt-specific representations of ambiguous phenomena by the residents of the site, resulting in the recrudescence of the phenomena.

The outburst appears to have been dissociative in nature and thus also reaffirms the relationship between dissociation and anomalous experiences (Kumar & Pekala, 2001; Ross & Joshi, 1992). Indeed, this episode closely corresponds to Ross and Joshi's (1992) discussion of the dissociative nature of poltergeist cases. In regard to a hypothetical case, they write:

If the disturbed adolescent in such a household has a dissociative disorder and is acting out angrily, it is to be expected that the child will also report being possessed. The child's anger is dissociated and experienced as an inner demon, while responsibility for angry behavior is disavowed. The disavowal may include amnesia for angry behavior in a case of *somnambulistic possession* (p. 360, italics in original).

The resident in the present case, as mentioned previously, also reported to be amnesic for the episode. One point of divergence between these two cases, however, which should not go unaddressed, is that the resident had been consuming alcohol. In addition, the investigators later found out that this inhabitant had a history of alcohol abuse and anger management problems. Although the amount of alcohol consumed is unknown to the experimenters, this episode can not be ruled out as an instance of alcoholic stupor. Nevertheless, this event and the descriptions of the experiences as presented to us strongly indicate that the present case can be understood as a series of psychological disturbances that were interpreted as paranormal phenomena because of the occupants' interest—and possible belief—in paranormal phenomena, which may have been further exasperated by the presence of strangers (both experimenters and research participants) in their home. Unfortunately, the truncated nature of the case does not allow us to delve more deeply into its nuances, especially with respect to the triggering mechanisms of particular experiences.

The contextual variable hypotheses were largely unsupported. Although the lower mean ambient temperature and higher humidity at the haunt site were highly significant and may have mediated the experience of anomalous perceptions at the site, the failure to replicate such differences between the active and inactive areas of the haunt site suggests that this was not the case. In fact, while the relationships did not achieve statistical significance, the converse was found at the target site. Alternatively, it may be that the lower temperature and higher humidity created a general ambiance that was conducive to haunt experiences and yet did not vary considerably between areas, but the active areas possessed further features which exceeded the inhabitants' tolerance thresholds and concomitantly triggered anomalous experiences. As it stands, the extent to which temperature and humidity influenced the occurrence of anomalous experiences at the target site is not clear, but the role of such variables in the incidence of haunt effects warrants further investigation.

The findings of greater peak ambient EM field magnitudes and greater variability in EM field magnitudes in active areas than inactive areas at the target site were suggestively significant and conceptually replicate previous findings (e.g., Roll et al., 1992). The non-significance (after a Bonferroni correction) of these findings is likely to have stemmed from the lower power of the analyses. At the very least, they can be interpreted as being broadly congruent with the extant literature on this hypothesis. The master bedroom at the target site exhibited the highest variability in EM field strengths ($0.97 \mu\text{T}$), apparently because this room is where the power lines enter the site, as found in a previous case (Terhune, 2004). Notably, this room also played host to a disproportionately greater amount of the phenomena reported at the site, relative to the two other target areas. However, this may be because the couple spent a sizeable proportion of their time in this room. It is worth pointing out that this area, along with two others, also received the highest average anomaly rating, 1.05.

It similarly remains to be seen whether the high CO count documented in the active basement of the target site played a functional role in the reporting of haunt experiences in that particular area. It is salient that the neurological symptoms of CO poisoning parallel some of the experiences reported in hauntings. For instance, Christinat (1998) reported that disorientation and hallucinations can result from exposure to high CO counts. CO poisoning may have caused neurological damage, which in turn led to the experience of anomalous perceptions in the site, the content of which was then informed by contextual variables such as paranormal belief. Although this finding is interesting and corresponds with Christinat (1998), it may just as well be a spurious observation. Nevertheless, future research should measure CO at haunt sites.

The small sample sizes in the analyses of the presence of contextual variables, especially the intra-site contrasts, possessed considerably low power, which may have inflated the possibility of Type II errors. One variable that did not significantly differ between the active and inactive areas of the target site, yet is worth considering here, is the number of mirrors. The active areas averaged two mirrors while the inactive areas averaged 0.25 mirrors, a difference which resulted in an F statistic of 3.89 and a p-value of 0.11 (non-parametric: $Z = 1.38$, $p = 0.17$). This analysis is particularly interesting because multiple visual apparitions were reported in reflective surfaces at the site. Moreover, reflective media, or specula, have previously been found to be conducive to the induction of visual apparitions in spontaneous (Green, & McCreery, 1975; Moody, 1992; Tyrrell, 1953/1963) and laboratory settings (Foltin, & Alluisi, 1969; Moody, 1994; Roll, 2004).

The contextual variable analyses present evidence for the potential influence of multiple contextual cues. Although the analyses and observations implicating these variables are mostly suggestive, a few points are worthy of brief mention here. Putative haunt-conducive contextual variables did not tend to be present across all of the active areas. For instance, the high CO count was only recorded in the basement, high EM field strength variability was most pronounced in the master bedroom, and the number of mirrors, though high in the master bedroom and hallway, was zero in the basement. Given this variability in the distribution of potentially haunt-conducive context variables, we might expect different types of experiences or different phenomenological features of kindred phenomena to have occurred in the different areas. The different types of experiences which have previously been attributed to haunts are large in number and range from unusual sounds to visual apparitions to erratic behavior displayed by pets (e.g., Tandy & Lawrence, 1998). It is likely that variability in the type and phenomenology of experiences may come to form a unified representation of a haunting through the attribution of paranormal agency to the phenomena. Similarly, certain experiences may initially be evoked in one area by a particular cue or variable, but concurrently predispose one to further experiences in other areas which lack the original contextual stimulus. Through this process of 'cognitive kindling' (Persinger, 1993), the maintenance of haunt experiences

over time may come to be mediated by different mechanisms than those initially implicated in the generation of the experience. That is, while certain environmental variables may have been responsible for the onset of the experiences, subsequent experiences may have been triggered by other variables, such as paranormal belief. These speculations were unable to be investigated in the present experiment due to its abrupt termination, but we consider these to be worthwhile considerations for future research.

Turning to the photographic print analyses, the finding of Maher and Hansen (1997), namely that active areas within an alleged haunt are more likely to display photographic anomalies than inactive areas, was replicated. Furthermore, the present experiment circumvented many confounds in their study through its employment of a randomized protocol, blind recording methods, blind assessment of the prints by professionals, and a larger sample size. A second, parallel hypothesis, conjecturing a greater incidence of photographic anomalies at the haunt site, relative to the control site, was also supported. While these analyses suggest the presence of anomalous agencies in the target areas of the haunt site, a number of findings indicate that this conclusion may be premature. Only seven prints of 338 received a rating of '3' ('somewhat anomalous') (six prints) or '4' ('definitely anomalous') (one print), and in none of these cases did more than one consultant assign such a rating to the respective print. That is, no items in the catalog of photographic prints were considered to be anomalous by a consensus of professional photographers, as previously found in a catalog of photographic prints captured during a randomized protocol and evaluated by amateur photographers (Houran, 1997). Similarly, anomaly ratings appear to be related in part to the demographics of the sample of professional photographic consultants. For instance, a moderate, albeit non-significant, negative correlation ($r = -0.60$, $p = 0.12$) between consultants' years of experience and average anomaly ratings was found. The non-significance of this statistic may derive from the low power of the analysis which had a sample comprised of only eight respondents. The two consultants who had over twenty years of photographic experience yielded average anomaly ratings of 1.00. One consultant assigned no ratings higher than '1', and the other assigned only one print a rating of '2'. Furthermore, the consultant with the fewest years of photography experience (four), yielded the highest anomaly print rating average, 1.06, and was the lone photographer to assign a rating of '4' to a print. This suggests that the items identified by novice photographers were defects which seasoned photographers did not consider to be unusual.

The findings supporting both tested hypotheses remain ambiguous. As it stands, photographs taken in a random fashion across fourteen sites by a professional photographer, who was blind to the purpose of the study and the identity of the sites, indicated that areas where haunt perceptions had previously been reported were more likely to receive greater anomaly print ratings, both across sites and within the target site. Accordingly, the statistically significant appearances of these apparent anomalies warrant explanation. The presence of

such defects was unexplained by the respective measured contextual variables. However, a moderate negative correlation ($n = 8$, $r = -0.43$, $p = 0.12$) was found between lighting levels and anomaly ratings. This seems to suggest that photographic defects were more common in rooms with lower lighting levels. Moreover, lighting levels were lower in the target site than the control site and lower in the active areas than the inactive areas of the target site. The non-significance of these relationships precludes us from asserting that lighting levels are responsible for the presence of photographic defects, but given the size of this correlation, this remains a worthwhile hypothesis to test in future research. More generally, the small sample size ($n = 14$) of contextual variable data disallows us from adequately testing whether any of the measured contextual variables mediated the occurrence of photographic anomalies in the catalog of prints. Given this inability to rule out potential confounding variables, we remain reluctant to posit that we have documented a genuine effect with respect to the concordance in the location of previously reported haunt effects and ratings of anomalous images across the two sites and within the target site. Rather, we think that the support for these hypotheses should be interpreted with caution until further controlled research with sufficient statistical power to eliminate all known potential confounding variables has been conducted and replicated or negated our findings.

One unexpected yet interesting finding from the analysis of the photographic prints is that color prints received greater anomaly ratings than all other media types. This may suggest that artifacts are more common with this media type. Alternatively, the higher anomaly ratings may stem from the types of artifacts that are unique to color prints. Lange and Houran (1997b), for instance, previously found higher incidence rates of amorphous forms in color prints. It is plausible that amorphous forms were considered to be more anomalous by our sample of photographic consultants than other types of anomalies, and that this attentional bias resulted in a greater number of assigned anomaly ratings to color prints. Given the relatively small number of photographic defects, consultants were not asked to distinguish between different types of anomalies across media types and sites. Therefore, this question remains unanswered. Nevertheless, we urge researchers in this area to consider how the type and incidence of artifacts vary across media types.

Two potential confounds in the analysis of the photographic prints, differences in the sizes of camera lenses and the use of the flash, are worthy of brief consideration. It is apparent from the catalog of prints that there is variability due to these features, which undoubtedly deflates the standardized status of the protocol. This in turn may have increased the incidence of photographic defects in particular areas. Future research should strive to maintain greater consistency in the utilization of camera features across media types and trials so as to lessen the impact that variability in such utilization may have on the incidence of photographic artifacts. There are a variety of cameras available on the market in 35-mm and medium format with interchangeable backs, which allow the use of

several different film types on the same camera in a single session, thereby minimizing the variability brought about by using different cameras. It is also possible to adequately photograph lighted interiors without the use of the flash. Investigators should request that their professional photographers work without the flash, given that it has been demonstrated (Schwartz & Creath, 2005) that flash usage might be responsible for many of the types of photographic images that have been culturally interpreted as anomalous.

An additional potential confound was discovered following the consultants' assessment of the print catalog. A library of occult and new age books was visible in two separate trials (ten prints) taken in an inactive area of the target site. The presence of such contextual information may have influenced consultants' assessments of these prints in particular and those at the site more generally. Upon inspection, it was found that none of these ten prints received ratings greater than '1'. However, along with an active area of the target site and an area of the control site, this area in general received the highest average anomaly rating, 1.05. It remains to be seen whether consultants' anomaly ratings were influenced by the presence of the occult library, but this does remain a potential confound especially given the anomaly ratings that were assigned to prints taken in that area.

One final limitation of the photographic analyses is the low consistency and consensus between the print anomaly ratings of the photographic consultants. The inter-rater reliability of the consultants' ratings was low, and consensus between consultants, as indexed by the kappa statistic, varied, but was generally low. Specifically, the highest kappa statistic between two consultants fell short of what is considered to indicate moderate consensus (Stemler, 2004). These results are likely to have been hindered by the severity of the negative skew found in this dataset. However, it is undoubtedly true that photographic consultants did not agree on what constituted a photographic anomaly. The implications of this finding, given the controlled nature of these analyses, extend beyond the boundaries of this study and pose problems for the assessment of photographic anomalies generally and in research contexts in particular. Despite these problems, we hope that these results encourage others to conduct research on this understudied topic.

Summary & Conclusion

The present study was abruptly terminated because of aberrant behavior displayed by one of the occupants of the haunt site. This termination resulted in our failure to conduct a comprehensive investigation of the site. The data collected, however, are consistent with previous findings in the literature surrounding haunt phenomena. Analyses weakly suggest the involvement of various physical contextual variables, such as temperature, humidity, high magnitude, and variability in EM fields, and high CO counts, in the experience of haunt perceptions at the site. They also suggest that prior paranormal belief

and the presence of specula may have mediated the incidence of anomalous experiences. Photographic analyses demonstrated no compelling photographic anomalies but did show that the haunt and control sites, as well as the active and inactive areas of the target site, exhibited differential anomaly print ratings, a relationship which we were unable to satisfactorily explain. Color prints, relative to other media types, were also found to yield greater anomaly ratings. The identification of photographic defects as anomalies, generally, may have been related to photographic consultants' years of experience. The presence of such defects may be due to the lighting levels in the respective areas in which prints were captured, or variability in lens and flash features of cameras across media types or trials. Finally, and perhaps most importantly, the present study demonstrates the highly sensitive and distressing nature of haunt phenomena and reaffirms the ethical obligations of investigators to have a mental health professional on call and to abide by recognized ethical codes of conduct when interacting with experiencers of haunt phenomena and conducting an investigation of an alleged haunting.

Notes

- ¹ While this would not affect contrasts between active and inactive areas, it may lead to an increase in photographic defects at the fault of the photographer.

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**Comment on "An Analysis of Contextual
Variables and the Incidence of Photographic
Anomalies at an Alleged Haunt and
a Control Site"**

Since some readers may wish for further information about this case, as one of our reviewers did, we publish the relevant exchange:

Reviewer:

I felt a definite lack of a fuller account of what the experiencers had experienced. A brief summary of their nature would, I believe, help the reader (1) to understand why this case was considered to justify investigation; (2) to appreciate why the experiencers felt as they did—particularly why one of them reacted as strongly as he did. Moreover, it would help the reader understand the significance of the findings if s/he was given information, such as "the kitchen, where a visitor allegedly saw the figure of an old woman" or whatever is the case. As it is, the investigation has a strangely abstract quality, as though divorced from the incidents that triggered it. This may have been intentional, as regards the participants in the investigation: but the reader may well feel he is not being given sufficient insight into the circumstances of the case.

Author's Response:

Although we appreciate this comment and wish we could provide more information regarding the experiences reported at the site, we were unable to do so given the methodological components of the study (the experimenters were double-blind) and the fact that the experiment was abruptly discontinued along with all contact with the inhabitants. We believe that this is outlined clearly in the paper. However, we have added an additional paragraph to the article to justify the case, why it was optimal and why it was investigated.