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Anomalistics and Frontier Science

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GUEST EDITORIAL

Societal Déjà Vu: Gender Bender Shapeshifting as a Cultural Mirror

John B. Kachuba
jkachuba@fuse.net
Ohio University

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KEYWORDS
shapeshifter, shapeshifting, transgender, gender, transformation.

Apart from the media frenzies around real-life ghost stories during the Halloween season (Houran et al., 2020) or the announcements of Nobel prizes for the latest scientific advancements (Piccone & Behrman, 2022), topics pertinent to frontier science seldom make the headlines or touch people's daily lives. Shapeshifting is one such topic. Embodying the larger concept of transformation, shapeshifting exists on a continuum from classic or archetypal representations in folklore and mythology to metaphorical representations within a range of other shapeshifting manifestations. In this liminal space, we may find shape-shifting ghosts from Asian folklore (Foster & Kijin, 2015); shapeshifters in films and literature; masks, cosplay, and Halloween costumes as a form of shapeshifting and people of color 'shapeshifting' to navigate through the dominant culture (Cox, 2015). There is also the parapsychology of shapeshifting shamans (Vilenskaya, 1996), as well as consumer products, especially food and alcohol, including bear shapeshifter names and logos (Kachuba, 2019). Of course, this editorial cannot possibly address all the various ways in which shapeshifting affects Western societies, so we will focus on one metaphorical manifestation that is passionately playing out across mainstream culture and the sociopolitical landscape — the phenomenon of 'fluidity' in gender identity (Lindqvist et al., 2021; Monro, 2019).

As seen in anthropological studies of the mythology, religion, and folklore of cultures worldwide, a shapeshifter is someone capable of physically changing into an animal, another person, or even an inanimate object. These characters are as ancient as time itself; the famous cave painting at Trois Freres, France, said to depict a shapeshifting shaman transforming into a deer. Entitled "The Sorcerer" by anthropologists, this cave painting dates from the Paleolithic era. By its very nature, the shapeshifter has come to symbolize the deconstruction of binaries. Instead, it occupies a transient, liminal space that defies specific categorization. Social scientific treatises have metaphorically related the concept of shapeshifting to contemporary issues and controversies, especially regarding gender identity (Kent, 2019). Classical mythology and folktales from around the world are likewise rife with stories of shapeshifters whose transformations often involve gender (Ready, 2021: Jameson, 1951). The gender-bending ability of shapeshifters resonates with our modern society, where gender identification issues have become paramount and sometimes contentious. Gender shifting brings into focus the question of what constitutes a person's identity. Does our outward appearance determine our gender, or is it something innate in our consciousness that informs us of our gender?

John Locke's (1689) An Essay Concerning Human Understanding examines ways to define and understand human thought and consciousness. Locke argued that personal identity is not decided upon a physical basis but rather upon the unique arrangement of each person's atoms; Locke referred to that arrangement as 'soul,' although it often

is interpreted as 'consciousness.' If we agree that one's identity will always encompass gender, then Locke's argument may be used to support the idea that society's judgment on how one looks or represents oneself does not determine a person's gender identity. Individuals' consciousness and how they think of themselves determine their gender identity. This conclusion would seem logical and rational, but it does not allow for irrational ideas of self-identity as in cases of lycanthropy, where the sufferer believes they are a wolf and acts accordingly (Guessoum et al., 2021; Nasirian et al., 2009). Wolf-men aside, in contemporary society, those who identify in any way other than 'cisgender' (i.e., a person whose gender identity corresponds to their sex assigned at birth) may find their gender identity challenged as unnatural and perhaps even immoral (Lombardi et al., 2008**);** Gordon & Meyer, 2008; Campbell et al., 2019).

It is interesting to speculate on the relationship between shapeshifters and the understanding of gender within the culture in which they appear. It is not unusual to find gender-bending shapeshifters mirroring the realities of gender identity in the society that had created them. Gender-bending shapeshifters were known to the ancient Greeks. The blind seer, Tiresias, transformed twice in his life, first from man to woman, then seven years later, from female back to male. Although his shapeshifting resulted from a curse by Hera and not of his own volition, he made the best of the situation each time. As a woman, Tiresias married, had children, and became a priestess and a successful businesswoman. Transformed again as a male, he became a famed seer, prophet, and king's confidant. Because of Tiresias's dual nature, he occupies a liminal space in Greek mythology, mediating between humans and the gods, man and woman, the mortal world and the underworld, and the present and future. This complexity comes from the knowledge gained through his gender transformation, the 'mating' of male knowledge with female knowledge. It reflects the values of Greek society with its well-defined male and female roles. Rather than an abnormal figure to be scorned or shunned, the Greeks held Tiresias in high regard for his/her complementary nature.

Norse mythology also demonstrates the notion of gaining knowledge or power through gender transformation, especially in the shapeshifting abilities of Odin, the most powerful male god, and the trickster, Loki. Norse culture adhered to rigid male/female roles, and a man who exhibited any feminine tendencies, either in actions or appearance, could be accused of ergi, or unmanliness, the worst kind of insult. Transsexualism or queerness was despised, and there were strict legal sanctions against such gender behavior. Yet Odin sought out and obtained seid, shamanic magic, from Freya and other sorceresses,

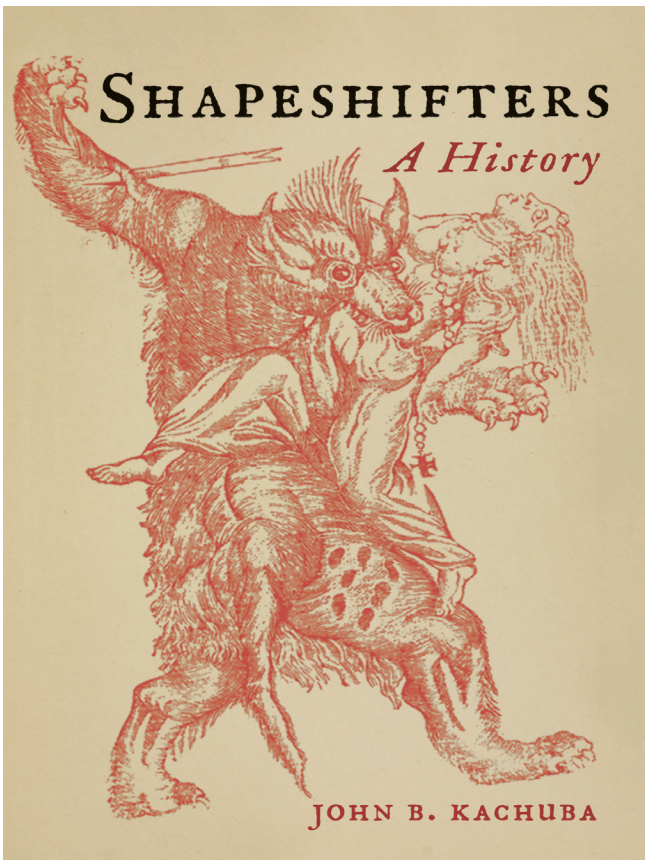

Figure 1. Shapeshifters: A History. (Reaktion Books, 2019).

acting unmanly since the Vikings recognized women as the holders of seid and rituals. Odin became a master of seid and used that power in ways that crossed gender boundaries. Disguised as a woman, he could beget a child to avenge Baldur, but his magic also allowed him to cross the border between the land of the living and the land of the dead, where he found knowledge in the runes. Like Tiresias, Odin becomes the embodiment of both the melding of male and female characters and a transgressor of gender boundaries.

Loki called out Odin as unmanly because of his affinity for the feminine or, to be more precise, his affinity for knowledge and power embodied in the feminine. Yet, the Norse myths relate how often Loki himself shapeshifted into the form of a woman, enjoying and making use of the female body, even to the point of bearing children. For that, he earns the derision of the gods. In one tale, Odin mocks Loki, calling him a 'milkmaid' after Loki spends eight winters living underground as a woman. Perhaps the most infamous tale of Loki's gender-bending shapeshifting relates to how he transformed himself into a mare, then mated with a stallion, giving birth to Sleipnir, the magical horse (Kent, 2019). Loki's gender-transforming shapeshifting is born of the same motivations as that of Odin, i.e., to fuse male and female attributes into one being. As a woman, Loki

could avoid the physical altercations common among the gods and gain access to the magical feminine knowledge contained in seid. While the myths refer to Loki with masculine pronouns, it might be more accurate to refer to him as non-binary or gender-fluid.

Many cultures have other examples of gender-shifting entities. Almost universally, Native American tribes believed coyotes and wolves to be shapeshifters. Some tribes also hold that 'skinwalkers' and 'wendigos' are shapeshifters. While contemporary films and movies seem to dwell on the evil nature of these mythological characters (Dillinger, 2015; McMahon-Coleman & Weaver, 2015), they ignore their positive aspects, especially the benefits of health, protection, and prosperity that these creatures may bring to the people. Among the Diné (Navajo), there is a strong belief in skinwalkers, or yenaldlooshi, evil shapeshifting shamans. As the skinwalker transforms its gender, it takes on the function and behavior of that gender. Once transformed, the shapeshifter's character is stereotypical, which is what one would expect from a member of that gender. However, the skinwalker is a confusing figure since its ability to shift between genders renders it, at heart, androgynous and undefinable. The societies of some Native American peoples mirror this androgynous nature.

Native American cultures have long familiarity with the berdache tradition in which a cisgender male adopts the role of a woman, wearing female clothing, doing women's chores, and sometimes marrying a man. It is important to note that while a berdache assumed a gender role different from his cisgender, it did not necessarily change his sexual identity. He may have still identified as heterosexual or adhered to a different sexual orientation. About 150 Native American nations had a berdache tradition, with about thirty of them having women who took on the roles of men. Members of the berdache community valued and respected them. The community regarded them as 'two spirits' people, a term revived among contemporary Native Americans to honor people of gender-fluid identity. While such gender shifters are not magically transforming themselves in the traditional way we think of shapeshifters, they do represent an innate desire to take on a new gender – a new shape, but one of their choosing.

In cultures holding rigid codes of gender identity and behavior, such as the Norse, people who are sure their birth gender does not truly represent who they are may find navigating their place in society challenging. As a result, they may suffer from anxiety, frustration, depression, and even suicide. Worse, their society may punish them for what it believes is a transgression against nature. In a tale of shapeshifting as punishment for transgressing traditional gender roles, the Aborigines of Australia tell of a tribe of women (jandu) who lived away from other conventional tribes and performed the roles of men. The jandu women carried men's weapons – spears, spear-throwers, and knives – and hunted kangaroos and emus, just like the men, rather than gather fruits and vegetables, as expected of them. Tchooroo, the Great Snake, who was responsible for upholding the laws of the tribes, chastised the women and ordered them to stop hunting since they were violating the law by taking on the role of men by doing men's work. The women defied him and continued hunting for meat, so Tchooroo transformed them into giant termite nests.

The shapeshifter character in such rigid cultures does serve to reinforce society's gender and sexual norms. Still, simultaneously it may recognize and honor the power and knowledge of the 'Other', the crosser of boundaries. Cultures with a more tolerant attitude toward gender and sexuality demonstrate a benign, if not favorable, attitude toward their shapeshifter characters. Like traditional Native Americans, these cultures may offer a model for creating harmonious societies for all, including gender-fluid people, our modern-day shapeshifters.

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RESEARCH ARTICLE

Thermotrophy Exploratory Study

James Weifu Lee
jwlee@odu.edu

Zhejiang Agricultural University, Department of Agronomy, Thermotrophy Exploratory Research Group. Hangzhou, Zhejiang Province, China

Department of Chemistry and Biochemistry
Old Dominion University, Norfolk, VA 23529 USA

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PLATINUM OPEN ACCESS

HIGHLIGHTS

Experiments with certain microorganisms in the absence of oxygen showed that life can utilize heat from the ambient environment as a source of energy.

ABSTRACT

The question of whether environmental heat energy could be utilized as a source of energy for biological metabolism is the center of this exploratory research. In 1979, this author postulated a hypothesis for the existence of thermotrophs that could isothermally utilize environmental heat energy as a source of their energy on Earth. According to this hypothesis, the thermotrophs could be the first primitive forms of life in the early Earth environment. The chemotrophs and phototrophs that we currently are all well familiar with might have been evolved somehow from the primitive thermotrophs. Furthermore, all the organisms currently regarded as the "chemotrophs" and "phototrophs" could actually be the mixed trophy types containing thermotrophic features: thermo-chemotrophs and thermo-phototrophs. Energetic analysis with the thermodynamic first law indicated that the anaerobic acetate-utilizing methanogenic archaea *Methanosarcina* could be a "living fossil specimen" of the thermotrophs. Experiments with enriched acetate-utilizing methanogen, including *Methanosarcina,* has, for the first time, demonstrated that their anaerobic metabolism was indeed associated with isothermal environmental heat utilization, resulting in their liquid culture temperature to change (decrease) by about −0.10 °C and sometimes drop by as much as −0.45 °C observed in the experiments. The mean temperature change (drop) was −0.25 ±0.06 °C.

KEYWORDS

Type-B thermotrophy, isothermal environmental heat energy utilization, thermotrophic function, methanogen, anaerobic fermentative hydrogen-producing bacteria, thermotrophs, thermo-chemotrophs, thermo-phototrophs.

Hypothesis for the Existence of Thermotrophic Organisms on Earth

American scientists Harada and Fox in 1958 performed an experiment in which they heated a mixture of amino acids and found polypeptides formed from many of the amino acids (Harada & Fox, 1958). It indicated that the use of environmental heat energy could promote the formation of complicated organic complexes from simple organic substrates, which appeared to resemble quasi-life-like organic matter, including polypeptides. If environmental heat energy could be involved in the formation of "quasi-life-like organic matters" before the first primitive forms of life emerged on Earth, why would life no lon-

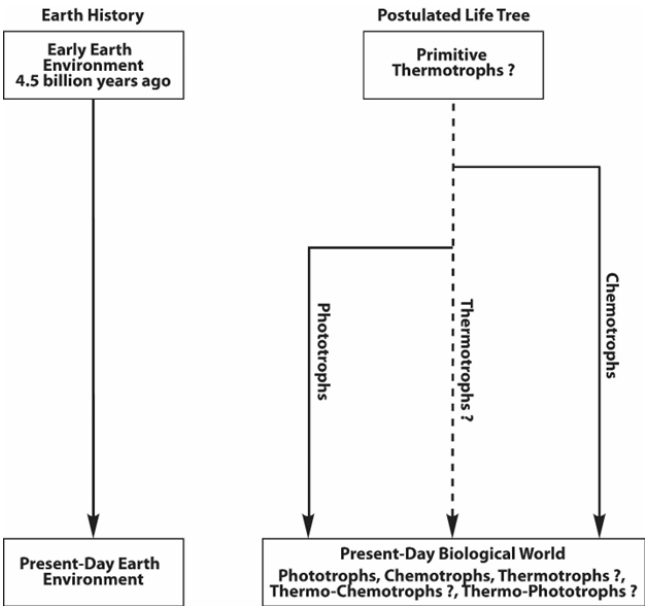

Figure 1. Illustration of the postulated hypothesis for the existence of thermotrophic life on Earth.

ger use heat energy as a source of its energy? Or, among some of the organisms (especially the primitive forms of life such as the primitive archaea including the extreme thermophiles), would they still retain their early evolution-historical features of thermotrophy that isothermally utilizes environmental heat energy as an energy source for their metabolism? This was one of the questions that came to the author's mind more than 40 years ago.

Furthermore, heat energy widely exists in the natural environment. In view of molecular dynamics, heat energy is the thermal molecular motion kinetic energy. Meanwhile, the molecular motion energy also represents the motion of the fundamental particles (including electrons) of the molecules. The motion of the fundamental particles can emit electromagnetic waves known as blackbody heat radiation (Planck, 1910). A 25 °C (T=298 °K) object can emit electromagnetic waves with their peak emission wavelength (λ_{peak}) of about 6.66 μm, which is in the infrared wavelength domain. The infrared peak wavelength (λ_{peak}) has an inverse relationship with the temperature (T). Infrared and visible light are both electromagnetic waves, which are fundamentally the same, except for their difference in wavelength. It is known that the dominant photosynthetic pigments in higher plants are chlorophyll-a molecules that have absorbance peaks in the blue and red regions of sunlight. The higher plant photosystem-I reaction center pigment (a dimer of chlorophyll-a molecules) has a light absorbance peak wavelength of around 700 nm, which is near the infrared domain. Some of the photosynthetic bacteria can utilize near-infrared radiation with a wavelength of < 1000 nm (certain bacteriochlorophyll shows absorption maxima around 805 nm and absorbs the light in the 800–1040 nm range). With these early perspectives, the author was wondering whether there could be some thermotrophic organisms that could utilize infrared (environmental heat energy) as a source of energy for their metabolism.

Inspired by the preliminary analysis above, the author in 1979 postulated the following thermotrophic life hypothesis (Figure 1) in regard to the question of whether there could be thermotrophic metabolism in the biological world.

According to the thermotrophy hypothesis, in addition to the currently known chemotrophs and phototrophs, there could exist another type of organism — "thermotrophs," which might have been one of the earliest forms of life on Earth. This hypothesis was based on the knowledge of the early Earth environment (Owen et al., 1979) that was likely quite hot (Woese, 1979), and its early atmosphere was reductive in nature containing no molecular oxygen and no ozone layer. Consequently, at that time, solar radiations, including UV light, x-ray, γ-ray, and cosmic radiations, could directly reach the Earth's surface, which could quickly destroy life's DNA (if any) on the early Earth's surface. From there, one could imagine that the land surface of the early Earth was probably life-less for a very long time; the sea surface at that early time was also likely lifeless. The high-energy radiations, including UV light, x-ray, and γ-ray could penetrate quite deep into the seawater so that life probably could not exist at any places on the early Earth surface where sunlight and high-energy radiations could hit; Consequently, at that early time, photosynthetic organisms could hardly exist there either.

However, in the deep dark ocean where the life-destroying high-energy solar radiations could not reach, there may be a quite different story. Especially near the deep ocean volcanic vents, the hot and relatively stable deep ocean environment could be a favorable birthplace for the formation of the first primitive forms of thermotrophic life: the primitive thermotrophs. Therefore, the thermotrophs could be born as the first primitive forms of life in a quite surprising manner in the early stage of the Earth's history when it was still quite hot, and its early atmosphere was reductive with no molecular oxygen and no ozone layer. It could be possible for the thermotrophs to first occupy the ocean floor and then further expand from the sea floor to the other living spaces on Earth while evolving themselves to produce more-advanced forms of life, including the chemotrophs and phototrophs and the possible mixed trophy types including thermo-chemotrophs (Lee, 2020a, 2021a, 2021b) and thermo-phototrophs (Jennings et al., 2018) that carry certain thermotrophic functions.

After the life-protecting ozone layer was formed in the Earth's atmosphere, life in all its forms: thermotrophs, chemotrophs, and phototrophs and their combined types, including thermo-chemotrophs, thermo-phototrophs, and thermo-chemo-phototrophs had the greater opportunities in expanding to nearly all areas of the Earth natural environment. As the Earth got cooler, however, the environmental conditions could become less favorable to the thermotrophs but more favorable to the phototrophs and chemotrophs, especially their combined types, including thermo-phototrophs, thermo-chemotrophs, and thermo-chemo-phototrophs. For example, the phototrophs (and/or thermo-phototrophs), owning to their advantage of utilizing energy-rich visible photons, have now apparently occupied the Earth's surfaces, including the oceans and land areas by their competing advantage against the primitive thermotrophs. However, under the present-day Earth conditions, it should still be possible to find some thermotrophs in certain special places, such as in the deep water/mud, anaerobic digestors, deep soils, and/or earth subsurface where the phototrophs could not compete with them.

In the present-day Earth environment, it should be possible to also find thermotrophs' derivatives such as thermo-phototrophs, thermo-chemotrophs, and thermo-chemo-phototrophs. This hypothesis for the postulated existence of thermotrophic organisms is illustrated in Figure 1.

The disclosure of the thermotrophic life hypothesis here is to encourage the scientific community to consider support for research on this topic of fundamental importance. Hopefully, this could stimulate scientific discussions on how to re-evaluate the effects of environmental heat energy on life for its possible applications. For example, one of the main goals for the agriculture system is to harvest and convert sunlight energy into the chemical energy of foods. Currently, only about 1-3% of the sunlight energy that reaches the crop field can be converted into biomass energy through photosynthesis (Edreira et al., 2020) (Keller et al., 2022); the remainder (over 90%) of the light energy is lost as the dissipated heat (infrared) into the Earth environment and the out space, which is quite wasteful. If we could somehow find a way to utilize not only the visible light energy but also the environmental heat energy for crop production, then it could fundamentally improve the yields for food and energy production.

Notably, inspired by the recent discovery on thermotropy (Lee, 2020a, 2021b), a novel invention on asymmetric-function-gated isothermal electricity generation (Lee, 2019b) has now been made to isothermally utilize the limitless environmental heat energy alone (without requiring any fossil fuel energy) for production of isothermal electricity, which could power many electric devices including (but not limited to) mobile phones, laptops, cars, and trains. It could potentially help liberate all people from their dependence on fossil fuels (Lee, 2022b). Therefore, this line of research and development may have much broader fundamental and practical implications, including its applications to solve the energy crisis and reduce greenhouse-gas emissions for a sustainable future to control climate change on Earth (Lee, 2021a, 2022a).

Preliminary Thermodynamic Evidence for the Existence of Thermotrophic Metabolism

In the present-day biological world, does there really exist any such a thermotrophic organism that can isothermally utilize environmental heat as a source of energy for its metabolism? According to our analysis with the thermodynamic first law, the anaerobic methanogenic archaea that utilize acetate as the sole organic carbon source for their growth and production of methane and carbon dioxide may represent "a living fossil specimen" of the thermotrophs.

The methanogenic bacteria (Fox et al., 1977), such as *Methanosarcina sp*., can grow in an anaerobic minimal culturing medium that contains acetic acid (CH_3COOH) as the sole organic carbon source for their growth and production of methane (CH_4) and carbon dioxide (CO_2) (Weimer & Zeikus, 1978a, 1979). Note, the production of methane (CH_4) and carbon dioxide (CO_2) from acetic acid (CH_3COOH) is an endothermic reaction process that requires heat energy (ethalpy change: ΔH = +3.77 kcal/mol) from the environment:

$$CH_3COOH \rightarrow CH_4 + CO_2 \; - 3.77 \text{ kcal/mol} \qquad (1)$$

The methanogen's anabolism, which utilizes acetic acid (CH_3COOH), mineral nutrients (N, P, K, Ca, Mg, S, Fe, Zn, Cu, Mo, and etc.) under anaerobic conditions to synthesize cellular materials including sugar, lipids, proteins, and nucleotides for cell growth, also requires exogenous energy input from the environment. Since both its catabolic production of methane (CH_4) and carbon dioxide (CO_2) and its anabolism in synthesizing the cellular materials from acetic acid (CH_3COOH) are endothermic, the total metabolic process of *Methanosarcina* must thus be endothermic, requiring exogenous energy input. Consequently, based on the first law (conservation of mass and energy), the required energy input, in this case, must be from the isothermal utilization (absorption) of heat energy from the environment. This thus provides the thermodynamic first-law evidence for the existence of ther-

motrophic metabolism in the anaerobic methanogenic *Methanosarcina* cells.

The predicted isothermal utilization (absorption) of environmental heat energy through thermotrophic metabolism is expected to lower the temperature in the liquid *Methanosarcina* cell culture. This predicted isothermal utilization (absorption) of environmental heat energy by *Methanosarcina* was experimentally demonstrated, as described near the end of this article. Briefly, the *Methanosarcina* cells were enriched from a liquid inoculum of a methane-producing anaerobic digestor using a minimal liquid culture medium containing acetate as the sole source of carbon under the anaerobic conditions. The experimental observation demonstrated that the metabolic activities in *Methanosarcina* liquid cell culture indeed resulted in a substantial temperature change (drop) by about −0.10 °C (and sometimes drop as much as −0.45 °C) compared with the control (liquid medium only without cells). This is a significant experimental observation since it has, for the first time, demonstrated that the anaerobic methanogenic archaea *Methanosarcina* cells might indeed represent a "living fossil specimen" of the thermotrophs on Earth.

In addition, our early analysis (Lee, 1983) indicated that certain anaerobic H_2-producing bacteria (Anukam et al., 2019; Turker et al., 2008) are also likely to carry the thermotrophic function capable of isothermally utilizing environmental heat energy in a way similar to that of the methanogenic archaea *Methanosarcina* cells. For example, the anaerobic hydrogen-producing "S" bacteria can utilize ethanol (CH_3CH_2OH) to produce molecular dihydrogen (H_2) and acetic acid (CH_3COOH) according to the following process reaction:

$$CH_3CH_2OH + H_2O \rightarrow CH_3COOH + 2H_2 \text{ -19.16 kcal/mol} \quad (2)$$

This catabolic production of CH_3COOH and H_2 from CH_3CH_2OH (Eq. 2) is endothermic (ΔH = +19.16 kcal/mol) (Lee, 1983). The "S" bacteria anabolism, which anaerobically utilizes ethanol (CH_3CH_2OH) and mineral nutrients (N, P, K, Ca, Mg, S, Fe, Zn, Cu, Mo) to synthesize cellular materials including sugar, lipids, proteins, and nucleotides for cell growth, also requires energy input. Consequently, based on the first law of thermodynamics, the anaerobic hydrogen-producing "S" bacteria are also likely to carry thermotrophic function for isothermal utilization (absorption) of heat energy from the environment.

Similarly, certain propanoic acid-utilizing, H_2-producing, and acetic acid-producing bacteria anaerobically utilize propanoic acid (CH_3CH_2COOH) to produce acetic acid (CH_3COOH), hydrogen (H_2), and carbon dioxide (CO_2) according to the following process reaction:

$$CH_3CH_2COOH + 2H_2O \rightarrow C_3COOH + 3H_2 + CO_2 \text{ -48.93 kcal/mol} \quad (3)$$

This catabolic production of acetic acid, hydrogen, and carbon dioxide from propanoic acid (Eq. 3) is clearly endothermic (ΔH = +48.93 kcal/mol; ΔG^o = + 13.59 kcal/mol; $\Delta G^{o\prime}$ = + 18.24 kcal/mol) (Lee, 1983); Their anabolism that anaerobically utilizes propanoic acid (CH_3CH_2COOH) and mineral nutrients to synthesize cellular materials for cell growth certainly also requires additional energy input. Based on the thermodynamic first law, their required energy must be from the isothermal utilization (absorption) of heat energy from the environment. Therefore, this analysis result also indicated the existence of thermotrophic metabolism in the propanoic acid-utilizing, H_2-producing, and acetic acid-producing bacteria.

Furthermore, certain butanoic acid-utilizing, H_2-producing, and acetic acid-producing bacteria anaerobically

Table 1. The published data of physical chemistry constants (from the 55th edition Handbook of Chemistry and Physics 1974–1975) (Weast, 1974 -1975) that were employed in the calculation for the enthalpy changes (ΔH) in the anaerobic process reactions of Eqs. 1–4.

Chemical formula	Name	State	Temperature °C	$-\Delta H_{Combustion}$ kcal/mol
CH_3COOH	Acetic acid	Liquid	25	209.02
CH_3CH_2OH	Ethanol	Liquid	25	326.48
CH_3CH_2COOH	Propanoic acid	Liquid	25	365.03
$CH_3CH_2CH_2COOH$	Butanoic acid	Liquid	20	521.90
CH_4	Methane	Gas	25	212.79
H_2	Hydrogen	Gas	25	68.31
CO_2	Carbon dioxide	Gas	25	0
H_2O	Water	Liquid	25	0

utilize butanoic acid ($CH_3CH_2CH_2COOH$) to produce acetic acid (CH_3COOH) and hydrogen (H_2) according to the following process reaction:

$$CH_3CH_2CH_2COOH + 2H_2O \rightarrow 2CH_3COOH + 2H_2 \ -32.77 \text{ kcal/mol} \quad (4)$$

This catabolic production of acetic acid, hydrogen, and carbon dioxide from butanoic acid (Eq. 4) is clearly endothermic (ΔH =+ 32.77 kcal/mol; ΔG^o =+ 16.13 kcal/mol; $\Delta G^{o'}$ =+ 11.50 kcal/mol) (Lee, 1983); their anaerobic utilization of butanoic acid and mineral nutrients to synthesize cellular materials for cell growth apparently requires additional energy from isothermal utilization (absorption) of heat energy from the environment. This analysis result indicated the existence of thermotrophic metabolism in the butanoic acid-utilizing, H_2-producing, and acetic acid-producing bacteria.

The enthalpy changes (ΔH) for each of Eqs. 1–4 above were calculated using the published data of physical chemistry constants from the 55th edition Handbook of Chemistry and Physics 1974–1975 (Weast, 1974 -1975) as listed in Table 1.

Recently, a new type of energy process called "Type-B energetic process" (Lee, 2021a) has been identified through the author's research work in alkalophilic bacteria (Lee, 2019d, 2020a) and mitochondria (Lee, 2019c, 2021b) that were shown to isothermally utilize environmental heat in driving ATP synthesis. The findings showed that the bacteria and mitochondria commonly regarded as "chemotrophs" are now known to also contain thermotrophic functions. That is, they actually are the mixed trophy type of "thermo-chemotrophs," which well supports the thermotrophic life hypothesis (Figure 1) as proposed by Lee in 1979.

Notably, Jennings et al. have also independently identified that the photosynthetic systems can also isothermally utilize environmental heat energy (Jennings et al., 2018). This independent finding (Jennings et al., 2018) also seems to implicate that the "phototrophs" are also likely to be the "thermo-phototrophs" as predicted in the Lee 1979 hypothesis (Figure 1) as well.

The Lee Thermotrophy Exploratory Research Group first published the idea of thermotrophs in an article titled "There may be thermotrophic type of life on Earth" in the 1983 Chinese journal *Potential Science* in Beijing, China (Lee, 1983). The 1983 Lee team article with thermodynamic energy analysis showed the possibility for the existence of thermotrophic life, which possesses the ability to "resist (disobey) the second law of thermodynamics," and is thus capable of "utilizing dissipated environmental heat energy as a source of energy for their metabolisms" (Lee, 1983 p. 1). It postulates that the "thermotrophic life forms may stay in the places where phototrophs could not compete with them, such as at the bottom of natural water bodies (ponds, rivers, lakes, and oceans) and deep soil earth layers." The article points out that "the anaerobic propanoic acid-utilizing and hydrogen (H_2)-producing and acetate-generating bacteria, and the anaerobic butanoic acid-utilizing and hydrogen-producing and acetate-generating bacteria may also be considered as some of the examples for the thermotrophic type of life in the present-day Earth environment" (Lee, 1983 p. 1).

The 1983 Lee team article (Lee, 1983) further draws attention to the fact that the physiological Gibbs free energy change in the anaerobic bacteria catabolism from propanoic acid to produce molecular hydrogen, acetate, and carbon dioxide has a substantial positive value ($\Delta G^{o'}$ = +18.24 kcal/mol) ; and so does that in the catabolism from butanoic acid to produce molecular hydrogen and acetate with a substantial positive change of the physiological Gibbs free energy ($\Delta G^{o'}$ =+ 11.50 kcal/mol). Consequently, the Lee team postulated that the total entropy in the anaerobic bacteria catabolic processes decreases instead of increasing (Lee, 1983). Since the anabolism (biosynthesis) per se is known as a process from disorder to order (with decreasing entropy of the system), the article concludes that the total entropy of the anaerobic H_2-producing bacterial life, including both their catabolism and anabolism also decreases, which could not be explained by the second law of thermodynamics. Thus, the article points out that the second law may not be fully applicable to the life systems. It also envisions that it will be possible for human society to isothermally utilize the limitless environmental heat energy to do useful work through the mimics and application of thermotrophic functions (Lee, 1983).

Notably, more than 20 years later, in a 2007 publication (Sheehan, 2007), Dr. Daniel Sheehan also excellently introduced a similar idea, "thermosynthetic life," which bears a strong resemblance to Lee's concept of "thermotrophic life" published in 1983 (Lee, 1983). Apparently, Dr. Sheehan seemed not aware of the 1983 Lee team publication (Lee, 1983) and came up with a somewhat similar idea for thermotrophy. In the 2007 "thermosynthetic life" article (Sheehan, 2007), Dr. Sheehan proposed an intriguing superthermal membrane capacitor where certain mobile electrons are hypothesized to climb the electrostatic potential across a biomembrane "against the potential gradient via multiple small, diffusive sub-k_BT steps" using thermal energy alone. This was proposed as a physical model with "a 3-D pyramidal array of charge transport molecules" through "an electrically conducting molecular ladder spanning the membrane from pyramidal base

to vertex" for the conversion of thermal energy into biochemical work (Sheehan, 2007 pp. 1779,1785). Although such a proposed thermal energy-driven pyramidal array charge transport for electrocapacitor energization has never been observed in the biological world so far, it remains still as an interesting research topic that should be encouraged to explore.

The protonic biomembrane capacitors (Lee, 2019a, 2020b) that Lee recently identified in bacteria and mitochondria are now known to charge up through a chemical (redox) energy-driven electron-transport-coupled proton translocation process (Lee, 2020a, 2021b), which is different from Sheehan's proposed thermal energy-driven pyramidal array charge transport mechanism (Sheehan, 2007). In the protonic biomembrane capacitor system (Lee, 2019a, 2020b), it is the use of the thermal kinetic energy (k_BT) associated with transmembrane-electrostatically localized protons through asymmetric membrane structures that enables a thermotrophic function in isothermal utilization of environmental heat energy to make ATP for cellular activities (Lee, 2020a, 2021a, 2021b) (Guan, 2022).

Based on the finding of protonic thermotrophic function, Lee has recently identified two thermodynamically distinct types (A and B) of energetic processes naturally occurring on Earth (Lee, 2021a). Type-A energetic processes, such as the classical heat engines, ATP hydrolysis, and many of the known chemical, electrical, and mechanical processes, apparently follow well the second law of thermodynamics; Type-B energetic processes, such as the newly discovered protonic thermotrophic function that isothermally utilizes environmental heat energy to do useful work in driving ATP synthesis, which follows the first law of thermodynamics (conservation of mass and energy), but do not have to be constrained by the second law, owning to their special asymmetric functions (Lee, 2022a).

Remarkably, Dr. Anthonie Muller excellently proposed a "heat engine"-based "thermosynthesis" hypothesis (Muller, 1996; Muller, 2012), which appears well in line also with the Lee concept of "thermotrophic life" (Lee, 1983) and the Sheehan model of "thermosynthetic life" (Sheehan, 2007); they all pointed to the same big direction that life could utilize heat energy as a source of energy to do useful work. However, there is also some fundamental difference here: Muller's "thermosynthesis" model requires a "thermal gradient" or "temperature cycling" (Muller, 1985; Muller, 2009; Muller & Schulze-Makuch, 2006), whereas both the Lee concept of "thermotrophic life" and the Sheehan model of "thermosynthetic life" may be classified as a Type-B process that isothermally utilizes environmental heat energy to do useful work without requiring any thermal gradient. That is, according to the classification of Type A and B energetic processes (Lee, 2021a, 2022a), Muller's "thermosynthesis" model would represent a Type-A thermotrophy while both the Lee concept of "thermotrophic life" and the Sheehan model of "thermosynthetic life" would be classified as the Type-B thermotrophy. Probably, it is debatable or discussable whether or not Muller's "thermosynthesis" model as Type-A thermotrophy could really operate in any biological cells with no substantial temperature gradient under the nearly constant temperature conditions in today's Earth environments. Nevertheless, Muller's "thermosynthesis" model is also valuable since it is a testable hypothesis and may also have potential implications in helping to explain some of the possible roles that heat energy could probably play in regard to the origin of life including the RNA world (Muller, 2005).

The following section of this paper reports the experimental demonstrations of the isothermal heat absorption (utilization) by anaerobic acetate-utilizing methane-producing bacteria that were performed at the former Zhejiang Agricultural University in 1979–1982. This experimental work through enrichment of anaerobic acetate-utilizing methanogenic bacteria and monitoring of their heat absorption has, for the first time, demonstrated that the methanogen *Methanosarcina* cells indeed absorb heat energy from the liquid culture environment, which may now be considered as the first experimental evidence for the methanogenic archaea as "a living fossil specimen" of thermotrophs that manifests the predicted Type-B thermotrophic activities (Figure 1 and Eq. 1).

EXPERIMENTAL DEMONSTRATION OF HEAT ABSORPTION BY ANAEROBIC ACETATE-UTILIZING METHANOGEN

Enrichment Culturing of Anaerobic Acetate-Utilizing Methane-Producing Bacteria

A minimal culturing medium (also known as the "#16" liquid medium) comprising acetate as the sole source of organic carbon was made and employed to enrich anaerobic acetate-utilizing methane-producing bacteria (methanogen) from a liquid inoculum of a methane-producing anaerobic digestor at the former Zhejiang Agricultural University. The "#16" liquid medium was made from distilled water by adding the following ingredients (per 2 liters (L) of the liquid medium): 31.298 gram (g) of $Ca(CH_3COO)_2$, 0.128 g of CH_3COOH, 1.0820 g of NH_4CH_3COO, 0.0300 g of $MgCl_2$, 0.4000 g of K_2HPO_4, 0.4000 g of $Na_2S.9H_2O$, 0.2000 g of yeast powder, 2.5 ppm of Fe, 0.5 ppm of B, 1.5 ppm of Mn, 1 ppm of Zn, 0.25 ppm of Cu, 0.25 ppm of Mo, 0.25 ppm of Vitamin B12, 0.5 ppm of

Vitamin B2, 0.75 ppm of Vitamin B1, 0.75 ppm of Vitamin B6, and 50 ppm of Vitamin C.

The experimental enrichment culturing of acetate-utilizing methane-producing bacteria was conducted employing the technique of anaerobic liquid culturing, as illustrated in Figure 2, using liter-size glass bottles as culturing reactors that were filled with the "#16" liquid medium. Each of the liquid culturing bottle reactors was sealed with an airtight rubber cap that was installed with a clinic glass cylinder with a needle to collect any gas product (including CH_4 and CO_2) from the headspace of the anaerobic liquid culture in each bottle reactor. The anaerobic liquid conditions were established by adding small amounts of reducing chemical compound ($Na_2S.9H_2O$) for the elimination of any residual O_2 by its reduction chemistry in the liquid medium so that the redox potential (E_h) of the liquid culturing medium was maintained at about – 100 mV, which was measured with a redox-measuring electrometer.

Note the acetate-utilizing methanogen cells that the enrichment culturing experiment was designed to enrich were known to be strictly anaerobic bacteria (archaea such as *Methanosarcina*). They cannot grow under aerobic conditions since they could be inactivated by any exposure to air oxygen. Under the strictly anaerobic conditions (the redox potential (E_h) of the liquid culturing medium was maintained at about – 100 mV), no other organisms except the acetate-utilizing methanogen cells could utilize the substrate acetate as shown in the ingredients of the "#16" liquid medium. Therefore, it was crucial to strictly keep the liquid culturing medium under anaerobic conditions, although sterilization of the liquid media in bottles was typically performed by autoclaving as well. The anaerobic conditions were accomplished and maintained through: 1) the use of reducing chemical compound ($Na_2S.9H_2O$) in the liquid medium as listed in the ingredients of the "#16" liquid medium; 2) the removal (or minimizing) of any residual air O_2 from the reactor headspace by filling the bottle reactor with the anaerobic liquid medium to near its full capacity (Figure 2); and 3) using airtight rubber caps to seal the anaerobic liquid medium bottles.

The anaerobic selective enrichment culturing experiment began with inoculation using a clinic needle injection of about 0.1 ml of the liquid inoculum (from the former Zhejiang Agricultural University's methane-producing anaerobic digestor) into a liter-size glass bottle containing about 1 liter of the "#16" liquid medium through its airtight rubber cap.

After the selective enrichment culturing under the anaerobic liquid incubation conditions for 30 days, the enrichment of acetate-utilizing methane-producing bacteria was finally accomplished. During this anaerobic liquid incubation process, about 40.5% of the acetate in the culturing reactor liquid medium was consumed, which was estimated from the amounts of gaseous products CO_2 and CH_4 as produced by the liquid culture. Its total gas production was 10,896 mL per L of the enriched methanogen liquid culture medium. About 74% of the collected gaseous products were determined to be methane (CH_4). Microscopic examination of the microorganisms in the enriched methanogen liquid culture showed that the microbes were mainly *Methanosarcina sp*. cells, as shown in Figure 3. The observed characteristics of "multicellular aggregates" (Figure 3) matched excellently with those reported by independent researchers (Maeder et al., 2006; Sowers et al., 1993) in a low-saline culture medium like our "#16" liquid medium.

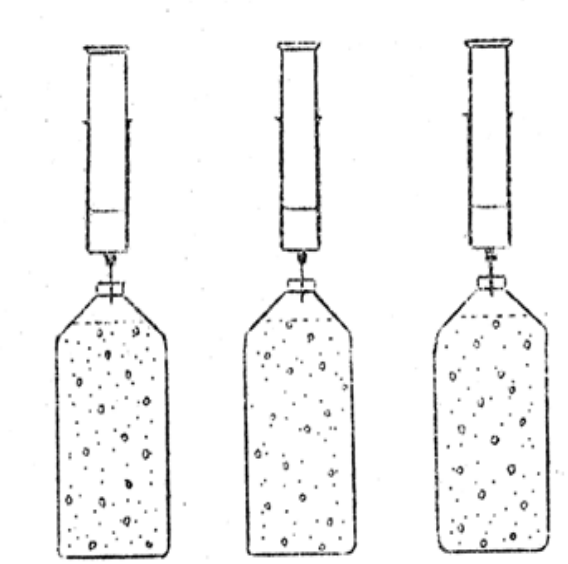

Figure 2. The anaerobic acetate-utilizing methane-producing bacteria enrichment experiment using liter-size glass bottle culturing reactors filled with the "#16" liquid medium and each sealed with an airtight rubber cap installed with a clinic glass cylinder with a needle to collect any gaseous product (including CH_4 and CO_2) from the headspace of the anaerobic liquid culture.

Experiments Demonstrating Isothermal Heat Absorption of Enriched Acetate-Utilizing Methane Producing Bacteria

To demonstrate the isothermal heat absorption from the predicted thermotrophic activities, the methanogenic bacteria *Methanosarcina* cells obtained through the enrichment culturing above were subsequently used here to inoculate a freshly prepared acetate-based minimal cul-

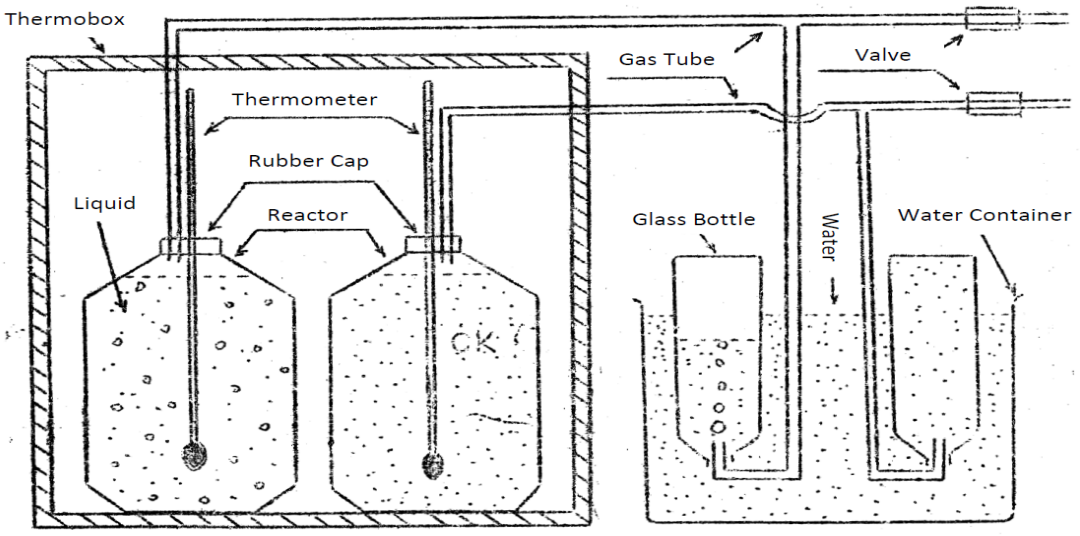

Figure 4. Illustration for the experimental apparatus comprising two 45-cm long Beckman mercury-based thermometers (temperature measuring range from 0 to 50 °C with detection precision of ± 0.01 °C) installed with two 5-bl size thermo-insulating bottle reactors through their rubber caps to monitor temperature changes in each of the two reactors. Each of the two thermobottle reactors was connected through the rubber cap with its plastic tubing system comprising a set of a tube valve and a gas-collecting bottle placed in a water tank to collect any gaseous product from the reactor headspace.

turing medium (also known as the "#16" liquid medium) in one of the two 5-bl size thermo-insulating bottle reactors (Figure 4), in comparison with the other reactor as a control that had the same physical setup and contained the same volume of the "#16" liquid medium except without the methanogen inoculation.

As shown in Figure 4, a special experimental apparatus was set up in a laboratory at the former Zhejiang Agricultural University. This experimental apparatus comprised two 45-cm long Beckman mercury-based thermometers (temperature measuring range from 0 to 50 °C with detection precision of ± 0.01 °C) that were installed with two 5-bl size thermo-insulating bottle (thermobottle) reactors through their rubber caps, respectively, to monitor temperature changes in each of the two reactors in real-time. Note the two 5-bl size thermobottle reactors were made of special heat-insulating double-glass walls with internal reflective coating and vacuum insulation to minimize heat exchange across the reactor walls.

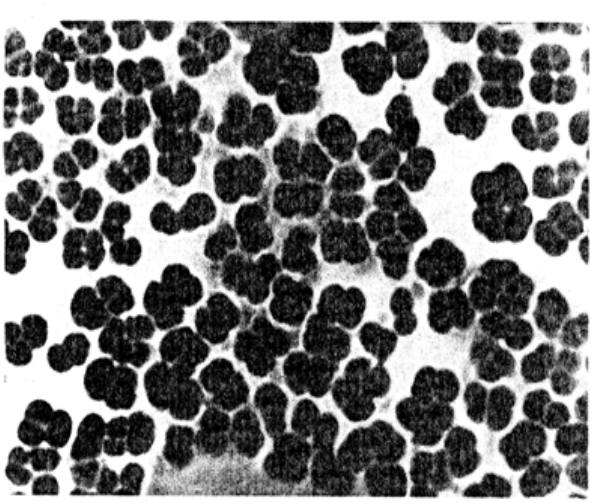

Figure 3. Microscopic imaging (1:8710) of the experimentally enriched acetate-utilizing methane-producing microbes that were identified mainly as *Methanosarcina sp*. cells.

Furthermore, to better control the experimental temperature and minimize heat exchange between the inside and outside of the thermobottle reactors so that the predicted methanogen isothermal heat absorption effect could be more clearly measured, the two thermobottle reactors were both placed in the same electric thermal box (Model GQ70B) with the thermostat of the electric thermal box set at the desirable physiology temperature of 37 °C for the methanogen activities (Weimer & Zeikus, 1978b).

In addition, the headspace for each of the two thermo-insulating bottle reactors was connected through its rubber cap with a plastic tubing system comprising a set of a tube valve and a gas-collecting bottle placed in a water tank to collect any gaseous product from the reactor headspace as shown in Figure 4.

At the beginning of each of the experiments, all the reactor items (including the thermobottle reactors and the "#16" liquid medium) were pre-heat equilibrated at

the temperature of about 37 °C. The two thermobottle reactors were filled with the "#16" liquid medium to the same liquid level, leaving a small (minimal) headspace for the possible gaseous product collection. Then, only one of the two thermobottle reactors was inoculated with the enriched methanogenic bacteria *Methanosarcina* cells while keeping the other reactor containing the same "#16" liquid medium (without methanogen inoculation) to serve as a control.

As illustrated in Figure 4, the experimental measurements for the methanogen isothermal heat absorption effect were performed by comparatively monitoring the temperature changes in the anaerobic liquid culture medium within each of the two thermo-insulating bottle reactors with and without the enriched methanogenic bacteria *Methanosarcina* cells.

The experiments were repeated four times. For each replication experiment, only the liquid culture of the enriched methanogenic bacteria *Methanosarcina* cells from the treatment reactor was swapped with the pure "#16" liquid medium (without inoculation) of the control reactor, while experimental apparatus including the two thermobottle reactors were remained (unchanged) at their same position. For example, the second reactor (marked "CK" in Figure 4), once used for a control, was subsequently used as a treatment reactor to be filled

Table 2. The results of the four replication experiments assessing the isothermal heat absorption of enriched acetate-utilizing methanogen, including *Methanosarcina sp*., by monitoring the methanogen gas production and their liquid medium temperature changes in comparison with the control (liquid medium without methanogen).

Replication of experiments	Time (hr)	Methanogen T (°C)	Control T (°C)	Δ T (°C)	Methanogen gas production rate (ml/L.hr)
I	0	36.96	36.96	0	0
I	7.25	36.90	36.97	-0.07	27.4
I	18.60	36.84	36.96	-0.12	27.2
I	23.25	36.82	36.96	-0.14	18.2
I	31.00	36.84	36.98	-0.14	16.6
I	42.75	36.34	36.98	-0.14	19.6
I	50.25	36.81	36.99	-0.18	24.6
II	0	36.88	36.88	0	0
II	19.47	36.77	36.80	-0.03	30.4
II	24.47	36.78	36.82	-0.04	20.0
II	34.47	36.80	36.89	-0.09	13.6
II	43.47	36.80	36.92	-0.12	13.4
II	53.47	36.80	36.97	-0.17	20.4
II	65.97	36.80	37.01	-0.21	31.0
II	70.97	36.80	37.03	-0.23	34.1
II	82.72	36.68	37.02	-0.34	47.0
II	93.47	36.35	36.80	-0.45	58.2
III	0	36.70	36.70	0	0
III	15.75	36.71	36.73	-0.02	24.0
III	25.75	36.65	36.70	-0.05	27.6
III	28.75	36.70	36.75	-0.05	33.4
III	39.25	36.72	36.78	-0.06	19.0
III	48.00	36.70	36.80	-0.10	13.4
III	50.25	36.68	36.80	-0.12	11.2
IV	0	36.70	36.70	0	0
IV	10.75	36.60	36.70	-0.10	28.0
IV	22.75	36.20	36.40	-0.20	42.0
IV	25.75	36.18	36.42	-0.24	58.0
IV	35.09	36.14	36.37	-0.23	4.6

with the #16" liquid medium inoculated with the enriched methanogenic bacteria *Methanosarcina* cells; while the first thermobottle reactor was then used as a control to be filed with the pure #16" liquid medium without any methanogens. In this way, any possible systematic error of the experimental apparatus comprising the thermobottle reactors, thermometers, and the other items of the system would be eliminated. Furthermore, during the 34 days of the experiment period, an additional 22.2 g of 36% acetic acid and 44.4 g of $Ca(CH_3COO)_2$ were gradually supplemented into the liquid culture for the enriched methanogenic *Methanosarcina* cells (typically at the beginning of each replication experiment) to maintain their active methane-producing metabolism for the replication experiments. A total of 25,685 ml of the gaseous product was generated per 2 L of the enriched methanogenic *Methanosarcina* cells liquid culture. About 74% of the collected gas volume was determined to be methane (CH_4). The temperature changes from the methanogen isothermal heat absorption, as observed through the four replication experiments, are presented in Table 2. At the end of the experiment, the anaerobic methanogenic bacteria in the experimental reactor were verified again by microscopic examination to be primarily the *Methanosarcina* cells as before.

As expected, we observed no gas production in the control thermo-insulating bottle reactor that contained the same volume of the pure "#16" liquid medium without any methanogen cells.

Statistical analysis of the experimental data (Table 2) showed that the temperature in the methanogen liquid culture medium (methanogen + "#16" liquid medium) decreased substantially in comparison with that of the control ("#16" liquid medium only). That is, the temperature of the active methanogen liquid culture medium consistently dropped by about –0.10 °C; the biggest observed temperature drop was as much as –0.45 °C. Taking the terminally observed temperature change from each of the four replication experiments, the mean temperature change (drop) and standard error (SEM) were calculated to be –0.25 ±0.06 °C. This experimental result (Table 2) supports the thermotrophic life hypothesis (Figure 1) since the observed isothermal heat absorption (utilization) was consistent with the predicted methanogen thermotrophic activities (Eq. 1).

In summary, the energy required for the anaerobic acetate-utilizing methane-producing bacteria *Methanosarcina* cells appeared indeed from the isothermal utilization (absorption) of environmental heat energy within the anaerobic acetate-based liquid medium (the "#16" liquid medium); When the anaerobic acetate-utilizing methane-producing *Methanosarcina* cells isothermally utilizing the environmental heat energy within the "#16" liquid medium, it caused the liquid temperature to consistently drop (observed as the temperature changes of about –0.10 °C and sometimes as much as –0.45 °C) in the experiments. Based on the terminally observed temperature changes from the four replication experiments, the mean temperature change (drop) and standard error (SEM) were calculated to be –0.25 ±0.06 °C as a result of the anaerobic acetate-utilizing methanogen activities.

As a conclusion, based on the observed isothermal utilization (absorption) of environmental heat energy, the anaerobic acetate-utilizing methanogenic archaea, including *Methanosarcina* may now be considered as "a living fossil specimen" of the thermotrophs (Figure 1) that manifest the predicted "Type-B" thermotrophic activities.

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CORRESPONDING AUTHOR

James Weifu Lee. Department of Chemistry and Biochemistry, Old Dominion University, Norfolk, VA 23529 United States, Email: jwlee@odu.edu, Tel: 757-683-4260

AUTHOR CONTRIBUTIONS

Lee conceived the original idea for the thermotrophy hypothesis first in 1979, and he subsequently obtained research resource support (including materials & supplies, instruments, equipment, and lab spaces) from the former Zhejiang Agriculture University's Department of Agronomy and the Office of Research Administration

to conduct this exploratory research project to test the thermotrophy hypothesis. Lee then organized and led a group of seven fellow undergraduate students known as the "Thermotrophy Exploratory Research Group" and conducted the experimental study during a period from 1979–1982 at the former Zhejiang Agriculture University, Hangzhou, China. Lee designed and performed research, analyzed data, and wrote the article.

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RESEARCH ARTICLE

Conspiracy Theory Advocacy and Endorsement of Inaccurate Material: A Review of the Psychological Research 2010 - 2022

Kenneth Drinkwater
k.drinkwater@mmu.ac.uk

Neil Dagnall
n.dagnall@mmu.ac.uk

Andrew Denovan
a.denovan@mmu.ac.uk

Department of Psychology, Manchester Metropolitan University, Manchester, United Kingdom

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HIGHLIGHTS

Despite increased research on 'conspiracy theories,' conclusions about their nature or dynamics is stymied by a lack of common definitions and approaches.

ABSTRACT

Since 2010 the number of psychological investigations examining relationships between conspiracy theory (CT) advocacy and endorsement of inaccurate material (i.e., misinformation, disinformation, and fake/false news) has increased exponentially. However, due to the breadth of topics investigated, the diversity of approaches/methods employed, and the range of data examined, the extent to which research in this domain provides a coherent body of work is unclear. Accordingly, this paper performed a review of psychological articles published in Web of Science and Scopus during the period January 2010 to May 2022. Search terms used were "conspir* AND misinformation OR disinformation OR "fake news" OR "false news". The articles selected had either collected primary data or analyzed extant secondary data and were written in English. Forty-six articles were included in the review and the majority 87% (n = 40) were published between January 2018 and May 2022. This reflected the increase in interest in the topic and the concomitant development of the COVID-19 pandemic. Across the literature, there was a lack of conceptual clarity and congruence. This arose principally from the failure to adequately operationalize key terminology (i.e., definitions of conspiracy and inaccurate information) and/or use terminology consistently. This indicated that research in the field would benefit from the development of standardized operational conceptualizations and taxonomies. Given the breadth of the research across different academic disciplines and in related areas such as pseudoscience, this article should be regarded as extensive, rather than exhaustive. In this context, this review provides only insights into the nature of psychological research within the designated parameters. Future work is required to determine if investigations in allied areas demonstrate similar reporting trends to those observed in this article.

KEYWORDS

Conspiracy theory advocacy, COVID-19 pandemic, misinformation, disinformation, fake news.

INTRODUCTION

Background

This paper reviewed Psychology indexed articles, published between January 2010 and May 2022, which examined conspiracy theory (CT) advocacy and endorsement of inaccurate material (i.e., misinformation, disinformation, and fake/false news). The decision to focus on this period was informed by the observation that it marked a progressive increase in internet use that facilitated a shift from traditional (i.e., newspapers, radio, and television) to digital media (e.g., websites, blogs, and podcasts). Concomitantly, engagement with and reliance on social networking increased significantly.

The co-evolution of digital media and social networks was important as it accentuated the blurring of distinctions between authentic content, conjecture, unintentionally specious information, and deliberate falsehood. Thus, this era evidenced an exponential growth in data accessibility and availability, without the attendant means to assess source credibility and content correctness. Moreover, throughout the period the disparity between the oldest and youngest adults in adoption of digital technologies narrowed markedly (Faverio, 2022, January 13), with the consequence that society generally became more likely to encounter and share uncertain, incorrect, and false information disseminated via the internet.

These factors, together with increased social and political awareness of issues associated with exposure to misinformation, stimulated scholarly interest in the allied area of conspiracy theory (CT). The prevailing presumption, regardless of narrative accuracy, is that CTs represent a specific form of misinformation. Consequently, the study of false news and CT became intertwined as both were commonly perceived as pervasive forms of communication that potentially adversely influenced and/or distorted mass attitudes and behaviors (Dagnall, Drinkwater, Denovan, & Walsh, 2020; Drinkwater, Dagnall, Denovan, & Walsh, 2021).

Predominant Conceptualizations of Conspiracy Theories

This section focuses on predominant conceptualizations of CTs. Consideration of CT (i.e., nature and role) is extended later to encompass alternative (critical) views and perspectives.

General inspection of published research reveals that there is no single agreed definition of CT (Dagnall, Drinkwater, Parker, Denovan, & Parton, 2015; Drinkwater, Dagnall, & Parker, 2012). Accordingly, investigators conceptualize CTs in terms of recurring, canonical features. These include, but are not restricted to, premeditation (planning), clandestineness (secrecy), deception (lies), abuse of power (authority), collusion (collective), manipulation (influence), control (dominance), and intention (purpose) (Denovan, Dagnall, Drinkwater, Parker, & Neave, 2020; Drinkwater et al., 2012). Together, these largely undesirable constituent characteristics infer that the activity of 'conspirators' is adversely consequential to the individual (personally) and society (globally). This is especially true when themes coalesce to infer that actions are orchestrated by influential individuals/groups, who are able and motivated to achieve, through exploitation and subterfuge, predetermined nefarious goals.

This classification explains why some CT believers present their narratives as authentic, just, and moral truths. Accordingly, scholars have framed CT discourse in the context of the Manichean struggle between good (reality) and evil (fabricated distortion) (Drinkwater, Dagnall, Denovan, Parker, & Clough, 2018; Oliver & Wood, 2014). Commensurate with this perspective, believers regard CTs as genuine alternatives to official flawed or distorted explanations. Indeed, perceived discrepancies in authorized accounts, provide grounds for establishing the veracity of conspiracies, regardless of their inherent credibility (Dagnall, Denovan, Drinkwater, Parker, & Clough, 2017).

The Importance of Conspiracy Theories

Perceptions of CTs within the majority of Psychological research articles are guided by the assumption (both explicit and implicit) that conspiracy narratives are typically untrue and therefore irritational. Hence, CT endorsement is viewed as psychologically and socially problematic because it is predicated on/or motivated by factors other than rational, systematic consideration of objective data. These include personal judgments and preferences (i.e., political, social, and geographical affiliations) (Douglas et al., 2019). Although these factors affect the reception and dissemination of information regardless of type, they are particularly evident in extreme views or with strong emotive issues, such as those often contained within CTs (Dagnall, Drinkwater, Denovan, & Walsh, 2020). Noting this, mainstream psychological research highlights that CT advocacy is linked with selective and/or biased consideration/interpretation. Congruent with this observation, studies robustly report relationships between CT endorsement and flawed/restricted thinking (Dagnall, Denovan, Drinkwater, Parker, & Clough, 2017; Dagnall et al., 2015).

However, from a critical viewpoint, it is important to recognize that the unconfirmed rumor that informs CTs

can prove true. This was recently the case in the United Kingdom, when accusations that Conservative Party staff breached legally enforced COVID restrictions in 2020 and 2021, despite repeated government denials, were eventually confirmed. In this instance, persistent accusations prompted investigations, which resulted in proof of guilt as evidenced by Police fines. This illustration concurs with Talbot (2015), who following examination of archival material, concluded that there are numerous instances where CTs are ultimately validated. This indicates that truthfulness is not a necessary defining feature of a CT. In fact, the labeling of alternative accounts as conspiracies is determined by a range of socio-political factors (i.e., power and control of media), which may in certain circumstances seek to obscure the truth.

Nonetheless, a further often-cited feature of CTs is that they are misinformed or unfounded. This aspect is important because it delegitimizes conspiratorial narratives (Konkes & Lester, 2017). This deprecatory perception also provides justification for classifying CTs as psychologically undesirable, or even maladaptive (Escolà-Gascón, 2022). Specifically, as results from a preference for subjective evidence and an over reliance upon self-generated data (i.e., anecdotal observations) (Denovan, Dagnall, Drinkwater, Parker, & Neave, 2020). Furthermore, the elaborate and self-validating nature of CTs is used to explain why they endure in the face of apparently conflicting evidence and persevere over time.

This unfavorable abstraction is overly simplistic for several reasons. From a rational standpoint it ignores the fact that understanding of the everyday world habitually derives from consideration of restricted information and constrained, 'bounded' rationality (Simon, 1955). Explicitly, it arises spontaneously from processing capacity limitations, which result in the use of cognitive shortcuts such as the use of heuristics (i.e., drawing on strategies derived from previous experiences with similar problems) (Dagnall, Denovan, Drinkwater, Parker, & Clough, 2016; Dagnall, Drinkwater, Denovan, Parker, & Rowley, 2016). Though truncated logic typically provides acceptable (rather than optimal) solutions, it can also produce erroneous conclusions. Thus, within general populations, endorsement of false CTs is often a simple manifestation of the restrictions of decision-making. Hence, the degree to which CT endorsement is actually maladaptive depends on the extent of belief rather than mere presence. Indeed, it has long been established that human reasoning under conditions of uncertainty is flawed and that people misperceive multiple aspects of the world (e.g., Slovic, Fischhoff, & Lichtenstein, 1977).

Moreover, within endorsers, CT ideation forms an intricate, internally coherent mental framework (i.e., worldview) that influences how information is construed and bestows meaning upon the external world (Dagnall et al., 2015; Irwin, Dagnall, & Drinkwater, 2015). Thus, whilst CT advocacy may appear externally illogical, from the perspective of the believer, ideation is cogent, coherent, and justified (Dagnall, Denovan, Drinkwater, Parker, & Clough, 2017; Irwin, Dagnall, & Drinkwater, 2015). This conceptualization is consistent with the observation that CT supporters frequently cite evidence (e.g., scientific proof) to support their claims. Negative depictions of CT emphasize that this 'evidence' is habitually spurious (Soukup, 2008) and ignores instances where counter information is ill-informed or specious. Nonetheless, the provision of evidence, regardless of correctness and/or impartial corroboration, demonstrates that validation is an integral aspect of CT advocacy.

Commensurate with the pathological view of CTs, scholars depict endorsers as short-sighted and/or blinkered. Particularly, report that believers overlook the implausibility of CT narratives (i.e., abridged reasoning and circular argument), and/or their pragmatic impossibility (Grimes, 2016). A supplementary illustration of misapplied rationality is when advocates draw on rare examples where CTs have proven to be true (i.e., Watergate, Project MK Ultra, and false flags) as justification for endorsing other theories (Drinkwater, Dagnall, Denovan, & Neave, 2020). Indeed, in rational terms there will always be more spurious CTs, however, the general tendency for narratives to be false does not necessarily invalidate the need to consider the legitimacy of each case independently.

This issue is highlighted by different approaches to evaluating conspiracy theories (Buenting & Taylor, 2010). Generalists dismiss CTs or subsets of theories based on generalities. Explicitly, they contend there is no need to examine particular theories when they share features with category members where exemplars have previously been discredited. Opposing this notion, particularists assert that each theory is independent and therefore must be appraised on its merits (Hagen, 2022). The latter position appears reasonable given the type of CTs featured within prevalently used belief measures. For instance, item 6 of the Generic Conspiracist Beliefs Scale (Brotherton, French, & Pickering, 2013) assesses belief in the possibility that authorities covertly, allow/enact violence on itself (i.e., 'The government permits or perpetrates acts of terrorism on its own soil, disguising its involvement'). Whilst false flag claims are regularly made and dismissed, it is an undeniable truth that in 1962 the United States Department of Defense proposed to orchestrate and commit acts of violent terrorism against American military and civilian targets as a means for justifying war against Cuba (i.e., devised Operation Northwoods).

Similarly, there are other historical examples of false flag operations (Wilson, 2015). Although in the case of Operation Northwoods the plans were not enacted, the example demonstrates that the American government covertly considered a false flag operation, which was intended to mislead the general populace.

Acknowledging this, it is unclear whether endorsement of a false flag explanation indicates a general belief in CTs or reflects historically informed apprehensions about power abuse and mismanagement. Hence, while statistically improbable the premise is neither implausible nor illogical (Dentith, 2019). Accordingly, given the existence of well-documented precedents, each false flag allegation should be assessed independently rather than merely dismissed because of previous correct rejections (Wilson, 2015). This applies equally to CTs located in other thematic areas where there is evidence of manipulation and malpractice (e.g., government malfeasance, mishandling of information, and profiteering) (Gellert, 2021).

While this pessimistic perspective is adopted by several academics it is not without criticism. A major contention is that researchers refer to CTs using openly evaluative terms (e.g., false beliefs, rumors, and myths), which present them in negative ways (Uscinski, 2018). This construction reflects and reinforces the supposition that CTs are by nature incorrect, unjustified, and detrimental (Coady, 2018). Coady (2018) opposes this generalization by pointing out that the veracity of CTs and their socially advantageous effects are ignored. Explicitly claiming that by questioning the actions of powerful bodies such as governments CTs provide a significant public benefit.

A reason for the negative psychological depiction of CTs is that they typically oppose orthodox wisdom (Barkun, 2015). This results in them becoming a form of stigmatized knowledge, where content is ignored or rejected by the institutions that validate meaning (e.g., government agencies, scientific communities, and mainstream media). Without 'official' verification, claims regardless of basis, lack consensual credibility, and appear disreputable (i.e., become stigmatized). Without social/political support, stigmatized knowledge survives within the sub-culture. This distances believers from the mainstream and at a macro-social level, their beliefs are disregarded and trivialized. This process illustrates how institutional perceptions of truth can prove more important than objective reality.

Hence, the negative perspective invalidates CTs as a source of critical thought and positions them as groundless (Husting & Orr, 2007). A subsequent consequence is that CT advocates are marginalized, and the term CT is often used by powerful individuals/groups to belittle concerns and diminish opposition (Uscinski, 2018). Hence, an understated key element of CT is ownership and application of power and how it is misused by those with authority and influence. In this context, CTs can be socially constructive as they challenge realities created and disseminated by ruling elites. Recognizing this, CTs are better regarded with skepticism rather than as fundamentally false. Consistent with this view, Coady (2018) compares CTs to scientific theories and argues that since it is commonly accepted that bad scientific theories do not invalidate good theories, this reasoning should also be applied to CTs.

Consistent with this notion, researchers should view CTs as accusatory perceptions that may (or not) prove true. Truth is determined at a personal level by individual factors not ineludibly related to the objective appraisal of information. Consistent with this, people are inclined to endorse CTs that malign political parties they oppose (Uscinski, 2018). This demonstrates the difficulties faced by researchers when they attempt to differentiate true from false CTs. To facilitate this process, Uscinski (2018) recommends implementation of the distinction forwarded by Levy (2007), which states that properly constituted epistemic authorities should determine the status of conspiracies. This refers to "institutions in which knowledge claims result from a socially distributed network of inquirers trained in assessing knowledge claims, with methods and results made public and available for scrutiny (i.e., courts of law, scientific institutions)" (Uscinski, 2018, p. 236).

The distinction between true and false CTs is also obfuscated by the failure to distinguish between theories and facts (Keeley, 2019). Theory implies a system of ideas that are used to explain an event or occurrence. Hence, they represent a premise that may be accurate (Bjerg & Presskorn-Thygesen, 2019). Noting this, the widespread adoption of the term CT is problematic because some instances labeled 'theories' (possibilities) have proven true and are therefore facts (e.g., Watergate, Project MK Ultra, and Operation Northwoods). Moreover, referring to these events as theories ignores the degree of complexity that was required to obscure and cover up the actual cause (e.g., Watergate was a series of intricate plots) (Coady, 2018). Such semantic confusions hinder the already complex process of distinguishing between true and false CTs (see Escolà-Gascón & Wright, 2021).

A further subtle but often overlooked distinction is between conspiracy belief and conspiratorial thinking. The former denotes endorsement of a specific CT, whereas the latter refers to an underlying worldview (Brotherton, French, & Pickering 2013), which biases the individual so that they generally regard official accounts as untrue and influential actors as conspirators (Wood, Douglas,

& Sutton, 2012). This discernment acknowledges that whilst specific theories may be widely endorsed, belief in one theory does not necessarily facilitate belief in others. This suggests that claims that CT belief is monological and generic (see Goertzel, 1994) are grossly overexaggerated.

A final point to consider when operationalizing CTs is that some theorists view them in terms of minority theory (Goertzel, 1994) and social identity (Pierre, 2020). This embraces consideration of why CTs appeal to marginal groups and the effects that group membership has on the development of a distinct and self-sustaining mindset. These concepts are important because they frame CTs regarding political, geographical, and social inequalities (Baele, 2019). This contextualization provides a collective (group and normative) rationale for believing in conspiracies. Explicitly, identifies shared perceptions and motives that are not necessarily evident within general consideration of CTs (marginalization, disenfranchisement, perceived powerlessness, etc.). From this standpoint, researchers view CTs as expressions of social and political alienation/cynicism.

Consideration of the nature of CTs is imperative since definitions within scholarly work provide only limited snapshots. An example is the delineation of a CT as the conviction that powerful groups or collectives covertly plan and implement strategies with the intention of realizing malevolent goals (Bale, 2007; Sunstein & Vermeule, 2009). This clearly represents CTs as an individual impression rather than a socio-political possibility. From the critical perspective, the incidence of CTs within the general population suggests that they are a natural feature of human cognition and serve important psychological functions (Franks, Bangerter & Bauer, 2013). Particularly, they provide explanations for major social and political events and in doing so allow individuals to resolve uncertainties and make sense of the world. The current problem with the psychological approach to CT is that it does not respect or value diversity of beliefs (Cíbik & Hardoš, 2020).

Inaccurate Information

Recently, the number of academic articles investigating belief in conspiracies and proclivity to endorse erroneous information has increased substantially (Roozenbeek et al., 2020; Ryan & Aziz, 2021). The developing body of literature is now vast, comprising contributions from myriad disciplines (e.g., psychology, political studies, communication, computing, mathematics, and philosophy). Thematically, much research combines exploration of the nature, causation, and social/individual impact of CTs with consideration of the influence of media on attitudes and behavior. This includes an increased focus on the role of digital media. Concurrently, scholars have also undertaken work around mis/disinformation, which includes consideration of the nature and consequences of fake/false news (Kemei et al., 2022).

These communication-related topics are important because acceptance of inaccurate data as valid can have significant social and political consequences, such as negatively influencing health behaviors (e.g., decreased engagement with campaigns) and reduce involvement in democratic processes. Finally, the COVID pandemic over the course of the last few years has provided an applied context for the study of conspiracies and inaccurate information (Roosenbeek et al., 2020).

The Present Study

Due to the breadth of topics investigated, diversity of approaches and methods employed, and range of data examined, the extent to which scholarly work on CT advocacy and endorsement of inaccurate information provides a coherent body of work was unclear. Acknowledging this, the present paper performed a review of studies conducted since January 2010. The authors restricted the search to this period since it captured important changes in the use and consumption of digital media. This includes the widening adoption of the internet as the primary source of information/news and the emergence of social media as a predominant communication platform.

Noting the volume of multi-disciplinary publications, analysis was further restricted to Psychology classified peer-reviewed papers that collected empirical data. The focus on Psychology reflected the author's expertise and made the process of assessing research coherence manageable. That is, reducing the number of approaches, conceptualizations, and measures. This was necessary due to the vastness of academic work on and around the topic and because academic work on CT generally lacks a cogent theoretical framework (see Goreis & Voracek, 2019). Noting this, the authors anticipated that a focus on Psychology would provide important insights into the status of research in this domain.

METHOD

Inclusion Criteria, Search Strategy, and Data Extraction

The authors performed a literature search using Web of Science and Scopus. This employed the keywords conspiracy* AND misinformation OR disinformation OR fake news OR false news. Dates were restricted to January 2010 through May 2022. Within Scopus selection criteria

were Journal, English, and Psychology. For Web of Science, the search was limited to Articles or Early Access, English, in the subject area Psychology. Review papers were removed since this article focused on research where the authors had either collected primary data or analyzed extant secondary data. Articles were also omitted if they were conceptual, review, or opinion pieces. Google Scholar alerts were enabled to ensure the inclusion of accepted articles and articles in preprint.

Once identified, the title, abstract, and main text of each paper were examined, with the exclusion of documents occurring at each stage (see Figure 1). Records were screened (title and abstract) by the authors for the following eligibility criteria: analysis of empirical data, assessment of conspiracy belief; and written in English, to ensure that all authors could accurately comprehend the article.

The initial unrestricted search identified 1098 records (Scopus = 593 and Web of Science = 505). Application of selection criteria reduced this to 109. Removal of duplicates left 67 peer-reviewed papers. Finally, 21 articles were excluded due to lacking relevance (*n* = 7), being conceptual in nature (*n* = 13), and being in a foreign language (*n* = 1). Of the 46 articles included in the review 31 appeared in both Scopus and Web of Science, 6 in Scopus alone, and 9 in Web of Science alone. Regarding the study publication date, 87% (n = 40) were published between January 2018 and May 2022.

RESULTS

Terminology

Within the reviewed literature there was a lack of conceptual clarity and congruence. This arose principally from the failure to adequately operationalization key terminology (i.e., definitions of conspiracy and inaccurate information) and/or use terminology consistently across articles.

The Conceptualization of Conspiracy Theories

Given the complexity of conspiratorial ideation (see introduction) it is imperative that studies provide informed definitions that are pertinent to aims and objects. This ensures that readers are afforded a knowledgeable, contextualized understanding of the subject matter. Operationalization is also important because it designates, which aspect or features of conspiracy are under investigation.

Several articles either failed to explicitly define CTs, assuming that meaning was inferred (Calvillo, Rutchick, & Garcia, 2021; Fuhrer & Cova, 2020), or merely delineated CTs as a form of misinformation (Lewandowsky, Ecker, & Cook, 2017**;** Quinn, Fazel, & Peters, 2021). This approach was problematic because it potentially conflated high-order abstract conspiratorial ideations with the tendency to endorse specific forms of misinformation (e.g., false

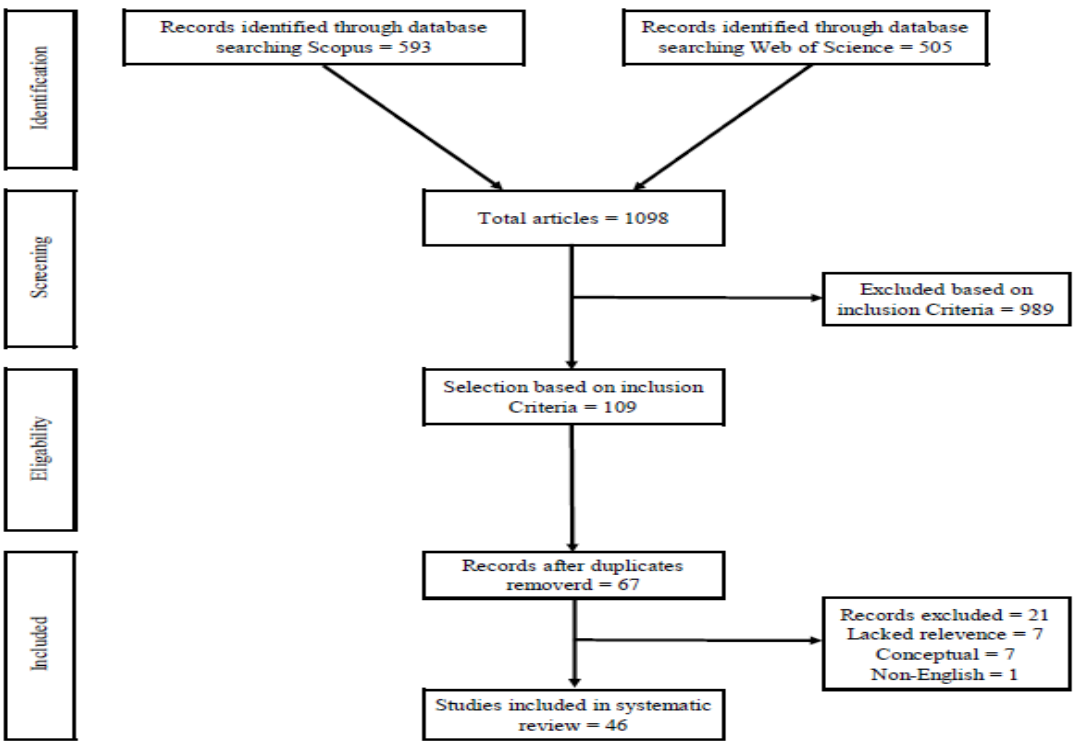

Figure 1. Prisma Chart

headlines, Calvillo et al., 2021; and implausible claim endorsement, Martire, Growns, Bali, Montgomery-Farrer, Summersby, & Younan, 2020). Although the constructs frequently overlap, they are distinct (i.e., CTs are not necessarily untrue). Furthermore, the premise that proclivity to validate misinformation in the form of CTs is likely to predict endorsement of other misinformation (e.g., false news) is tautological.

Furthermore, it is reductionist to suppose that individuals who believe in CTs (domain-specific) are likely to commonly endorse false information (domain-general). Instead, it is more productive to consider which ideational elements (e.g., thinking style) facilitate the endorsement of CTs and validation of erroneous data. Generally, these conceptual obfuscations arose from a lack of standardization and precision.

Within papers, authors typically employed narrow definitions that outlined restricted features of conspiratorial ideation. For instance, Brotherton and Son, used the Brotherton (2013) designation of CTs as "unproven claims about the existence of nefarious secret plots" (Brotherton & Son 2021, p2). Likewise, Mashuri, et al., (2021, p.4) denoted CTs as involving "allegations of secret coalitions or collaborations by certain groups with the deliberate intention to harm another group". Constrained conceptualizations such as these are problematic since they provide only restricted insights into the nature of CT.

Additionally, abridged abstractions failed to acknowledge that CT endorsement derives from multiple elements, which interact in complex ways to form discrete perceptions and cognitions. Although there exists no single agreed or prevailing delimitation of CT (Dagnall et al., 2015, Drinkwater et al., 2012), it is important that papers provide sufficient construct detail. Even within articles that outlined multiple characteristics, this was commonly not the case. For example, Sternisko, Cichocka, Cislak, and van Bavel (2021, p. 2), drawing on Douglas et al. (2019), cited that "Conspiracy theories constitute the idea that a secret group of people is conspiring towards a malevolent or unlawful goal". In a similar vein, Anthony, and Moulding (2019, p.154) classified CT as "the belief that the explanation for events (or their concealment) is that powerful forces are secretly at work to realize their sinister plans (cf. Swami, Chamorro-Premuzic, & Furnham, 2010; Zonis & Joseph, 1994)". Despite these elucidations being well-established and widely cited, they have limited utility due to their generic nature.

Indeed, using definitions that focus on specific characteristics can prove unintentionally misleading. That is, inadvertently focus attention on the attributes highlighted rather than CT ideation generally. Acknowledging this, to effectively research CTs subsequent work needs either to state that its intention is to investigate particular features or explicitly recognize the breadth of CT characteristics. This contextualization will provide greater clarity, exactness, help to disambiguate findings, and encourage meaningful comparisons between study outcomes. This is especially important as investigations typically employed global measures of conspiratorial ideations (e.g., the Generic Conspiracist Beliefs Scale; Brotherton, French, & Pickering, 2013).

Another theoretical issue was the use of interchangeable terms to describe belief in CTs. Illustratively, Imhoff et al. (2022) refer to conspiracy 'mentality' or 'mindset'. Although these terms are well located with CT literature (see Bruder, Haffke, Neave, Nouripanah, & Imhoff, 2013) and signify "general conspiracist beliefs", language was not employed consistently across the literature. Explicitly, 'mentality' or 'mindset' denotes the general tendency to suspect that conspiracies are at play, uncontaminated by concrete events, actors, or contexts (see Imhoff et al., 2022).

In addition, to using a range of operationalizations, articles assessed conspiratorial thinking using myriad measurement instruments. These included a mixture of standard and author-generated indices. The former comprised the Generic Conspiracist Beliefs Scale (GCBS; Brotherton et al., 2013), Conspiracist Mentality Questionnaire (CMQ; Bruder et al., 2013), and Belief in Conspiracy Theories Inventory (BCTI**,** Swami, Chamorro-Premuzic, & Furnham, 2010). Even though these are established scales, comparisons between measures is complicated by the differing theorizations employed (see Swami, Barron, Weis, Voracek, Stieger, & Furnham, 2017).

The GCBS and CMQ measure generic conspiracist ideation (Drinkwater, Dagnall, Denovan, & Neave, 2020). In the case of the CMQ, this is a specific form of conspiratorial thinking referred to as a conspiracy mindset (Imhoff & Bruder, 2014). This is defined as a relatively stable personality characteristic that describes individual differences in the extent to which people believe in conspiracies or conspiracy theories (e.g., Moscovici, 1987; Imhoff & Bruder, 2014). Whereas the BCTI evaluates conspiratorial ideation via endorsement of specific theories (e.g., "The assassination of John F. Kennedy"). Although independent, these measures share significant variance and appear to tap into a common construct (Swami et al., 2017).

The GCBS and CMQ appeared in a substantial proportion of the papers within the reviewed articles (e.g., Adam-Troian et al., 2021; Calvillo, Rutchick, & Garcia, 2021; Newman, Lewandowsky, & Mayo, 2022; Szebeni, Lönnqvist, & Jasinskaja-Lahti, 2021). The BCTI, however, was employed rarely (Anthony & Moulding, 2019). In the case of author-generated measures, these assessed myr-

iad events and occurrences (e.g., climate change, Brotherton & Son, 2021; Instagram post tags, Quinn, Fazel, & Peters, 2021; and comments on Facebook posts, Bessi 2016). The degree to which these were psychometrically valid and/or related to established measures was often absent. Without comparison to concurrent and discriminant measures, the validity of the outcomes is debatable. Regarding, secondary data sources it was not possible for authors to assess fit with standard scales since data was derived from pre-existing real-world sources.

Data Sources

Studies used a variety of data sources, these included online surveys (e.g., Anthony & Moulding, 2019; De Coninck et al., 2021; Lewandowsky, Oberauer, & Gignac, 2013), experiments (e.g., Banas & Miller, 2013; O'Brien, Palmer, & Albarracin, 2021), and analysis of social media (e.g., Bessi, 2016; Quinn, Fazel, & Peters, 2021). Within these, researchers employed a range of sampling techniques, which yielded differing participant numbers. For instance, Brotherton and Son (2021) drew on a traditional sample of Psychology undergraduate students (N = 211) from one college in the United States. In contrast, Adam-Trojan et al. (2021) performed a large-scale, three nation-level analyses of data from 25, 19, and 18 countries using different measures of CT beliefs (Study 1, *N* = 5323; Study 2a, *N* = 12,255; Study 2b, *N* = 30,994). While Teovanović et al. (2021), recruited participants (N = 407) via social networks (Facebook and Viber groups), and Szebeni, Lönnqvist, and Jasinskaja-Lahti (2021) used Facebook, Master's student's social contacts, and political discussion groups to recruit (*N* = 702).

A frequent recruitment strategy was to draw on commercial sources (e.g., Bowes & Tasimi, 2022). The most frequently employed were Amazon's Mechanical Turk (MTurk) (e.g., Calvillo, Ross, Garcia, Smelter, & Rutchick. 2020; Calvillo, Rutchick, & Garcia, 2021; Jolley & Douglas, 2017; Martire, Growns, Bali, Montgomery-Farrer, Summersby, & Younan, 2020) and Prolific (e.g., Juanchich, Sirota, Jolles, & Whiley, 2021; Pantazi, Papaioannou, & van Prooijen, 2021). MTurk is a crowdsourcing marketplace that enables individuals (Turkers) to complete human intelligence tasks (HITs). Since its inception, academics have increasingly utilized the platform to recruit participants and respondents for research (Palan & Schitter, 2018). The attraction of MTurk is that it is a cost-effective, expedient method for collecting large databases (Buhrmester, Talaifar, & Gosling, 2018). These properties have resulted in an exponential increase in psychological studies using MTurk. Although there is debate about the quality of data produced via the platform (see Chmielewski & Kucker, 2020) several investigators report that MTurk provides data equivalent or superior in quality to that collected via traditional methods such as laboratories, market research companies, and online professional panels (e.g., Kees, Berry, Burton, & Sheehan, 2017).

Moreover, this is true across data types and designs. Importantly, analysis indicates that MTurk samples are broader and more representative than student samples. To ensure quality, researchers should include response validity checks and screen data to identify biased responses and/or invalid data. Despite this positive body of work, concerns have recently risen about data quality. This directs that detailed reporting of data screening, which is often omitted from papers, should be a standard operating procedure (Chmielewski & Kucker, 2020).

Prolific is an online platform for participant recruitment that provides data for researchers. Investigators from several disciplines including Psychology have used Prolific as a subject pool. Noting the emergence of Prolific, Peer, Brandimarte, Samat, and Acquisti (2017) compared Prolific with MTurk, CrowdFlower (an alternative crowdsourcing platform), and traditional university subject pool data. Across experiments and a range of tasks, both Prolific and MTurk provided higher data quality than CrowdFlower and the university subject pool and replicated existing results. Regarding response rate, Prolific was superior to the university pool and slightly lower than MTurk and CrowdFlower.

In a further study, Eyal, David, Andrew, Zak, and Ekaterina (2021) examined data quality for online behavioral research across selected platforms (i.e., MTurk, Prolific, and CloudResearch) and panels (i.e., Qualtrics and Dynata). Without filters, only Prolific provided consistently high-quality data. With filters, both Prolific and CloudResearch produced high data quality. In comparison, MTurk, even with filters, supplied low-quality data. Additionally, Eyal et al. (2021) found that frequency and usage predicted data quality. Accordingly, MTurk participants who specified that the site was their primary source of income and spent the least time on it per week supplied the lowest data quality.

These findings, consistent with Chmielewski and Kucker (2020), suggest that researchers using platforms such as MTurk and Prolific should routinely employ quality checks and rigorous data screening techniques. Consideration of the papers included within the review revealed that investigators regularly reported integrity checks (e.g., honesty, implausible patterns of responding, and attention monitoring) (see Bowes & Tasimi, 2022; Calvillo, Ross, Garcia, Smelter, & Rutchick, 2020; Calvillo, Rutchick, & Garcia, 2021; Jolley & Douglas, 2017). However, information on screening was less detailed and

frequently absent. The assumption is that quality checks addressed issues arising from aberrant responses. The failure to fully report data screening concurred with Chmielewski and Kucker (2020).

Samples comprised a range of different national groups. For example, American (e.g., Calvillo, Rutchick, & Garcia, 2021; Enders & Uscinski, 2021; Jolley & Douglas, 2017), Russian (Egorova, Parshikova, Chertkova, Staroverov, & Mitina, 2020), Norwegian (Filkuková, Ayton, Rand, & Langguth, 2021), Swiss (Hartmann & Müller, 2022), Indonesian (Prawira, Pratama, Bella, & Nuraini, 2021), Spanish (Fasce, Adrián-Ventura, Lewandowsky, & van der Linden, 2021), Slovakian (Šrol, Čavojová, & Ballová Mikušková, 2022), and French. (Fuhrer & Cova, 2020).

Comparisons between national samples, providing they are large enough to be representative of/generalizable to the populations from which they were selected, offer potentially important insights into conspiratorial ideation. For instance, similarities between countries suggest possible causal influences. However, to assess these further additional methods of data collection are required. These should encompass a wide range of countries and employ methods that assess countries' relative standing on a cultural measurement of conspiracy ideation (Franke & Richey, 2010). The resulting scaled values can then be used to investigate relationships with other variables of interest (national identity, political involvement, etc.).

Inaccurate Information

Studies classified misinformation in differing ways. This was a function of study focus (e.g., COVID-19, Lobato, Powell, Padilla, & Holbrook, 2020; Theories, Sternisko et al., 2021) and the fact that there exists no agreed taxonomy of misinformation. Examples included rating the truthfulness of false headlines (Anthony & Moulding, 2019; Calvillo, Rutchick, & Garcia, 2021; Calvillo, Ross, Garcia, Smelter, & Rutchick, 2020; Faragó, Kende, & Krekó, 2020), rejection of climate science (Lewandowsky, Oberauer, & Gignac, 2013), inclination to approve rumor narratives (Kwon, Pellizzaro, Shao, & Chadha, 2022), and endorsement of statements on socially important topics (Brotherton & Son, 2021).

The multiplicity of measures made generalization across studies difficult. An underlying supposition is that endorsement of one type of misinformation predicted the global tendency to accept questionable and inaccurate material as authentic. This macro-level assumption is reductionist and disputable because there are myriad factors that influence willingness to validate misinformation. Prominent influences are source credibility, prior experience, level of knowledge, normative pressure, and social context (historical, temporal, and cultural).

Illustratively, people are more distrustful of social media and have greater faith in traditional fact-based media (Wagner & Boczkowski, 2019). Acknowledging the potential effects of such variables, researchers should be cautious when extrapolating findings or include concurrent measures. Furthermore, awareness of false information is developing rapidly. Hence awareness of false/fake news has increased, and the need to fact-check data is now more commonly practiced. This was not the case a couple of years ago. Dynamic changes such as these also potentially limit the usefulness of generalizations.

A pertinent distinction, highlighted by Campos-Castillo and Shuster (2021), was between misinformation (an unwittingly false statement) and disinformation (a deliberately false statement). However, not all demarcations were as precise and there was a tendency to merely view CTs as a specific form of misinformation. This was also true of the terms false and fake, which were regularly used interchangeably (e.g., Unkelbach & Speckmann, 2021). For example, Calvillo et al. (2021, p.1) classified fake news as "the presentation of false or misleading information as if it were legitimate journalism". This was extended by Szebeni, Lönnqvist, and Jasinskaja-Lahti, (2021, p.2), who borrowed van der Linden (2017) abstraction of fake news or disinformation as "misinformation coupled with a clear intent to cause harm or purposefully deceive others". Similarly, Faragó, Kende, and Krekó (2020) operationalized fake news as fabricated "information," which is deliberately created to misinform readers. Other studies adopted other definitions that qualified terminology. For example, De Coninck et al. (2021) used the explication of Benkler, Faris, and Roberts (2018) that states that misinformation (or fake news) is "publishing wrong information without meaning to be wrong or having a political purpose in communicating false information" (De Coninck et al., 2021, p.2).

From these illustrations disambiguation of key terms is required. This is necessary if researchers are to make meaningful comparisons between study outcomes and a coherent literature is to emerge (Molina, Sundar, Le, & Lee, 2021). Recently, the need for exactness has resulted in developing a lexicon for infodemic terms (Gradoń, Hołyst, Moy, Sienkiewicz, & Suchecki, 2021). This distinguishes between misinformation (i.e., information that is false and disseminated *unintentionally*), disinformation (false information that is *intentionally* created or disseminated), misinformation (genuine information that is shared to cause harm), and propaganda (i.e., true or false information spread to persuade an audience) (see Wardle, 2018; Wardle & Derakhshan, 2017). The difference be-

tween misinformation and disinformation can therefore be viewed as intent (Egelhofer, & Lecheler, 2019).

Similarly, there are important factors that researchers should recognize when using the terms fake and false news. Firstly, the distinction between fake and genuine news is not always clear. As Nielsen and Graves (2017) note, it is a matter of degree rather than distinction. Secondly, the label is broad and diffuse and applies to inaccuracy generally (Egelhofer, & Lecheler, 2019). Thus, fake news encompasses poor journalism, propaganda, and advertising more readily than incorrect news reports (Nielsen & Graves, 2017). The key elements of fake news are purposely fabricated (i.e., falsifies facts and details), deliberately misleading, presented as genuine in order to mislead, and inaccurate (Egelhofer, & Lecheler, 2019). Key defining features are that fake news is low in facticity, imitates media content, and intentionally seeks to deceive (Egelhofer, & Lecheler, 2019).

COVID

The outbreak and course of the COVID pandemic had a profound effect on the literature. This is evidenced by the fact that a significant proportion of post-2020 publications focused on COVID conspiracies and misinformation (e.g., Allington, Duffy, Wessely, Dhavan, & Rubin, 2021; Quinn, Fazel, & Peters, 2021; Prawira, Pratama, Bella, & Nuraini, 2021). Indeed, of the 24 studies published on CT advocacy and endorsement of inaccurate material in 2021, 37.50% focused on or around COVID. The consequence of this interest was that the number of articles in 2020, represented the majority of papers included in the review. COVID-focused articles comprised mainly large-scale international studies (e.g., De Coninck et al., 2021; Sternisko, Cichocka, Cislak, & van Bavel, 2021) and online surveys (e.g., Allington, Duffy, Wessely, Dhavan, & Rubin, 2021; Egorova et al., 2020; Prawira, Pratama, Bella, & Nuraini, 2021). However, as with the non-COVID articles, a minority of investigations used alternative methods (i.e., Instagram posts, Quinn, Fazel, & Peters, 2021; comparing vaccine supporters with vaccine rejectors; Newman, Lewandowsky, & Mayo, 2022).

Articles looked at both COVID conspiracies and COVID as a source of misinformation (Kwon, Pellizzaro, Shao, & Chadha, 2022). In some cases, as with the general research area, conceptualizations of CT and inaccurate information were used interchangeably. In this context, COVID conspiracies represented a specific embodiment of misinformation.

DISCUSSION

Despite limiting the search to Psychology publications, this review identified a breadth of approaches, which employed a variety of methods. Given this diversity and the influence of theoretical disciplines that inform work on CT advocacy and endorsement of inaccurate information, it was understandable that authors operationalized key terms in differing ways. This reflected the rapidly developing nature of the research area, the vast amount of previous investigation, and intense multi-disciplinary interest in the topic. The intention of this review, in illustrating this was not to criticize the body of work, but rather to establish the degree to which articles represented a coherent field of inquiry. It is clear from this review that this was not the case. Acknowledging this, subsequent academic work in the areas of conspiracy, false news, and mis/disinformation would benefit from considered operationalization of key terminology. Greater precision will prove beneficial by facilitating conceptual alignment and enabling meaningful comparisons between study outcomes. Currently, this is difficult because researchers use myriad definitions and central terms, such as misinformation and disinformation, which are used synonymously.

Regarding CT, this requires greater awareness of the complex nature of conspiratorial ideation and a more careful selection of delineations to ensure they align with study aims and objectives. Specifically, identification of the aspect(s) of conspiratorial ideation under investigation. For instance, researchers need to clarify whether outcomes are related to general CT beliefs (i.e., common, non-event-based ideations; Brotherton et al., 2013), specific facets (e.g., Government Malfeasance, Extra-terrestrial Cover-up, Malevolent Global Conspiracies, Personal Wellbeing, or Control of Information; Brotherton et al., 2013; Drinkwater et al., 2020), or discrete characteristics such as distrust of authority (e.g., Lobato, Powell, Padilla, & Holbrook, 2020) as assessed by measures that focus on specific government-related theories (e.g., 9/11 cover-up).

Too frequently authors used CTs as a ubiquitous, all-embracing label. This implied that findings from one context generalize to others, which is not necessarily true. For instance, believing that one celebrity faked their death or was murdered does not necessarily mean that an individual will endorse all such theories. Although these assumptions can coalesce (e.g., the 27 Club, where associations are made between famous people who died aged 27 years) they are often influenced by other factors (age, perceived health, importance, etc.).

While abridged definitions are understandable, in the context of journal word limits, the research area would undoubtedly benefit from greater conceptual exactness and the use of consensually agreed delineations of CT.

The danger with using concise definitions as illustrations is that they are reductionist to the extent that they provide only truncated snapshots of CT ideation. This is problematic as these often fail to fully represent the complex nature of CT endorsement, and consequently, prove either uninformative, or unintentionally misleading.

For instance, Egorova, Parshikova, Chertkova, Staroverov, and Mitina (2020, p. 3) define CTs as "attempts to explain various social phenomena as the result of conspiracies by certain powerful groups that are exceptionally effective and no less exceptionally malicious". This classification is vague as it refers only to collective action, power, and malevolence, and omits important elements (e.g., planning, intention, and purpose). Similarly, Lobato et al. (2020) placed an emphasis on distrust of recognized legal or scientific cultural authorities, then assessed conspiratorial ideation using the Conspiracy Mentality Questionnaire (Bruder et al., 2013), which measures the general tendency to engage in conspiracist ideation.

The limitation with measures that assess the general endorsement of CTs is the presumption that ideation is global (Pierre, 2020). That is, belief in one theory predicts faith in others (Goertzel, 1994**;** Lewandowsky, Oberauer, & Gignac, 2013). This extends to instances where narratives conflict (Wood, Douglas, & Sutton, 2012), and are fabricated (Swami et al., 2017). A commonly cited example of the former is that the more individuals believed that Princess Diana faked her own death, the more they believed that she was murdered. Similarly, the greater the conviction that Osama Bin Laden was already dead when U.S. special forces raided his compound in Pakistan, the more participants supposed he was still alive (Wood, Douglas, & Sutton, 2012). Regarding the latter, Swami et al. (2017) devised a scale around a fabricated Red Bull story (e.g., "Red Bull contains illegal substances that raise the desire for the product").

The notion that CT endorsement is a monological belief system, where belief in one theory is predicated on the advocacy of others is debatable (Franks, Bangerter, Bauer, Hall, & Noort, 2017). Critics argue that elements of CT beliefs combine to form a worldview, which is typified by CT mentality, of which monological belief is not a defining characteristic (Franks et al., 2017). Correspondingly, the commonality between theories arises from high-order factors such as distrust of government rather than conspiracies per se.

Furthermore, people do not simply share inaccurate information because they believe it is true. Analyzing data from Twitter, Vosoughi, Roy, and Aral (2018) found that falsehood (vs. truthful information) diffused significantly farther, faster, deeper, and more broadly. This was pronounced for political news. The effect was attributable to the inherent nature of false news, which was perceived as more novel and therefore worthy of sharing. True and false stories also elicited different replies. True content produced anticipation, sadness, joy, and trust, whereas false material provoked fear, disgust, and surprise. These findings indicated that conspiracies may be of inherent interest to people regardless of credibility (Vosoughi, Roy, & Aral, 2018). This observation reinforces the point that although accuracy is an important feature of CTs it is not a defining characteristic. As with gossip, people may share CTs for various social reasons.

The potential consequence of viewing CTs in overly simplistic terms is to depict endorsers as a homogeneous group. Recent work around paranormal credence indicates that believers (Dagnall, Denovan, & Drinkwater, under review) and experiencers (Drinkwater, Dagnall, Denovan, & Williams, 2021; Drinkwater, Dagnall, Denovan, Parker, & Escolà-Gascón, 2022) are best conceptualized as subgroups, who differ as a function of life history or other cognitive-perceptual factors such as level of schizotypy (Denovan, Dagnall, Drinkwater, & Parker, 2018). Applying this approach to CTs, then the tendency to validate inaccurate information within individuals scoring high on endorsement may be influenced by other variables such as delusional ideation (i.e., persecution) (see Verdoux et al., 1998). Future research would benefit from the ability to differentiate between benign CT beliefs and those that are likely to negatively influence individual well-being and/or social and political processes.

Using standardized taxonomies (e.g., lexicon for infodemic terms) would also advance work by ensuring greater conceptual consistency. A key distinction is between intentionally and unintentionally misleading sources of data. Classification of terminology is important because it enables researchers to determine whether belief in CTs is associated with a general propensity to endorse inaccurate information (Miller, Saunders, & Farhart, 2016). Tentatively, given the nature of conspiratorial ideation, it is logical to presume that higher levels of conspiratorial ideation incline individuals to place less faith in 'official' sources of information regardless of their veracity (Drinkwater et al., 2012). This should be especially true in the case of individuals scoring high on mistrust of authority. Analysis, such as latent profiling, that recognizes that CT endorsers potentially represent sub-populations based on other factors would allow investigators to test such notions.

From a critical perspective, scholars should avoid applying value judgments to CTs, as expressing concerns about the veracity of information disseminated by corrupt administrations is socially beneficial. Certainly, the notion that CTs are inherently wrong and personally and

socially harmful requires greater consideration and contextualization.

Finally, it is important to acknowledge that the selected search terms in this review highlighted only a restricted range of papers. Whilst this was necessary to ensure focus and manageability, it should be acknowledged that related, relevant articles were excluded. For example, papers investigating combinations of COVID-19, fake news, and pseudo scientific information. Hence, the review should be considered extensive, rather than exhaustive, and it only provides insights into the nature of psychological work within the designated research parameters. Consequently, future work should examine allied areas to determine if they demonstrate similar reporting trends (during the period 2010-2022) to those observed in this article.

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RESEARCH ARTICLE

A Double Blind, Placebo Controlled Clinical Trial on Hospitalized Covid Patients Using Informed Water

William Bengston
wbengston@sjny.edu
St. Joseph's University

Margaret Nies
mnies@optimum7.net

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HIGHLIGHTS

A clinical study of COVID-19 symptoms found that water was an effective medium for the storage and scaling of 'healing intention.'

ABSTRACT

Two technological hurdles need to be overcome for biofield therapies to transition from fringe status to active clinical application. First, healing intention must be able to be stored, and second, it must be able to be scaled. Work on the storage problem has been done for some decades, but the scalability problem has rarely been addressed. The present study evaluates the therapeutic effect of "informed water" on West African patients entering a hospital for Covid. One hundred sixty patients were randomly assigned to either a treatment or control group. Both groups were blindly administered sublingual drops of water over the course of a week. The two water formulations given sublingually to the treatment group went through a physical device designed to capture and reproduce the healing phenomenon. The control group was administered sublingual drops of untreated water. Multiple Covid symptoms were measured daily over the course of a week. In addition, multiple PCR tests were administered. The patients receiving the informed water were blindly assessed to have significant improvements on a number of symptoms, and those patients also reported higher levels of general health and fewer positive PCR results. The data from this experiment are strongly suggestive that 1) water is a good medium for the storage of healing; 2) the therapeutically prepared informed water can be replicated by a physical device and is hence scalable; 3) mass-produced water can deliver a strong therapeutic effect on Covid; 4) there are no negative side effects. Future work on additional health conditions needs to be carried out.

KEYWORDS

Water therapies, complementary medicine, storage of healing intention, Covid therapies.

INTRODUCTION

In order for biofield healing to transition from "fringe" status to "conventional" applications, at least two conditions must be met. First, healing must be made storable so that it can be utilized as needed; and second, healing must be made scalable so that it can be applied to large populations. These two conditions are routinely satisfied in the technology of a variety of traditional medical and non-medical communities. In the medical community, for some quick examples, drugs can be stored with the potential for future application, and they can be mass-produced to meet wider demand (think of everything from vitamins to antibiotics to vaccines, etc.). The same holds true for non-medical technology, which can routinely store power, potential, and information for mass produc-

tion (e.g., batteries).

And while healing researchers have by now reasonably demonstrated the reality of what is sometimes called anomalous healing or biofield healing, there has been insufficient work on its storability, and the scalability problem has not been adequately addressed. This paper addresses both storage and scalability problems in a controlled experiment that uses "informed water" as a therapeutic agent for patients entering a hospital for Covid treatment.

Background

As distinct from the empirical demonstration of one-on-one healing as a valid and reliable phenomenon, the examination of storability was first systematically studied by Bernard Grad at McGill University in the 1950's and '60's (Grad et al., 1961; Grad, 1964; Grad, 1963). In these early experiments, Grad found that the Hungarian healer Oskar Estebany was able to significantly affect the rate of wound healing in mice, the growth rate of plants, as well as a variety of anomalous healing outcomes. Most significant to the present work, Grad found that it made no difference whether Estebany actually put his hands around a cage of mice or pots of plants in order to produce the effects. If Estebany had intended healing while holding pieces of cotton or beakers of water, the healing outcome was the same if these substances were administered as surrogates for hands-on treatment. In effect, healing intention was demonstrably able to be stored in a selection of organic and inorganic materials.

Using actual physical devices, Tiller et al. demonstrated that experienced meditators could imprint devices with a specific intention (Tiller, et.al., 2000). These devices, shipped several thousand miles to another lab, could decrease or increase the pH of water by one pH unit and could increase the ATP/ADP ratio in fruit fly larvae so as to significantly decrease their development time.

Jacques Benveniste, in a long series of controversial studies, demonstrated that biological signals could be extracted and recorded, and stored in water, and the playback of these signals to water can reproduce the original biological response (Thomas, 2007). Benveniste called this "digital biology."

Following and building upon the inquiries of Benveniste, Nobel laureate Luc Montagnier demonstrated the experimental conditions by which electromagnetic signals of low frequency can be emitted by diluted aqueous solutions of some bacterial and viral DNAs. The recorded electromagnetic signals in water carry the DNA information of the original (Montagnier, et al., 2015).

The cases of Grad, Benveniste, and Montagnier illustrate some of the difficulties encountered by those who seriously challenge the scientific status quo. Grad suffered consequences at his home institution because of his research of the unorthodox. Benveniste too was roundly attacked and even had his previously published paper in Nature on the memory of water retracted by alleged skeptics acting in defense of the orthodox position that water simply can't have memory. Benveniste's reputation was reduced from him being an award-winning scientific luminary to an outcast with impossible nutty ideas. Montagnier, despite being a nobel laureate, was roundly attacked for his experiments on the digitization of the information of biological materials. Critics simply could not accept that both Benveniste and Montagnier might have made serious advances in some mechanisms of action that might provide practical alternatives to a traditional understanding of how the world works.

Other methods of storing and scaling healing intention have included using sophisticated EMF detectors inside of a Faraday cage, and the signals from the various detectors combined and reduced to an audio file. These recordings played either to cancer cells in-vitro (Beseme et al., 2018); or to mice in-vivo (Beseme et al., 2020; Bengston et al., forthcoming 2023) produce some significant but not well-understood biological effects. By the same token, initial findings are suggestive that the recordings, although producing biological effects, may not be as efficacious as one-on-one healer-to-healee approaches.

Had the audio recordings fully reproduced the healing effect, they would be maximally scalable. Imagine, for example, an audio recording that could be uploaded to the internet and then globally scaled. Studies on water seem to suggest that it may be close to an ideal medium for storage, though scalability, addressed in this paper, remains more of a problem. Water, recent research shows, is not just the passive molecule found in most conventional textbooks (Pollack, 2013).

The controversies stimulated by both Benveniste and Montagnier had the additional complication of potentially presenting mechanisms of action for yet another therapy considered to be medically outside the mainstream - homeopathy. Contrary to conventional thinking, through extreme dilution and succussion techniques, homeopaths suggest that potency and effect size increase with a reduction in active molecules. Strong effects are enhanced by the dilution of molecules, even to the point where no original molecules remain in the diluted therapeutic formulation (Saine, 2017).

The example of homeopathy is instructive to our question of storability and scalability, as practitioners claim the ability to store healing potential in homeopath-

ic formulations. They also claim the ability to mass-produce some of these formulations. Though it addresses both storability and scalability, much of homeopathy remains pushed to the fringes of clinical medicine, despite pioneering work on water memory and decades of clinical application (Senel, 2019). And so, the resistance to non-traditional medical applications is a bit more complicated than simply solving the problems of storability and scalability. Social and psychological impediments to novel healing approaches can be quite severe.

The present study presents a classical clinical experiment, double-blinded and placebo-controlled, that uses "informed water" as the therapeutic agent to treat hospitalized Covid patients. Homeopathy begins with chemically recognizable molecules, even though these molecules may be diluted below Avogadro's limit. This study is additionally unorthodox as "informed water" contains only information stored in the water. In the present study, we use a variety of methods and a device to "inform" water with therapeutic information and then scale that water for widespread dissemination.

Goal

To assess the clinical effectiveness and potential scalability of an information-infused water therapy on hospitalized Covid patients.

Materials

Approximately 6 oz of filtered tap water was treated by Bengston, using the techniques that he developed, for one-half hour. The healing method involves very rapid imaging techniques, which the participant healer cycles through. This is a relatively mechanical process that requires practice but not belief and has been described elsewhere in great detail (Bengston, 2007; 2010)

That sample of water was serially diluted and succussed numerous times, and the end water product of that procedure became the basis for scaled production. The sample of water was placed in a proprietary device designed and intended to scale and replicate this informed water. This device was made of copper, had a hose fitting for water input and output, and a central cylinder into which the material to be duplicated was placed. The output water moves around the central cylinder. The outgoing water from the device was the only formulation used in these experiments.

Sufficient informed water was then produced to fill 80 15ml bottles, and these bottles became coded as "A." Previous clinical tests on approximately 300 people had shown significant improvements in general health using this protocol to create informed water (Bengston, 2020).

An anti-viral sub lingual liquid therapy developed by Beech Tree Labs[1] (Mamber et al., 2020) was subjected to an energy plasma infusion system designed by Energy Tools International,[2] whose primary purpose was to capture the energetic signal of the original anti-viral formulation (Kronn, 2022). The anti-viral signal obtained was then infused into tablets. These tablets, in turn, were placed within the proprietary replication device, and sufficient water, which never actually came into physical contact with the tablets, was then produced to fill 80 15ml bottles. These bottles became coded as "B." Previous anecdotal clinical applications of this water-based therapy have been suggestive of anti-viral efficacy.

Ordinary untreated water was generated in sufficient quantities to fill 160 15ml bottles. Eighty of these bottles were coded as "X" and 80 bottles were coded as "Y." These served as the placebo or control part of the study. Both X and Y were the same sourced water.

Methods

One hundred sixty patients entering a hospital for Covid treatment in Western Africa[3] were randomly assigned (systematic sample with a randomized start) to one of two groups. The randomly assigned treated group received the two therapies labeled A and B taken as two sub lingual drops, 4-6 times per day. The untreated control group received the ordinary water in bottles labeled X and Y, and they too, took two sub lingual drops of the untreated water 4-6 times per day. The previous anecdotal experience was suggestive that therapeutic effects on Covid could be maximized by a combination of boosting general health and administering an anti-viral. And so for this experiment, we began by using our informed water, which we hoped would target both health and anti-viral responses.

This was fully double blinded, so that neither patients nor medical administrators knew what was in any of the prepared bottles of water. All therapies were chemically simply water, as were the controls.

In addition, we also gathered data on 160 patients who entered a hospital in the previous week. These were to be "historical controls" to monitor any anomalous fluctuations in the medical outcome, and these data may be used in future analyses.

This analysis focuses on the traditional comparisons between treated and placebo-controlled groups at the end of the one-week trial.

The entire study was conducted over the course of two weeks in September 2022. During the first week, the 160 historical control patients were admitted into a hospital. These patients are not part of this analysis. In the

second week, the 160 patients that are the focus of this evaluation were admitted on what we labeled "day 1," and they spent their first full day in the hospital on "day 2." Data were collected on a variety of Covid symptoms (e.g., shortness of breath; fatigue; etc.) on each day. In addition, the patients, all of whom had not been vaccinated, were given PCR tests before entering the hospital, and the diagnosis was later confirmed by additional PCR tests on days 1 and 6. The PCR tests given on the first day in the hospital were not reported until day 3.

All ethical guidelines on informed consent were followed using local criteria, and the onsite supervision was performed by a local physician.

Analyses

The bulk of this evaluation is a comparison of treated versus control groups along a variety of measurements at the end of a week hospital stay. These included Covid symptoms and PCR diagnostics. Since we were primarily comparing two groups, most of the analyses involved t-tests. And although we had sufficient previous data to justify 1-tail directional hypotheses, *we opted to follow the more conservative criteria of calculating two-tailed outcomes.*

RESULTS

Narrative Summary of Selected Findings

Day 8 Comparisons on "general feeling"

The comparison between treated and control groups was highly significant (t = 5, 153df, p = .0000). On the eighth day, those receiving the treated water reported higher levels of general well-being (mean score 7.7 v. 5.8).

Day 8 Comparisons on "temperature"

The comparison between treated and control groups was statistically significant (t = 2.6, 156df, p = .01), with the treated group having a statistically significant lower temperature.

Day 8 Comparisons on "coughs"

The treated group had significantly lower scores on coughs (t = 2.4, 157df, p = .02).

Day 8 Comparisons on Sore Throat Symptoms

The treated group had significantly lower sore throat symptoms (t = 3.5, 157df, p = .0006).

Day 8 Comparisons on Headache Symptoms

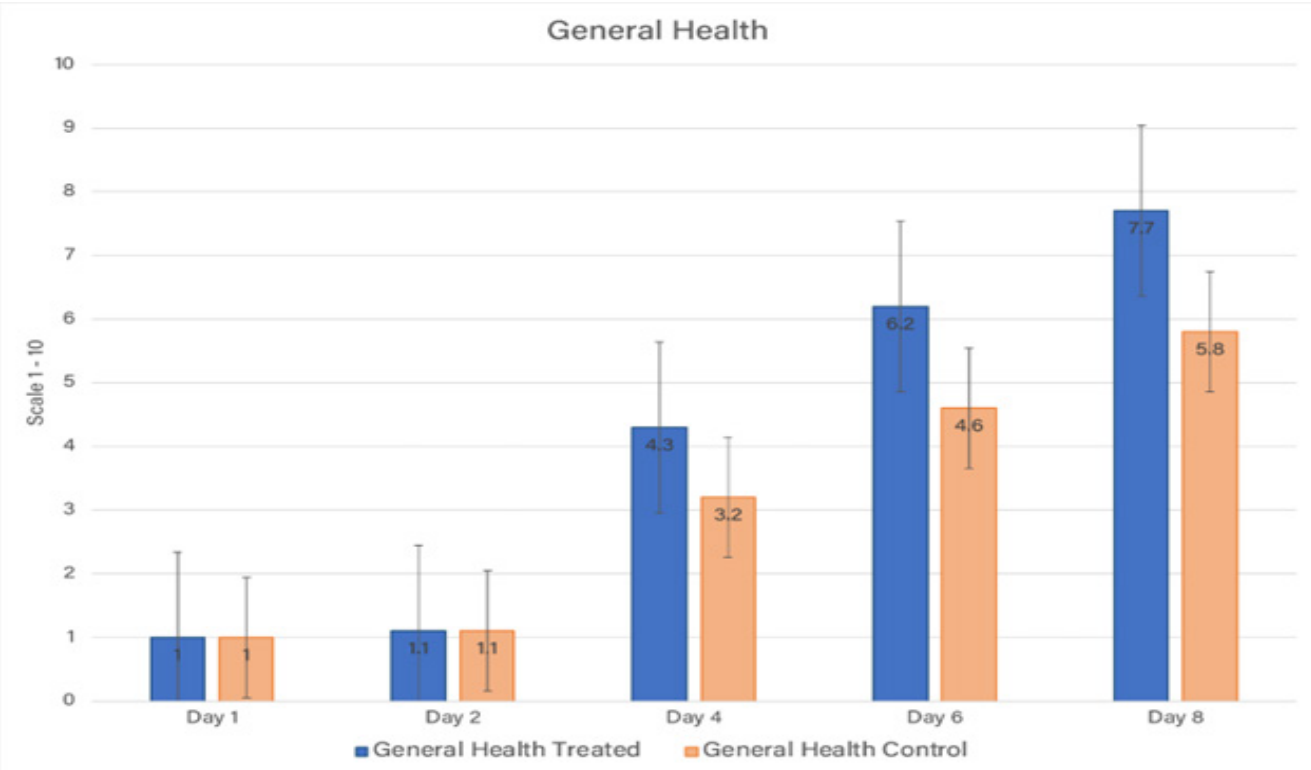

Figure 1. Histograms Comparing Treated and Untreated Groups on General Health Scores with Standard Error Bars.

The 2-tail test did not yield significant differences between treated and untreated groups on headache symptoms (p=.09).

Day 8 Comparisons on Fatigue

There were no significant differences between treated and untreated groups on fatigue.

Day 8 Comparisons on Aches

There was no significant difference between groups on aches.

Day 8 Comparisons on Eyes

There was no significant difference between groups on eye symptoms.

Day 8 Comparisons on Shortness of Breath

There was no significant difference between groups on shortness of breath.

Day 6 Comparisons on PCR positivity

On day 1, all participants tested positive for Covid, so there was no "variable." On day 6, the difference between the groups on the positivity of PCR test was highly significant (χ^2 = 12.3, p=.000). The treated group had a 42.5% positivity rate, and the untreated a 70% positivity rate.

Simple Summary

A comparison of all the symptoms on the last day of the trial, plus the PCR test results on day 6, yield significant differences between treated and control groups on:

General Feeling, Temperature, Sore Throats, Coughs, PCR positivity.

There were no statistically significant differences between treated and control groups on:

Headache, Fatigue, Aches, Eyes, Shortness of Breath.

On all variables, the treated group had the more desirable directional leanings (e.g., reduced symptoms) by the last day, though five of those did not reach 2-tail significance.

With a further examination of the symptoms, which did not produce statistically significant differences between treated and control groups, it can be observed that those symptoms in both groups had very low scores on Day 8. In other words, they were more symptomatically mild than those symptoms which otherwise persist and were generally in symptomatic retreat whether treated or not. Of these five symptoms, the average score on a 1-10 self-report scale, lower scores signifying fewer symptoms, was 1.4 for the treated group and 1.6 for the untreated group. In analytical terms, that means that relatively symptom-free scores had no room statistically to vary. Those people were essentially symptom-free whether treated or not. In other words, there would be no differences between the groups in a short period of time anyway.

In medical terms, these five symptoms had already been resolved, treated or not, by Day 8.

The pattern tended to diverge in a favorable direction for those symptoms which were stronger. The symptoms in the treated water group tended to diverge from the control groups in about two days. Once the groups separated, they tended to remain separated. The graph below suggests that by day 4, the groups had significantly diverged from each other, and although the health of both groups improved over time, the treated water group improved significantly faster.

DISCUSSION AND CONCLUSIONS

It should be remembered that all patient volunteers were treated by conventional medicine, but the treated group blindly also took the informed water, while the control group took water that had not been informed with healing intention.

The trend in both treated and untreated groups was towards a reduction in the severity of many Covid symptoms over time. So, for example, the "general health" report had respondents in both groups having checked into a hospital with a score of 1 (on this measure 1 is negative; 10 positive). As the days progressed, both the recipients of the treated water and the recipients of the control water improved, but the treated water group improved more so that even by day four, the treated water group had improved more.

On the other symptoms where there were significant differences between groups, the trend was similar. That is, both groups were improving over time, but the treated informed water group tended to improve earlier and more rapidly.

This yields an interesting speculative hypothesis: *the therapy is more effective on symptoms that are more severe and long-lasting.* By extension, the therapy is not needed for quickly self-resolving symptoms.

Of particular note is the steep decline in PCR positivity for those taking the treated drops. On day 1, all volunteers tested positive. By day 6 (the next time PCR was tested), the treated group had significantly less positivity (42.5%) compared to a positivity rate of 70% in the control group (χ^2 = 12.3, p = .000). *And the all-important measurement of "general feeling" was also very significantly improved.*

The data indicate that significant medical improve-

ments are evident with the use of the treated water, especially for those symptoms that do not naturally resolve quickly. On perhaps the two most important variables, general health and PCR positivity, the water-based therapy produced significant benefits.

Returning to the larger questions of storability and scalability, the data from this experiment are strongly suggestive that 1) water is a good medium for the storage of healing; 2) the therapeutically prepared water can be replicated by a physical device and is hence scalable; 3) mass produced water can deliver a strong therapeutic effect on Covid; 4) there are no negative side effects.

It would seem that there are sufficient data suggestive of the desirability of using informed water as a therapeutic, with a likely improved outcome for those receiving traditional medical care.

Future research should replicate this kind of experimental research on other clinical conditions.[4]

NOTES

[1] beechtreelabs.com

[2] energytoolsint.com

[3] Because of some recent political and social unrest, the indigenous personnel expressed concern about publicly revealing more information than "A West African Country" as an identifier. The journal has been told the country, city, hospital, supervising physician, and local adminstrators but has been asked to keep these specific identifiers confidential.

[4] We will be glad to supply researchers with the informed water should they wish to replicate or collaborate.

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CONFLICT OF INTEREST

William Bengston is the developer of the Bengston Energy Healing Method.

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RESEARCH ARTICLE

Experiences of Dying Animals: Parallels With End-Of-Life Experiences in Humans

Rupert Sheldrake
rupert@rsheldrake.org
20 Willow Road, London NW3 1TJ, UK

Pam Smart
p.e.smart57@gmail.com
19 Cliff Mount, Ramsbottom, Bury BL0 9EP, UK

Michael Nahm
nahm@igpp.de
Institute for Frontier Areas of Psychology and Mental Health, Wilhelmstrasse 3a, 79098 Freiburg, Germany

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HIGHLIGHTS

Reports of pet behavior before death often resemble people's end-of-life experiences, suggesting common underpinnings to these events.

ABSTRACT

There has recently been an increased interest in end-of-life experiences (ELEs) in humans, but ELEs in non-human animals have not yet been assessed. In this paper, we present findings from a study we performed to collect and analyze reports about remarkable behavioral aspects of animals during their last phase of life. After public appeals in which we asked for reports about ELEs in animals, we received numerous responses from pet owners. We were able to group these experiences into specific categories, which we termed the *last goodbyes*, *last visits*, *last rally*, *retreating into solitude*, *unusual premonitions of death*, *somatic surprises*, *terminal lucidity in animals*, and potential *near-death visions in animals*. We present 43 case reports pertaining to these different categories. Many of them show striking similarities to remarkable behavior reported by dying people. This similarity between animal and human ELEs might be a sign of a common physiology underpinning such experiences and could also increase the recognition that animals share an inner life similar to that of humans during all phases of life. This could lead to a more respectful treatment of pets, as well as of animals in farms, zoos, and in the wild. However, as our study was of a preliminary character and only the first of its kind, we encourage further systematic research in this field. In the Supplementary Material, we publish 71 additional cases for those who would like to study more examples.

KEYWORDS

Animals, end-of-life experiences, near-death phenomena, terminal lucidity.

INTRODUCTION

There has recently been an increased interest in end-of-life experiences (ELEs) in humans, including terminal lucidity, an unexpected surge of clarity soon before dying. Here, we describe our findings from a collection of reports about dying non-human animals, which show remarkable similarities to the behavior of dying people.

Early scientists who were interested in the study of psychical phenomena relied to a very large extent on reports of spontaneous exceptional experiences that were reported by the general population. For example, the pages of the arguably earliest parapsychological magazines *Blätter aus Prevorst* (published from 1831 to 1839) and *Magikon* (published from 1840 to 1853), edited by pi-

oneering physician, poet, and parapsychologist Justinus Kerner (1786–1862), contain numerous reports of mysterious occurrences related to dying. Similarly, when academic psychical research was established in 1882 by the founding of the *Society of Psychical Research* in England, two voluminous landmark publications were concerned with reports of occurrences that chiefly concerned death-related experiences (Gurney et al., 1886; Sidgwick et al., 1894). Many other treatises on exceptional experiences published in the 19th and 20th centuries covered unusual death-related phenomena. Nevertheless, only in recent decades have these spontaneous phenomena aroused the interest of scientists in mainstream medical settings. Such phenomena include near-death experiences (Cassol et al., 2020; Holden et al., 2009), end-of-life visions or deathbed visions (Claxton-Oldfield & Dunnett, 2018; Depner et al., 2020; Morita et al., 2016), and terminal lucidity (Nahm, 2012; Nahm et al., 2012; Nahm, 2022a, b). The variety of remarkable death-related occurrences has become known by different names, including deathbed phenomena, end-of-life phenomena, or end-of-life experiences (Brayne et al., 2008; Claxton-Oldfield et al., 2020; dos Santos et al., 2017; Shared Crossing Research Initiative, 2022). The study of ELEs can help to improve our understanding of human nature, advance our knowledge about the dying process, and offer perspectives for dealing with spontaneous and often emotionally intense phenomena in near-death states.

Unusual death-related experiences have not only been reported from human beings for a long time but, to a lesser degree, also from non-human animals. Early collections of reports regarding unusual death-related animal phenomena, chiefly animal apparitional and haunting phenomena, were published by Ernesto Bozzano (1905, 1950), Elliott O'Donnell (1913), and Raymond Bayless (1970). Other compilations contained reports that concerned other seemingly psychic faculties and unusual behavior of animals and included accounts from pet owners (e.g., Gaddis & Gaddis, 1970; Schul, 1977; Schwertner, 1984). In general, however, systematic research into faculties suggestive of psi in the animal kingdom has largely been neglected. Facets that have been studied comprise the homing behavior of animals (for reviews, see Nahm, 2015; Sheldrake, 2011), cases of "psi trailing" in which an animal found its owner in a new location that the animal had never visited previously (Gaddis & Gaddis, 1970; Rhine & Feather, 1962; Sheldrake, 2011), the ability of animals to anticipate when their owners return, other animal premonitions, animals that "read people's minds" and respond to their intentions, as well as animals' reactions to distant death and danger (e.g., Pleimes, 1971a, 1971b; Sheldrake, 2011; Sheldrake & Morgana, 2003; for an overview of such studies, see Sheldrake, 2015).

With the present study, we aim to cover new ground in a virtually untouched field of research into animal life: We address phenomena reported to occur when animals die. Unlike the treatises mentioned above and numerous more recent popular books on death-related aspects of animal life, such as animal after-death communications and the possible afterlife of deceased pets (e.g., Anderson, 2017; Bivona et al., 2004; Warren, 2006) or ways to cope with the loss of beloved pets (e.g., Kowalski, 2012; Wycherley, 2018), we focus directly on behavioral aspects of animals in near-death states. After public appeals in which we asked for reports about ELEs in animals, we received numerous responses from pet owners. In order to draw attention to these phenomena and to raise awareness about their occurrence, we give a variety of examples below. In the Discussion section, we consider aspects of the reported cases in relation to ELEs reported from human beings.

METHODS AND RESULTS

Appeals for information about unusual near-death phenomena in animals were published on Rupert Sheldrake's website, in his newsletter, via a video created for YouTube, a talk on the US radio station Coast to Coast AM on 14.09.2021, and through personal requests to contribute to our research project. In response, we received numerous case reports via email. Some cases had been reported to Rupert Sheldrake already earlier in the context of his other work on animals and pets. We also found a few cases describing unusual animal behavior prior to dying in publicly available sources such as books and online-entries. Some reports were also related to Michael Nahm in person by people with a general interest in ELEs and terminal lucidity. At the time of writing, our database contains about 150 entries of varying quality in which people described behavior of animals that seemed to be related to their impending death. Many case reports contain features that allowed us to group these experiences into specific categories. Notwithstanding that some cases could be allocated to more than one category, we classified 114 examples pertaining to the classification scheme shown in Table 1, together with the number of cases in each category at the time of writing. Of these 114 case reports, we present 43 representative cases in this publication. The other 71 cases are available online as Supplementary Material, so that readers can review them for themselves. In the following sections, we give examples that illustrate typical examples of these various types of ELE behavior.

TABLE 1. Classification of end of life behaviours in our collection and the number of cases in each category

Category	Number
Last goodbyes	53
Last visits	6
The last rally	28
Retreating into solitude	10
Unusual premonitions of death	5
Somatic surprises	2
Terminal lucidity	7
Near-death visions?	3

CASE EXAMPLES

Last Goodbyes

The dominant feature in many of the case reports is that the pet seeks to say goodbye to their owners or other loved ones. Typically, these pets are already very weak, and they die soon after this final farewell. Gaddis and Gaddis (1970) already reported such a case. During the prime of its days, tomcat Pussy was taught by the couple who kept him to hold out a paw to shake hands. As Pussy grew older, he suffered from severe chronic dysentery and had to be put down. When the vet arrived, the cat dragged himself out of his basket, walked straight to its sorrowful keepers, and held out his paw to each of them in turn. He then crept back into his basket, buried his head in his paws, and awaited his fate. Some of the reports we received are remarkably similar.

> Our cat lived an incredible 21 years but suddenly became ill. We knew she was beyond her life expectancy but didn't want her to suffer. However, before we could take her to the veterinarian, late one Sunday afternoon, and with all of the family home but in separate parts of the house, she made her rounds to each of us, gently pushing her head against a leg and looking up very lovingly and very softly, meowed, and walked away. Although she was a vocal and very affectionate cat, I can still recall all these years later what a profound feeling I had at the time as she walked away from me. Later as evening fell, we found her dead, peacefully, as if sleeping. Each of us in the family, my wife and two children shared our stories with one another and concluded that the cat said her "Goodbyes" in nearly the exact same manner.

This is the sad but true story of what our family experienced with our dog Foxi. We all loved the dog because it was so friendly, devoted, and loyal, as well as very watchful and clever. When the dog became old, it could not hear so well anymore, ate less, and became weak. Finally, at the age of 14, it could barely move from its resting place. Then one day, the following happened: The whole family sat at the dinner table when the good dog struggled to its feet, went around from one to the next, sadly looked at everybody, and gave paws to each member of the family. Then it trudged back, slowly lay down - and died. You can believe me, we had tears in our eyes after this goodbye scene. The dog had felt the end and pulled itself together for a final goodbye to all of us.

A few years ago, our Staffordshire bulldog "Petie" fell terminally ill. One hour before he died, he came to each member of the family and spent a little time with everybody, one at a time. We thought this behavior odd as he didn't usually do this, at least not to each individual person at one time. He seemed alive and much more energetic than he had been being so ill. After spending a bit of time with each of us, he made his way downstairs to his bed and died peacefully.

Baker, the cat our son and daughter-in-law adopted, was sociable on his own terms and would appear for a while when we visited them and then disappear. Knowing we were family, he was affectionate with us, but briefly. The last time we saw him, as he was clearly dying, he came in as usual. But this time, he made the rounds, sitting in each of our four laps for 15 minutes or so and then moving to the next lap as if clearly saying goodbye. When he died very soon afterward, and I mentioned the incident, each of the four of us said that they had sensed that exact thing at the time: that he was aware of his imminent death and was saying goodbye.

We adopted my first cat Emilia when she was about three months old. She had Feline leukemia and other immunodeficiencies that took her life three years later, despite all our efforts to help her. The night that she was dying on my legs,

around 5 a.m., I thanked her for having accompanied me for those wonderful three years and for having helped me lose my fear of cats. I asked her to join me for another hour to watch the sunrise together. At that moment, almost by magic, she stood up, raised her head, licked my hand, and together we watched the sunrise from my window. And around 6 a.m., the moment the sun came up and touched our window, she looked at me, leaned back on my legs, and exhaled deeply. That was the last breath of her. I am a Nurse of critical patients in Chile, and it is common for us to observe the famous "mejoría de la muerte" in terminally ill people or with different pathologies, but in animals, I had never observed it. With Emilia, it was my first time.

When I was a child, our family inherited my great-grandmother's parakeet, Sugar-Bird. Sugar-bird was a light blue parakeet that had suffered a stroke and was no longer able to use his legs to grasp his perch. My dad installed a batten to replace the perch so the bird could still sit in his spot. One day the bird flew from his cage in the family room to the kitchen while the family was eating dinner at the kitchen table. We were all startled by this as he had never flown outside the cage before. The next day he passed away. We thought at the time that the bird must have flown up to the kitchen to say goodbye to all of us as we were all gathered around the table.

In the cases presented above, the animals visited their loved ones shortly before dying. But in a number of cases in our collection, they also seemed to wait until the loved ones came and visited them. Once they arrived, the pets died. The following case is one example.

Our dog Coyote was dying. The boys were grown and moved away, as it should be. My husband and I were sitting vigil. Out of the blue, our elder son called and said he was driving through town, and although it was late, he wanted to drop in. He lived hours away. Another son called and took a zip car home from the city. My husband and I had been sitting vigil for two days, giving our beloved dog all the care and "permission to go." Only once the boys were home, Coyote visibly relaxed and crossed over. It seems she could not go until her family/tribe/pack were present. It was uncanny and beautiful. I "know" she called out and called the boys home.

Last Visits

In this category, we included accounts in which animals visited loved ones for a last goodbye. The case reports in this category are very similar to the previous one. But rather than conveying a last goodbye at home, the animals grouped here factually crossed a distance between two different locations. Such a case had already been reported by inventor and futurist Nicola Tesla (1856–1943), according to whom a pigeon he was particularly fond of flew into his room one night with the seeming purpose of informing him that it was dying and to say goodbye (Cheney, 1983). In their book on remarkable aspects of animal life, Gaddis and Gaddis (1970) included an intriguing case that represented a case of psi trailing. A dog found a beloved caretaker in a location it had never been to and then died there. The three cases reported below concern dogs who visited the houses of their former keepers or caretakers and then returned to their present homes. The first of these cases is particularly notable as it involves the comparably rare aspect of psi trailing as well.

For many years I had a mongrel dog called Bruce. When I started courting, I spent less time with him, although I still loved him. In turn, he turned his affection toward a girl who lived not very far away who took him long walks, and occasionally she would ask if she could keep him at weekends. After mother died, my father decided to move house several miles away. What to do with Bruce was a problem, which was resolved when my friend said she would love to have him. Many years later, on a lovely summer's evening, I heard scratching outside the bedroom window of my new home. I opened it and looking down, I saw the white-haired face of Bruce. You can imagine the excitement in the household. We made such a fuss over him. However, in the early hours of the morning, he made indications it was time to go. I can still see him walking away over the field, stopping and looking back. I met my friend whilst shopping a few weeks later who informed me Bruce had died. He had gone missing one night, returning early the following day – and had passed away three days later. It is especially remarkable that Bruce had never been to the new address, and we had been parted for over five years. The dog had to cross over a bridge and travel over three miles to find me in my new address.

My friend G. had a dog, "Bobby" who was

enticed by a neighbor – maybe even "enchanted" – to move away from his home into her own household. After some time, several years later, the dog Bobby suddenly appeared on G.'s property/home. Bobby focused his gaze upon his former master, G. He asked the pup if he wanted something to eat. "No," indicated Bobby. Then, Bobby turned away, returned to the "abductor's" house – and died.

We lived next door to a family who had a female Black Lab, her name was Orio. She was such a gentle dog, and whenever her people would go away and leave her at home, my husband would go over, feed her, and take her for walks. Only once or twice did she come into our house, and only then when her master was with her. About two years ago, one afternoon, she was standing at our front door by herself. As I opened the door, she insisted on coming in, which was very unusual. She walked all over the house and finally came to me in the kitchen and laid down by my feet and stayed there. After a while, I phoned my neighbor to tell her that the dog was in our house. She could not explain how the dog got out of the yard as the gate was closed and she was in no condition to jump over the fence. Later the same day, she turned up at the neighbor across the street. He too, from time to time, looked after her. After he phoned the mistress of Orio she went to pick the dog up and took her home. The next day Orio became very sick, and the mistress took her to their veterinarian. After examining her, it was determined that nothing could be done for Orio. That night she went down into their basement, the neighbor followed her and stayed with the dog. A few hours afterwards she was dead. I am convinced the dog knew that she was to die and came to say goodbye to the people who were kind to her. Still to this day, my heart becomes heavy whenever I think of how that dog came to say thank you and goodbye.

The Last Rally in Dogs and Cats

In some of the presented cases, the animals appeared to muster an extra strength to say goodbye. A pronounced surge of vitality in animals shortly before dying was, in fact, a frequent feature of the cases reported to us, and we, therefore, grouped them into a specific category. Such increased vitality has long been known to occur in some dying people. Typically, it involves enhanced physical vigor, but there can also be a surprising improvement in the mental state of people who were previously drowsy, confused, or even comatose, i.e., terminal lucidity. There are various names in different cultures and languages for this remarkable increase in vitality. In English, recent terms that are used in the context of palliative and hospice care include the last "rally" before death (Kastenbaum, 2006; Kemp, 1995) or "pre mortem surge" (Schreiber & Bennett, 2014). Our Chilean correspondent who reported the case of Emilia the cat called it "mejoría de la muerte" (improvement of death). As evidenced in the examples given below, many of our correspondents were deeply impressed by the last rally of their pets. As a veterinarian informed us, such occurrences are not even rare:

In my practice as a vet, experiencing the last rally in dogs isn't uncommon. It happened already a number of times that when I rang the bell of a house I was called to in order to put a dog down, a vital and barking canine greeted me and jumped around me. I was surprised already more than once that when I asked its owners where the sick dog is that I was supposed to put down, they informed me that this seemingly vital animal would be the moribund dog in question.

We present examples of the last rally of moribund dogs and cats in the following and continue with examples from birds and ungulates.

My little dog Daisy, a Pembroke Corgi, was suffering from terminal cancer and had deteriorated for several days to the point that she could not walk or stand. But on her final day, she "brightened" and followed me everywhere for an hour before passing. It was as if she knew the time was at hand, and she wanted to be as close to me as possible when she passed.

Princess Lavender was my baby girl for 11 years. She had congestive heart failure for eight months before she passed. Her veterinarian prescribed medicines that helped her. On March 4, 2021, she passed away. Around 1 a.m., I was up with her because her breathing was very unsteady, and she was not able to stand on her own. I had to go to work at 3 a.m., and my husband was with her till I came home at 10 a.m. While at work, I called the veterinarian's office and was told that the vet would see her at 10:30 a.m. We decided to help her pass with the doctor. When I got home, she was her young self, she was run-

ning around, playing, jumping up and down, giving me kisses, just her young self! We went to the vet's office, and the doctor looked at her and told us she would not do what we had planned, that she was doing very well. So, we decided to go on vacation (we had already planned to leave on this day) and drove four hours to the house we were renting. Princess loved the drive. When we arrived at the house, she bounced out of the car and took off running, checking out the place and smelling like crazy. She ate, drank water, took a nap, and then played a little with her ball and me and was doing great. Around 7 p.m., I checked on her and she was not doing good with breathing. I held her for five minutes, telling her how much we loved her, how much we would miss her, and telling her that it was OK to pass on. She gave me a kiss and took her last breath.

We had to say goodbye to our beloved Golden Retriever, Zoey, on July 5, 2021, at the age of 14 1/2 years. Zoey had started to deteriorate rapidly on the week of June 21st. She was barely able to walk the stairs, barely eating and sleeping most of the time. Sometimes she seemed as if she wasn't present if that makes any sense. We had started sleeping in the family room with her since navigating to the second floor, and the bed was not an option. On Friday, July 2, we were unable to rouse her or coax her to eat. After many tears, the decision was made to say goodbye and all vet arrangements were made for the following day on Saturday. On that Friday afternoon, she miraculously got up, walked over to her food bowl and, ate her meal, drank her water. She then went outside in the backyard, walked around, and proceeded to enjoy the rest of the evening. We could not, in good conscience, go through with the appointment. We had a family meeting, as we all stood around and stared at each other in disbelief and cancelled her euthanasia. She had a remarkable Saturday! She ate approximately five small meals, enjoyed some outside time, and slept with our daughter for the last time on the mattress on the floor. She was slowing down on Sunday, as I believe she was out of her last reserves of energy. On Monday, she refused to eat or get up, and I feel waited for my daughter to come home from work. At that time, she collapsed in the backyard and had to be carried inside. We called my son to come home, and he carried her to the car and subsequently to the vet, where we said our final goodbye.

We were told our rescue dog, a Parsons Jack Russell we named "Piglet" might be around three years of age when we got him, and we had him for over three years. We started noticing Piglet having foul-smelling breath and took him to the vet to have his teeth/gums looked at. He was scheduled for a dental cleaning, but when his pre-surgery lab work was done, we were told that he was in end-stage renal failure and would not survive any operation. His vet then told us that he would steadily decline, and if he started to have seizures, that would be the end. He continued to be his happy self for another six months but then things started going downhill rapidly. He lost his sight and grew gradually weaker. When he stopped eating and drinking, I contacted the vet to have him put to sleep the next day. I slept alongside him that night on the floor so he wouldn't feel frightened or alone. I was dreading the morning. At 7 a.m., I awoke. Our other dogs were up and running around. Piglet jumped up and ran out the doggy door, following the rest of the pack! He did his business outside and came in with the rest. He went over to the water bowl and had a drink. I immediately started questioning our decision to have him put down in two hours. My husband encouraged me to take him to the vet anyway and at least have him checked out, to which I agreed. My husband then left for work. Piglet continued to be lively, even jumping up to his favorite spot on the sofa. I went and got his brush; he jumped down and I proceeded to give him a much-loved brushing. He got down on his haunches, and after about ten minutes, I turned to clean his brush. When I turned back to him, Piglet was lying on his side and seizing violently. I gathered him in my arms, sat down on the sofa, and watched as he passed away in my arms while I told him how much he was loved.

We lost our dog Ollie of over nine years. The few hours before she passed, we knew it would be her final hours due to her different behavior along with physical symptoms of ill health. She sat watching the sunrise for minutes... transfixed, then walked round slowly looking at all parts of the house, garden, etc. This may not seem unusual. But to us, it was a very distinctive behavior that was very different... and we knew it

was her time. The day before, she had an amazing longer walk that she had not been able to walk anymore for quite some time. What reminded us of our other dog Barney who passed at the age of 18. He also had an amazing walk in the morning on the day he passed. He was virtually blind and previously unable to walk a few yards without stopping.

Some three years ago, our black Labrador Shadow had been suffering for some weeks/months with his back legs where he would be in pain and often struggled to get up or walk. Initially, we were able to medicate, which mitigated the worst symptoms for a time. Sadly we eventually learned from the vet that he had a very large tumor pressing on his spine, which was causing all the symptoms, he was also by now off his food, so it was decided that he would be put down to spare him the suffering. Inexplicably, on the morning that he was due to be euthanized Shadow was full of energy, greeting us all and wagging his tail, and was tucking into his food with enthusiasm which naturally made it very hard to proceed with the procedure.

Five weeks ago, my cat was dying, not eating or drinking for days, hiding under the bed. Then the next day, she suddenly perked up and was very active. She was jumping on furniture, following me around, and acting like she was healthy and young. It went on for hours; I felt it was a gift. But the next morning, she was back hiding under the bed, refusing to eat or drink. We had a vet come to the house two days later to put her down. I've had multiple pets in my 77 years and never experienced anything like this.

On November 2021, my beloved cat Balou received euthanasia because his terminal illness left no other choice. He was about ten years old. Regarding his health, Balou had had a difficult life with many severe diseases and operations, but his condition could always be stabilized through applying a mix of conservative and alternative healing practices. He was a happy, lively cat and moved freely in our house and garden. At the end of October, his health deteriorated rapidly. His hind legs became unstable, and he occasionally tipped to the side. The diagnosis was a bilateral rupture of the coronary ligament; surgery was not possible due to his pre-existing diseases. Two weeks later, Balou developed a fever and renal dysfunctions. He was in severe pain and showed first signs of dying: Refusal of food and water for several days, extreme lethargy, weakness, difficulties walking and climbing stairs, no interest in going into the garden. Outpatient and inpatient treatment didn't improve his state. Furthermore, an inoperable tumor that was already purulent and necrotic was diagnosed under his tongue. In consultation with the vet, we scheduled euthanasia for the next day. After returning from the vet, Balou hid in the closet all day, only came out to go to the toilet and to eat. In the evening, he sought my company, and after a new injection of painkiller, we fell asleep together, holding hands side by side (he stretched out his paw to my hand – he had never done that before). The next morning, however, Balou was out of the blue vital again. He didn't sleep and withdraw, but came to me on the couch, cleaned himself a lot, and lay down on my lap (like he always did when he was healthy), he even ate a lot again, although the oral ulceration had worsened further. We went to the garden together and watched birds there like so often before. He even climbed stairs independently without tipping over. In short, we spent the day as we had routinely done in the many years before, but which hadn't been possible during the previous weeks. Until the vet arrived, we cuddled together on the couch. It was a very peaceful atmosphere and a loving farewell. The contrast in behavior between the last day and the time before was so obvious that I was aware that it must be a case of what is sometimes called "the last rally." He had also never held my hand before. Therefore, I am convinced that he knew (even if unconsciously) that he was going to die.

The Last Rally in Birds

Our second budgie, whom we called Jockel, was very much unlike the first one. He never wanted to learn new tricks and was completely uncommunicative. He even rarely left his cage, only when forced. My family named him "halfwit," but I just said he had character (I had picked him, after all). After some years, Jockel became sickly. His cage always was in the eat-in kitchen, next to the big living room – about 18 meters distance all in all. One night I sat in the living room and read a book. This was the best time for me

since all the others were in bed. Suddenly there was a strange sound. The door leading towards the dark kitchen was not completely closed, and I noticed that our little Jockel walked on the floor, forcing himself through the door and turning into a room totally unknown to him, toddling on the slippery parquet floor towards me in the middle of the night. Spellbound, I observed how he managed the last five meters to me, stopped at my feet, and looked up to me. He let me pick him up – which was unthinkable before – and I caressed him gently. In a low voice, I talked to him, and he closed his eyes, dying in my warm hand. And I believe he made himself immortal at that moment. He must have sensed that his end was close.

I have a bird story that is almost hard to believe because it is about our family's parakeet who lived 20 years, seemed to adore my mother, and exhibited skills and traits seemingly impossible for a creature with a brain the size of a pea. The years came and went, and I am at a loss to know how to explain all the wonderful things we learned from this cheerful, loving green being. The last day inevitably came, and he sat in a stupor on his perch for hours without eating, drinking, wing-stretching, or chirping. We just sat there by his cage, wondering if he was suffering or if there was something we should do for him. Suddenly he awoke bolt upright, exited the open door of his cage, and managed to fly to my mother's hand. He never moved again. He returned to a stupor state for another two hours as she held him. Then he was gone. We never knew how he found the strength to make that final flight. He knew he was dying, and he wanted to spend his final moments with my mother.

The Last Rally in Ungulates

We had an old mare who spent her last days barely acknowledging her surroundings until her last day. She brightened up considerably and asked to be let out of her stable and into the field with her friends. She spent a few minutes interacting with them all before walking up the field to her favorite dozing spot, where she just laid down and passed peacefully. My years of experience with horses suggest that they "know" when their time has come, and they generally go peacefully. My old stallion spent the last few minutes of his life parading up and down like a youngster before doing exactly the same as the mare.

I run a very large animal sanctuary in Australia and oversee every soul who passes. They usually know when they are going. I had a racehorse who was dying of snake bite with us frantically trying to save her. Suddenly she got up, and we were able to lead her to a stable. We thought she was healing. But she died the next day. This type of rally, for me, is part of the dying process. Dying animals will get very active. We just lost a beloved old goat who wandered up to the hay shed and gorged himself. We knew it was his last rally.

My beautiful gelding, named Kid, had the most wonderful fun personality and was full of energy, playfulness, and curiosity. I got him when he was four years old when I was in my twenties. He passed when he was 25 years old. Kid stopped eating and was lying down in the pasture one rainy day. He didn't want to get up and was in pain, so I called the vet. The vet came out and did not know what was wrong with him. She thought maybe he was colic and treated him for that, but the treatment did not help. He became very lethargic, almost like in a coma-like trance, with his eyes open and standing up. We gave him injections of morphine to help him with his pain. He would get a little burst of energy, walk around and graze on grass, then go back into just standing there. He made it through the night, and the next day he was in the yard. I went out with him for a while and went into the house – and then, he had disappeared. As it turned out, Kid had gotten out of the property, walked down our gravel road about half a mile, then went about another half a mile down the paved road to where he knew other horses he had visited in the past lived at my boyfriend's uncle's house. He died in the middle of the street in front of their driveway and the other horses. I could not believe he had walked that far in his condition. He wanted to be with other horses when he passed, and he made it to them.

Retreating Into Solitude

Another seemingly typical phenomenon reported from animals is their retreat into solitude before dying. Gaddis and Gaddis (1970) reported an account concerning

a dog that was badly mauled in a fight. After its wounds had been treated and it seemed to recover, it disappeared one day. Soon after, its owner had a vivid dream of the dog in which it appeared to stand on a particular knoll. The dog was found later on this knoll; it was dead. As the following examples from our collection illustrate, animals sometimes gather enough physical strength to bid farewell to their loved ones prior to leaving.

Our cat Anton was the classic tabby house cat. We received him when he was a little kitten. He was 16 years old when in the Summer of 2008, his health declined drastically. For weeks, Anton had only lain in the shade under a big bush near our house in the garden. I fed him minced meat with my fingers, and from time to time, I gave him a cracked egg, which he licked from the bowl, remaining in his procumbent position. One evening, on another balmy summer evening, when the front door was open, and I was doing the dishes, he dragged himself into the house and joined me in the kitchen at his feeding place. I turned to him, and we looked at each other briefly. Then I knelt on the floor, and he rubbed his head against my leg. He was very loving and strong, like in healthy days, so full of devotion – that really touched me a lot. I stroked him for quite a while. He purred barely audibly. His body felt relaxed, although he had become only skin and bones, and his fur was so shaggy. Then, abruptly, he rose and limped outside again. I closed the front door and knew that he would die very soon. The next morning his place under the bush was empty, and I could not find him in the surrounding area. Our son, who came to visit on August 21, 2008, went to search for him. Finally, he found him in the back of the garden, still breathing shallowly, surrounded by flies. I was surprised how much strength Anton had mustered to cover this distance since he had not been able to walk for weeks before. Our son sat next to him. Two hours later, our son came into the house and wanted to call the vet to finally release Anton from his misery. Then, the classical scenario developed that is also reported frequently from dying people: They die exactly at a time when they are finally alone, e.g., when their caregivers need to go to the restroom or fetch a cup of coffee. When our son and the vet arrived at Anton, he had already taken his last breath on his own.

We had a Collie many years ago. In the final months and weeks, it was just lying passively on the floor without energy. Then one day it came running to each family member to greet us, jumping like in joy, etc. Then it took off to the woods, where it chose to die in solitude. We found it later the same day. Without a doubt, it knew that now the time had come to say goodbye.

Pepi was a forest dog, a collie/Labrador mix, bright and strong in his prime. He was a family pet when the children were growing up, but he also accompanied my husband and me when we did forest surveys. In his fifteenth year, he started to slow down and was diagnosed as having a liver tumor. Still keen to come with us, we made allowances so that he could continue to enjoy his forest outings as much as possible. We lifted him over ditches and sometimes carried him between sites. While we took measurements, he lay on a wax jacket nearby. On what turned out to be his last day with us, however, he suddenly got up, started barking like his old playful, joyous self, eyes shining and cocking his leg so liberally roundabout I had to tell him to stay clear of my boots for heaven's sake! I turned to height a tree, and the next time I looked around, Pepi was nowhere to be seen. I called to my husband if Pepi had come to him. He had, briefly, but now he was gone. We thought he couldn't have gone far but started looking for him immediately in case he had fallen and lay somewhere. But however much we searched and called, we could not find him. We checked the whole compartment and didn't stop till it got too dark to see under the canopy. Back at the car, we shone the headlights into the forest in case he was making his way back after us. He never came. The next day a friend brought his two tracker dogs. They didn't find Pepi. The following day, coming out of the forest, we met an old crofter who lived nearby. We told him about Pepi and asked him to keep a lookout for him. "You won't find him, he will have made sure of that," the old boy said. "I have had two sheepdogs take themselves away like that to die. The third, when he got old, was sneaking out the same way, but I caught him and shut him in the barn. The next morning I found him dead there. I wish I had let him do what his instinct told him."

My dog came and said goodbye to me before

he died. He woke me up in the middle of the night by licking my face. Then he ran off and was found dead the next day.

Our dog Paddy is no longer with us. A year ago, he became deaf and obviously felt old and tired, and his hind legs were weak. I remember thinking tomorrow I will take him to the vet and he will decide his future, but that afternoon he walked out of the house and I never saw him again. I searched frantically for two days. Friends told me if he wanted to die in your arms he wouldn't go off by himself. Was it his wish to behave like most wild animals who wander away from the herd to die quietly and with dignity – alone?

My cat Ripp and I were a very happy couple for 18 years. Then one warm August evening, Ripp and I were sitting on the front porch – he was sleeping, and I was reading. Then, my telephone rang, so I got up and went in the house to answer. As the phone rang, Ripp got up and climbed into my lap. I was sitting in kind of a lotus position, so he sat right in the middle. The phone kept ringing, and Ripp sat on his haunches, put his two front paws directly on my shoulders, and stared at me (and vice versa), nose-to-nose. We just stared at each other for what seemed like forever, and I said to Ripp, "I'll be right back – I have to answer the phone." So, I went in the house, but whomever it was had hung up by then. So, I went back outside to resume my session with Ripp. But he was gone. Nowhere to be seen. I was only gone about 45 seconds between the time I excused myself from Ripp, went to the phone, and then came back to the front porch, where Ripp and I had been staring at each other, eyes-to-eyes and nose-to-nose. I called him, but no Ripp. I went around the house, looking under bushes and shrubs. I walked up and down the block, looking in the yards of all the houses in the neighborhood. But no Ripp. I went door-to-door, asking if neighbors had seen him. Nobody had. Given that this whole escapade had taken almost literally seconds, and given how "drowsy" Ripp had been as we stared at each other at such a close distance, I was certain he hadn't just bolted away while I was answering the phone. There were no thieves who were waiting for me to leave so they could snatch him. I swear, it was as if he had just disappeared. In fact, he HAD just disappeared – really disappeared. And I never saw him again, although I kept looking for a few weeks.

Unusual Premonitions of Death

Several of the previous case reports indicated that the moribund animals knew that their lives were about to end. These premonitions are quite remarkable, given that even the minds of higher mammals such as dogs and cats are often thought to be not developed enough to be able to form a concept of dying and their own death. Nevertheless, the animals in the presented examples had been very old and/or ill already and might have felt their powers fading. They also might have reacted in response to altered physiological processes and left their "pack" out of a biological instinct. It is, therefore, even more intriguing that we also received reports that concerned comparatively healthy animals that nevertheless displayed premonitions of their impending threat to their lives, such as the following two cases.

It happened during the Second World War in Houffalize, Belgium, probably in 1944. An old man who owned sheep had died. He had no family. My grandfather decided to lead the sheep into his garden and into a kind of veranda or greenhouse near the main building. The sheep didn't have a problem with living in this new environment for a few days. But one evening, they all began to bleat very loudly all night through. The eight children who lived in the house (including my mother) didn't understand what was happening and considered the sheep's behavior very curious. It was difficult, if not impossible, to sleep. Early in the morning, a bomb hit the greenhouse and killed all sheep. My mother told me this story. It was impossible for her to forget it. [Authors' note: The little town Houffalize suffered from an intense bombardment in December 1944.]

In the summer of 1997, my daughter was working on a grant under Dr. [...] at a university in California. Part of her duties was to retrieve the cage with the lab rats. They were part of a cancer research program and, as such, had been injected with live cancer tumors and then different medicines to study the results. Each of the rats was color dotted to determine how long they had been on the medications. And, every so often, the rats would be "sacrificed" so the cancer and the organs could be studied. My daughter, not really sympathetic to lab rats, became concerned when

she noticed a regular phenomenon. On the day the rats were to be sacrificed, unlike days when they were being weighed and measured, the rats would all gather in a corner, heads facing the center of a circle, and they would be squeaking and showing signs of alarm. As my daughter said to me, "Mom, they know. Somehow, they know."

Somatic Surprises

Sometimes, the last rally or terminal vitality goes hand in hand with physical improvements or movements that seemed inconceivable before because of the animals' handicap or injury. Below we present two examples.

I have a story about a cat that I found on the road with a broken neck and brought home to die. It was with me three days and never moved, just panted. Just before it died, it got up, stretched, meowed very loud, purred into my hand, and then lay down dead.

I want to share an experience with our 16-year-old dog Lucy. Lucy's hips were giving up, and she dragged her right leg to walk. We made arrangements for a home visit to end her pain. We had a carpet laid out in the backyard for what turned into a beautiful ceremony. After the doctor arrived, Lucy immediately walked outside with no limping to the carpet and lay down.

Terminal Lucidity in Animals

The mental pendant to somatic surprises is terminal lucidity, the already mentioned unexpected improvement of mental alertness or faculties shortly before death in creatures that have previously been in a drowsy, confused, or even unconscious state. Naturally, somatic surprises and terminal lucidity can occur concomitantly, as in the following example. It concerns the aftermath of a sudden accident involving a bird that seemingly turned unconscious and motionless after the accident. Although the bird's final malaise was only of comparably short duration, this case can still be counted as an instance of terminal lucidity.

One day a bird crashed into the cabin I live in, and I ran outside to see about it. As I picked up this bird, a large thrush, it just lay still in my hands, its eyes closed, and I assumed it had broken its neck and was dying. I began to say a small prayer for its soul and put my thumb on its heart as its beat got slower and slower. And then, just as the heart was about to stop, this bird, with a broken neck, managed to turn its head and open its eyes and look right into mine for a few moments. Then it closed its eyes again, turned its head to the side, and was dead. Was it making contact with life for one more moment? This has long haunted me.

Because the communication of animals is more difficult to decipher than that of other human beings, it is hard to determine whether an animal is confused or demented, and thus, if a last goodbye or rally before death also implied an instance of terminal lucidity. Nevertheless, we received a number of case reports according to which the mental state of the moribund animals was clearly impaired before they seemed to brighten up for a very last time and provided them with the opportunity to bid farewell.

My pet was a six-year-old Chihuahua that developed a brain tumor. He was basically out of it, did not respond to my wife or me, and was having occasional convulsions. The night before, he was to be put down at the vet for a brief time, about 30 minutes, and he was completely normal. He jumped up in my lap, wanted to play like everything was normal, then went to my wife and did the same thing. All of this happened in about a 30-minute time frame, and then he went back into "out of it and convulsing." We told the vet about this, and he said he had never heard of this before and that the dog would not recover. Anyway, that did happen, and my wife and I believe he was saying goodbye.

My cat Cleo was dying, and I was sitting with her. She was nearly comatose, not moving, her eyes glazed over unseeing. Her legs were very cold. This state had been progressing upon her for days, and because of the coldness of her legs, I felt she might be very close. But I was just sitting there, mostly, not even really petting her. Suddenly she woke up. She put her paw upon my hand and gazed into my eyes with intensity. She was saying goodbye to me. That was perfectly clear. Within an hour, she had passed.

We had a dog, a Yorkshire Terrier, greatly loved, especially by my sister. She had digestion issues, which meant that she was put on a restricted diet, and as she aged, she lost a lot of weight. My sister would carefully carry her from

the house to a nearby field every day when she became unable to walk the distance herself, allowing her to take whatever bit of walking she could manage and bring her back. Her last couple of days, though, she could hardly move, and we knew she wouldn't last long. Her last night, she went into a totally inert state, with her breathing altered, her mouth in an unusual shape, totally limp, and seemingly unaware of us or anything else around her. She really couldn't move at all at this stage. My sister was very upset and had been holding her for some time when all of a sudden, the dog raised her whole body and head as if nothing was wrong, looked straight into my sister's face for a few moments, then dropped her head and died. I don't know if this explains it all well, but what I'm trying to convey was that she went from a dying state that had really lasted all day, then into a couple of hours where there hardly seemed to be a sliver of life in her, and then this was all entirely lifted for those few moments when she raised herself up from this state and seemed to say goodbye or take her leave of my sister.

My husband and I had a 17-year-old Basset hound girl who was terminally ill. Her health was deteriorating each day, and we knew her time was near. She had stopped eating and moving about except to go to the door each morning and sit, waiting to go on our morning walk, but could not move beyond the door when we'd open it with her leash in hand. So, we'd all stay inside with her. One morning before Lee (my husband, a philosophy professor) was preparing to leave to teach, she came and laid in a sphinx position between my husband, who was standing in the hall near the door, and I, who was sitting. It was unusual for her to so determinedly sit in a way that drew our attention without seemingly requesting it. We both looked at her, wondering what was up. We noticed then that her breathing seemed a bit labored, so together, we decided we should not go into work but stay with her. We carried her to her doggie bed, which on that day we'd taken upstairs so we could keep her close between where we sat and watched and talked to her. It became clear that she was on her way out because of the odor being emitted with each of her increasingly rapid breaths. It became so strong that I had to get up and move downstairs for a break. I was gone for about ten minutes when I heard Lee call down, "there she goes." I hurried up to find her no longer in her sphinx position but lying on her side. There was no sign of life. She had no pulse, and by the look of her unmoving chest, was no longer breathing. Her eyes were closed, and I watched for a few moments, and then again, to confirm she wasn't breathing, I put my hand near her nostrils. From the time Lee had called up until the time I put my hand in front of her nose, about two and a half minutes had elapsed. Immediately she bolted up into her sphinx position, looked me in the eyes for a few seconds, and then fell back on her side. She was gone (again?). In spite of my deep sadness, I felt exhilarated that she'd "come back" to say goodbye as I'd so wanted to be with her when she passed ... and so I was.

Near Death Visions in Animals?

Among ELEs known from human beings, near-death visions are a prominent feature. In these experiences, sick people report glimpses into what appears to them as a transcendental afterlife realm. Frequently, they perceive apparitions of deceased loved ones or spiritual figures who come to prepare them for their transition (Claxton-Oldfield & Dunnett, 2018; Depner et al., 2020). In the vast majority of cases, these experiences are regarded as very comforting and soothing. Sometimes, near-death visions go hand in hand with terminal lucidity and a transiently improved physical strength. It is intriguing that judging from their behavior, also some of the moribund animals in our reports might have experienced a similar vision. This is particularly evident in the first example.

Our dog Snowy died on 30 June 2004. She was in a coma for several hours: Initially, her level of consciousness fluctuated somewhat, and she was calmed. Then she fell into a deep coma in which she was unresponsive to sound stimuli, from about noon that day until her eventual death at 11:45 p.m. At about 6 p.m., she was more clearly very weak and had altered consciousness. She did not respond to tactile stimuli, which were not painful (we did not perform painful stimuli for humane reasons). At about 7 p.m., Snowy suddenly sat upright, looked as if she was looking at an object very, very intensely, and followed that object with her eyes, her head moved slightly from side to side. If a dog could smile, she would smile. You could see a certain happiness radiating from her. She started wag-

ging her tail for a few seconds, then collapsed and fell back into a coma. All four members of my family witnessed this. My wife, myself, and two teenagers (my daughter and my son), although I and my daughter were particularly aware of this. We both independently and immediately noticed that it was a very strange thing happening. We spoke almost simultaneously, recording our amazement. I interpreted this as a possible near-death vision.[1]

In the following two cases, the animals' keepers were convinced that their pets were perceiving something only they could see, but they were less evidential.

I do have an experience that struck me as noteworthy, involving our elderly family dog, Prince Moonshadow, who seemed to achieve something akin to a state of joyful enlightenment in the weeks after he'd had a series of mini-strokes, and before he died. He smiled continuously every moment he was awake for the last weeks of his life – about the last couple of months. He'd been having mini strokes prior to that. I felt when looking at him, resting and smiling in the garden, that he was seeing heaven. And when I said the same thing, I'd said to him every day for 14 years, "I'll love you forever," in those weeks, he consistently would do something very different than he'd ever done before. He met my gaze with a look that showed he knew that I meant it – and that he was experiencing this as if he was partway there. He was extremely lucid, even though he'd had many strokes.

A very close friend of mine's beloved cat Teddy Boo died a month ago. He was 16 years and eight months old, and his kidneys and other organs had been failing beyond repair. The day came when he stopped eating, and we knew the end was near, so we made an appointment for euthanasia for a couple of days later. The night before, he was in a very weakened state and found it difficult just to stand or make it across the room. He also had stopped drinking water a day before. I spent a good eight hours with him that afternoon/evening, just he and I (I was at my friend's place). He seemed to be going in and out of consciousness but didn't show overt signs of pain. His favorite spot had become the bathtub, where we had put lots of soft blankets and makeshift steps so he could get up into it. He was so weak I had to place him in it this time — I could see he wanted to get in. Anyway, I was just in the other room, sitting at a desk working on my computer, and the inside of the bathroom was in eyeshot. Every 15 minutes or so, I would check in with him and talk to him in a sweet voice. At one point, when I checked in, he opened his eyes and partially sat up and looked at me with an astounding look that I had never seen from him before. The best I can describe it is a beatific, blissful smile of sweet ecstasy. He did not look at me with recognition, which was strange and hard to describe. I didn't sense that he specifically recognized me in that look, but rather that he was coming back into our world from some other dimension and staring up at what he saw as some kind of angelic energy field or something. It was a very beautiful experience for me. This state of being and this "look" he was giving lasted a couple of hours. I left a couple of minutes before my close friend returned home. We happened to be on the phone while she was entering her apartment to see Teddy. I didn't mention anything about the look he gave me. And while I was on the phone, I could hear her say, "Wow! What is this amazing look he's giving me???!" I could hear it in the tone of her voice that she experienced it just exactly as I had experienced it, and just like me, she knew how unusual this was. He had never been like this before. We spoke more about it afterwards, and we shared the same feelings about it and experience of it. It really felt like a blessing to me. And it made me ponder just exactly what the dying process is to someone or to some animal going through it. I would have loved to have been in his head for just a few minutes while he was in that beatific state of consciousness.

DISCUSSION

The case reports presented above constitute the first collection of ELEs in non-human animals. For those familiar with ELEs in human beings, it is intriguing that these ELEs in animals show many parallels to those reported by humans. This concerns especially the *last rally before death* and the additional characteristics that we classified into *last goodbyes*, *somatic surprises*, *terminal lucidity*, and potential *near-death visions*. The literature on ELEs in humans describes numerous aspects of this last rally. One of them is an increased desire and renewed ability to eat (Klein et al., 2018; Schreiber & Bennett, 2014). In our

collection, we find indications of this behavior in the cat Balou, the Golden Retriever Zoey, the Labrador Shadow, and the goat that "gorged" himself before dying. Likewise, it has been observed on a regular base that the last rally provides an opportunity to express final goodbyes or obtain closure with family members (Callanan & Kelley, 1992; Schreiber & Bennett, 2014). In this context, waiting until absent loved ones arrive at the deathbed before dying, as in the case of the dog Coyote that seemingly waited for two sons of the couple who kept him before he let go and died, is also reported from humans (Callanan & Kelley, 1992; Claxton-Oldfield & Richard, 2020).

The literature on human ELEs furthermore contains examples of somatic surprises. For example, a man born deaf-mute was said to have uttered his first intelligible words during his last hours (Schubert, 1808); a man suffering from high fever and grave articular rheumatism lost his fever and rheumatism after having had a near-death vision, ate a copious meal and died on the same evening (Geley, 1927); a woman in a nursing home with severe spinal fusion which was able to only look down to the floor for several years noticed one day with surprise that she was able to look out of her room window for the first time – and died soon after (Brayne et al., 2008). In another case, a man dying from lymphatic cancer, who had been unable to move his arm for over a year, moved his arm while he experienced a near-death vision (Fenwick & Fenwick, 2008; for other examples, see Nahm, 2012).

Similarly, the already mentioned unexpected surge of mental clarity shortly before dying – terminal lucidity – has been reported for centuries and across cultures (Claxton-Oldfield & Dunnett, 2018; Lim et al., 2020; Nahm, 2012; Nahm et al., 2012; Nahm & Greyson, 2009). Because terminal lucidity frequently goes hand in hand with near-death visions in humans, it is not too surprising that some pet owners held the opinion that their moribund animals experienced something similar. However, while last goodbyes, last visits, last rallies, somatic surprises, and terminal lucidity are accessible to external observation and can be documented, it will always remain difficult to gain insight into the mental state of animals that seem to experience near-death visions. It is nevertheless noteworthy that other ELEs known from human life, such as crisis telepathy and crisis apparitions, and even after-death communications, appear to be paralleled in the life of pets as well. Unfortunately, however, systematic research in the latter field is practically absent, even though respective experiences do not seem to be uncommon. Although there are several recent popular books on such occurrences, the case collections published by Italian parapsychologist Ernesto Bozzano (1905, 1950) still contain some of the best-documented examples.

Regarding the category of *unusual premonitions of death* or of grave danger, the literature on psychical research contains numerous examples already, both in people and in animals. Regarding animals, for example, members of various vertebrate and invertebrate species have been reported to anticipate natural catastrophes such as earthquakes, volcano eruptions, and tsunamis (Gaddis & Gaddis, 1970; Pleimes, 1971b; Schrödter, 1960; Schul, 1977; Sheldrake, 2005, 2011). Moreover, just as in our example of the sheep that had been killed in an air raid in Houffalize during the Second World War, several people have reported already that animals displayed very unusual behavior during war times. This behavior was often – and apparently correctly – interpreted as a premonition and warning of immediate danger. In Freiburg in Germany, for example, the conspicuous and alarming behavior of a duck warned many people who lived in its surroundings that an unexpected air raid was about to strike their quarter in November 1944. Many inhabitants were able to save their lives, but the duck was killed by the bombs. In 1953, the township erected a memorial for the bird in a public park (Schrödter, 1960; for more examples, see Sheldrake, 2011). In fact, the extraordinary behavior of animals that indicated the anticipation of danger while people did not notice anything unusual, and also their sometimes frightened behavior in contexts of hauntings, has made many people speculate about the possibility that animals possess psychic abilities that surpass those of humans in our modern reason-dominated Western civilizations (e.g., Bozzano, 1905; Gaddis & Gaddis, 1970; Mattiesen, 1936-1939; see also Nahm, 2007, 2016; Sheldrake, 2011).

The examples of our animal categories *last visits* and *retreating into solitude* appear to be absent in the literature on the death and dying of the Western world. At least, we are not aware of reports about sick people who suddenly and unexpectedly showed up at the homes of friends and relatives for a last visit to say goodbye, and died shortly after. However, this lack of such case reports in humans might be culturally determined. In our present Western culture, sick or decrepit people usually stay at home, in nursing homes, or in hospices and are visited by their kin rather than the other way around. Means for arranging visits to sick people are often readily available, and conversations including last goodbyes can also be held via telephone. In addition, family members often live too far apart from each other to enable the old and sick to visit them unexpectedly. Therefore, it is neither necessary nor possible to pay unexpected last visits to loved ones in contemporary Western life. Nevertheless, cases of crisis telepathy and crisis apparitions from dying people often fulfill the role of conveying a last farewell to somebody at

a distance (Gurney et al. 1886; Fenwick & Fenwick, 2008; Shared Crossing Research Initiative, 2022).

As with *last visits*, *retreating into solitude* is hardly possible for terminally ill humans. It would be very difficult and often impossible for such a person to suddenly leave their home in order to walk away and find a lonely place where they can lie down and die. The notion that the circumstances of death in the modern Western world provide reasons for the apparent lack of typical accounts of *last visits* and *retreating into solitude* in this culture is supported by a report about how an old Australian Aboriginal died:

> One morning, the man, who worked in a tannery, came to work and went to all his workmates, shook hands with them, said he was glad to have worked with them, and expressed his hope that he wouldn't be forgotten. Because he had never behaved in this manner before, his colleagues didn't know what to make of this. However, he was found dead later that evening, seated alone at an old church of the mission. It seemed as if he knew that his time was over (Rose, 1968).

The anticipation of dying at a given time has also been reported in Western patients (Callanan & Kelley, 1992; Klein et al., 2018), but premonitions of death in the absence of physical threats such as natural catastrophes might not only be due to passively received impressions. It is known from tribal societies, including Australian Aboriginal people, that they seem able to induce their own death, e.g., when they think they have been influenced by sorcery or voodoo practices (Kelly, 2007; Rose, 1968). Severe psychologically driven effects on one's body that may even lead to death have also been reported from the West (Kelly, 2007; Nahm, 2012; Reeves et al., 2007). Thus, an active component of psychophysiological influence on the body could also play a role when people and animals seem to anticipate their own death, including *retreating into solitude*.

This behavior might, furthermore, have a parallel in humans in that moribund patients sometimes seem to wait until they are alone, if only for a moment, and then die in this brief time span (Callanan & Kelley, 1992) – as also highlighted by our correspondent who reported the case of Anton, the dying cat. In the animal kingdom, the final retreat to a lonely place could represent a biologically driven instinct in order not to contaminate the kin's favorite dwelling place with a rotting corpse or not to hinder their wandering and hunting activities. Among wild animals, such behavior might even be more pronounced and pertain to sick and injured individuals as well because undisturbed resting in solitude can have beneficial effects on healing processes. William Long, an experienced naturalist, observed that "every stricken bird or beast seeks instinctively to be alone and quiet while his hurt is healing" (Long, 2005, p. 88/1919).

Our case collection is, as far as we know, the first of its kind and is necessarily limited in its scope. Most reports were received in response to a privately initiated call that was chiefly addressed to English-speaking people. We also made no attempt to verify the contents of these self-selected reports through interviews with different witnesses. Still, we consider the data obtained in our survey sufficiently robust to draw the conclusion that ELEs reported from animals are remarkably similar to those reported from human beings. The close similarity between animal and human ELEs might be a sign of a common physiology underpinning such experiences. In fact, there is increasing evidence supporting the notion that on a general level, the mental life of non-human animals, such as higher vertebrates and cephalopods is similar to that of humans. This is evidenced by similarities in cognition, play, and problem-solving, including the use of tools and emotional behavior that involves the secretion of the same types of neurotransmitters and hormones known to correlate with specific emotions in humans (for an overview of these topics, see Brensing, 2018).

Hence, just as the interest in studying ELEs, including terminal lucidity in humans, is currently increasing, we believe that further studies into ELEs in animals could elucidate facets of their lives that have so far received only little attention among scientists. At the very least, it would help to understand facets of the dying process in animals, and especially pets, better, the loss of which can be felt with similar or even greater grief than the loss of human family members (Kowalski, 2012). We would like to encourage further research in this field. It seems certain that performing systematic and large-scale studies in different languages will elicit many more reports about unusual occurrences regarding animals during their last phase of life. They might even include characteristic groups of cases not yet covered in our preliminary classification. Apart from addressing pet owners and animal keepers of various kinds, including pet-loss groups in social media, possible research strategies could include asking vets how often people called them for euthanasia and then said their pet has rallied or displayed other ELEs, or how often the vets have observed animal ELEs themselves. Likewise, people who look after sick and dying animals in sanctuaries may well have much relevant experience that they could share. Similarly, one could ask rat room technicians whether they have noticed rats or other animals behaving differently soon before they are

to be "sacrificed" or ask farmers if they have observed any difference in the behavior of farm animals before they are due to be slaughtered. Ideally, the sketched possibilities for further lines of investigation would entail a prospective study design. One might also conduct systematic studies into animal after-death communications and even suspected cases of animal reincarnation. We are convinced that there is still a lot we can learn from our animal companions.

IMPLICATIONS AND APPLICATIONS

Because our study is the first of its kind and is limited in scope, we recommend further research in this field. We are confident that such studies would elicit many other reports about remarkable behavioral feats of animals during their last phase of life, thereby elucidating facets of their lives that have so far received only little attention but help to understand the dying process in animals better. The conspicuous similarity of end-of-life experiences in human beings and non-human animals could also increase the recognition that animals share an inner life similar to that of humans, which could lead to a more respectful treatment of animals. In the Supplementary Materials, we make all the case studies in our collection available for anyone who would like to study further examples.

AUTHOR CONTRIBUTIONS

Rupert Sheldrake: Conceptualization, Methodology, Investigation, Writing – Reviewing and Editing. ORCID: 0000-0001-8814-4014 **Pam Smart**: Data curation, Formal analyses. **Michael Nahm**: Writing – Original Draft, Methodology, Investigation. ORCID: 0000-0003-1930-9692.

NOTES

[1] This case was reported by Vernon Neppe on the website of the Near-Death Experiences Research Foundation; https://www.nderf.org/French/snowy_nele.htm.

Supplementary materials associated with this article can be found at: https://www.sheldrake.org/research/end-of-life-experiences

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BRIEF REPORT

Approximating the Effect of Consciousness on Stochastic Brain Structures

Benjamin T. Hendel
bthendel@gmail.com
Independent Researcher

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HIGHLIGHTS

A testable new idea proposes a causal connection between the randomness of physical systems and the decision-making dynamics of the human brain.

ABSTRACT

There is a large amount of evidence in the Parapsychology literature that indicates that consciousness is not an emergent property of neuronal interactions and can exist and function independently of a brain. Here we examine mathematical methods that can be used to derive dynamic equations for the mind-matter interactions occurring in the brain that these observations imply the existence of. We use the moments method to approximate the effect that consciousness has on stochastic binary decision-making neural networks , which we model using biologically realistic Wilson-Cowan equations (Deco et al., 2007). We show that small changes in the variance of the randomness (on the order of 0.1 Hz^2) consumed by the neural networks can bias the networks to select one binary decision value over the other. Using observations about the interconnectedness of relatively isolated groups of neurons, we argue that biases of the size predicted by the approximation would be sufficient to allow a brain-independent consciousness to exert significant control over the brain. The results that we present here are relevant to any theory positing that rote computations carried out by neurons are not the sole contributor to consciousness.

KEYWORDS

Consciousness, survival, parapsychology, moments method, Wilson-Cowan equations.

INTRODUCTION

Over the past century, Parapsychology has amassed an extensive collection of anomalous observations that, when viewed together, suggest that human consciousness can exist and function independently of the brain (Kelly et al., 2007). Cases of veridical near-death experiences (NDEs) suggest that under some circumstances, clinical patients experiencing extreme physiological stress (oftentimes as a result of cardiac arrest) can accurately perceive remote locations in detail– a feat that they would be unable to accomplish if they were fully conscious and not in the throes of a serious medical emergency (Kelly et al., 2007, Chapter 6). Cases of young children claiming to remember details of "previous lives," who bear birthmarks in the shape of fatal injuries they claim to have sustained in previous lives, whose detailed stories can be matched to the life stories and autopsy information of deceased people suggest that in some circumstances consciousness can reincarnate after bodily death (Tucker, 2008). While research into anomalous experiences and happenings of this sort does little to shed light on what consciousness

is directly, it makes a compelling case for what consciousness *is not*. If consciousness can exist without a brain, then it is not, as contemporary neuroscience posits, an emergent property of neuronal interactions. This would imply the existence of mind-matter interactions taking place inside the human brain. Easily observable neuronal processes drive conscious behavior requiring physical movement in humans and brain-equipped animals. For a brain-independent consciousness to exert control over the actions of its body, it must be able to influence these neuronal processes in some way.

Generally, individual neurons behave deterministically following the Hodgkin-Huxley model, so there is no room for a brain-independent consciousness to influence the activity of these cells significantly. However, *in vivo* observations of layer five pyramidal cells in awake cats have shown that some pyramidal cells deviate from Hodgkin-Huxley behavior (Naundorf et al., 2006). These neurons have an unusually wide firing threshold window, resulting in large temporal variability in spike times (Hameroff & Penrose, 2014). Empirical evidence suggests that the physical structures underpinning many brain functions associated with consciousness, such as decision-making, attention, and some types of memory recollection, need to consume random noise to function properly (Deco et al., 2009). A significant portion of this noise comes from the probabilistic spiking of pyramidal cells (Rolls & Deco, 2012, pp. 78-80). If consciousness is independent of the brain, it must *a priori* exert influence on the brain by influencing the random noise that it consumes. This suggests that certain pyramidal cells may contain some mechanism that consciousness can influence. Some have speculated that layer five pyramidal cells contain what are essentially small quantum random noise generators made of microtubules (Hameroff & Penrose, 2014). It may be the case that these structures are sensitive to micro-PK effects, as there is evidence that a combination of conscious attention and intention can influence the behavior of random systems, not limited to just those of a quantum nature (Kauffman & Radin, 2021).

Of the brain structures thought to require the consumption of random noise to function, perhaps the best understood are those that make binary decisions (Deco et al., 2007). In this paper, we will approximate how sensitive the behavior of stochastic binary decision-making neural networks is to small changes in the underlying randomness that they consume. We will show that small changes in the variance of the randomness consumed (on the order of 0.1 Hz^2) by the networks bias the networks to select one choice over the other. Our analysis will use the moment method, and we will derive an analytical approximation for the size of the decision bias. We will then discuss how biases of the kind and size shown to exist when applied to all stochastic brain processes could feasibly allow a brain-independent consciousness to exert substantial control over its associated body. The methods presented here can be used to perform similar analyses on other brain structures that exhibit stochastic behavior. The results that we present here are relevant to any theory positing that consciousness is not the sole product of rote computations carried out by neurons.

STOCHASTIC WILSON-COWAN MODEL OF BINARY DECISION MAKING ATTRACTOR NETWORKS

The Basic Stochastic Wilson-Cowan Model

Empirical data collected from animal experiments have shown that binary decision-making attractor networks are composed of two competing populations of excitatory and inhibitory neurons whose interaction is mediated by inhibition (Deco & Martí, 2007). The brain uses each of the two populations to represent one of two possible binary decisions. In general, after interacting for some time, one population ends up with a firing rate significantly higher than the other, signifying that its associated decision value has been reached. As the populations interact, sensory input fed to each population biases the attractor network to favor one decision over the other if significant evidence for one decision exists. In cases where there is no evidence supporting either of the binary decisions, random noise alone is responsible for causing the system to favor one decision over the other (Deco et al., 2007). Neurons in the same population are connected to each other with excitatory connections of dimensionless weight w_+. The two populations are connected with inhibitory connections of dimensionless weight w_I. The time evolution of the firing rates of the two groups of neurons, $v_i(t)$ where i = 1,2, is driven by competing inhibitory and excitatory interactions—a sort of "push and pull".

This interaction can be accurately modeled using a system of stochastic first-order Wilson-Cowan differential equations (Deco et al., 2007). We will consider Gustavo Deco's 2007 model:

$$\tau \frac{dv_i(t)}{dt} = -v_i(t) + \phi\left(\lambda_i + \sum_{j=1}^{2} w_{ij} v_j(t)\right) + \sqrt{\tau}\xi_i(t), i = 1,2 \qquad (1)$$

where w_{ij} is the (dimensionless) total synaptic strength between populations i and j, λ_i is the external sensory input received by population i measured in Hertz, τ is a time constant describing the rate at which the system responds to sensory input change measured in milliseconds

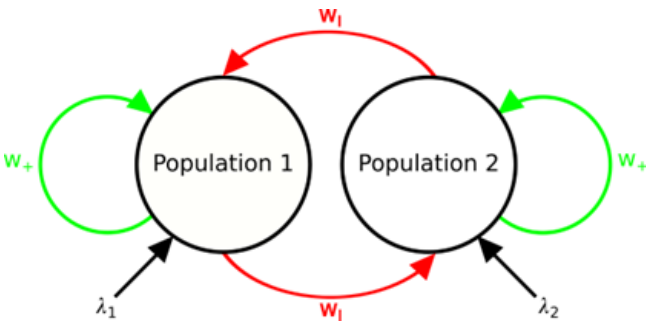

Figure 1. Two populations of neurons, each corresponding to one of two binary decision outcomes, interact with inhibitory connections between populations (red) and excitatory connections within populations (green). The inhibitory connections between the two populations have dimensionless weight w_I, and the excitatory connections among neurons in the same population have dimensionless weight w_+.

$$\phi(x) = \frac{v_c}{1 + exp(-\alpha[x/v_c - 1])}$$

,and φ(x) is the sigmoidal activation function (Deco & Martí, 2007). Here v_c is both the maximal activity rate of the two populations and the input frequency needed to cause each population to assume one-half of its maximal activity rate, and α is a constant. Random fluctuations in the attractor network are modeled by independent additive Gaussian noise terms $\xi_i(t)$ measured in Hertz satisfying $< \xi_i(t) > = 0$ and $< \xi_i(t)\xi_j(s) >= \beta^2\delta(t - s)\delta_{ij}$ where the angle brackets denote expected value β and is the variance of $\xi_i(t)$.

The Phase Plane of the Non-Stochastc Wilson-Cowan Model

Figure 2 depicts the phase plane of what we will refer to as the non-stochastic version of Equation (1), which we will formally define as the case where β = 0 . The case where β = 0 need not be viewed as a stochastic differential equation, as if the variance of $\xi_i(t)$ is zero then the noise term in Equation (1) vanishes because $< \xi_i(t) > = 0$. The time evolution of the system initialized at two initial states $v_1 = 1.25$, $v_2 = 1$ and $v_1 = 1$, $v_2 = 1.25$ is shown as blue lines. The three fixed points of the system are displayed as red dots. The phase plane contains two basins of attraction separated by the line $v_1=v_2$, which have been labeled P_1 and P_2. For initial states in P_1, where $v_1 > v_2$ (or equivalently $v^{def} = (v_1, v_2) \in P_1$, the system eventually falls into the fixed point in P_1, which we will refer to as F_1. For initial states in P_2, where $v_2 > v_1$, the system eventually falls into the fixed point in P_2, which we will refer to as F_2. We will refer to the fixed point on $v_1=v_2$ as F_0. In the non-stochastic version of Equation (1), the side of the $v_1=v_2$ line that the system's initial state resides on completely determines its final state. This observation will later play a crucial role in deriving the approximation of the behavior of Equation (1) in our moment method analysis. F_1 and F_2 correspond to "decision states" that are assumed by the attractor network to represent that one of two possible decisions has been made (Deco & Martí, 2007). F_0 corresponds to the "spontaneous state", which is assumed by the attractor network to represent that a decision has not yet been made. In the presence of noise, the attractor network will tend to settle near one fixed point, each of which carries meaning in the context of the binary decision being made. For all numerical simulations in this paper we will let $w_{11} = w_{22} = w_+ - w_I$ and $w_{12} = w_{21} = w_- - w_I$ where $w_+ = 2.45$,$w_I = 1.9$, $w_- = 0.43(w_+ - 1)$, and $v_c = 20$ Hz, α = 4, τ = 10 ms, and $\lambda_1 = \lambda_2 = 15$ Hz . These parameters were motivated by the model in Deco's paper and chosen so that F_1 and F_2 are stable.

Applying the Moments Method to the Stochastic Wilson-Cowan Model

The behavior of Equation (1) is fundamentally probabilistic. Its behavior can be studied via repeated numerical simulations, but these are resource-intensive and do

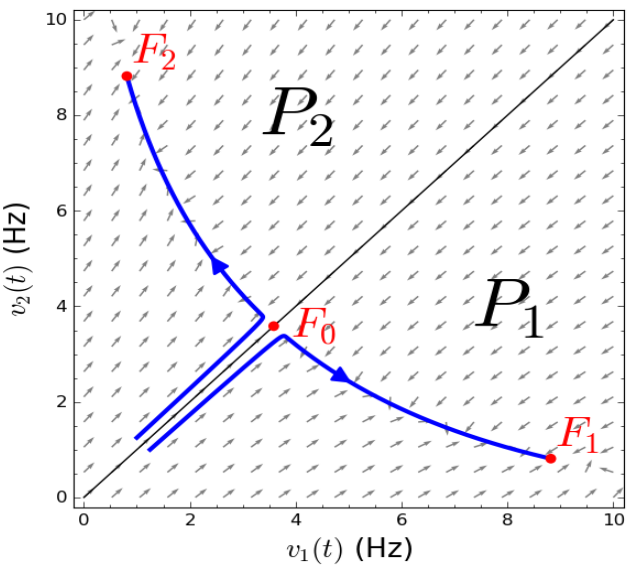

Figure 2. The phase plane of the non-stochastic version of Equation (1). The time evolution of the system is shown in blue for two example starting points: (1.25, 1) and (1, 1.25). The three fixed points of the system are shown as red dots. The arrows show the normalized direction field. Regions to either side of the $v_1=v_2$ line are labeled as P_1 and P_2.

not directly yield results that can be used to describe the dynamics of the neural network analytically. It is possible to compute the first and second moments of the random variable $v_i(t)$ at time t using the moments method (see Figure 3 below) where $\mu_i(t)$ is the statistical mean of $v_i(t)$ at time t for i=1,2, γ_{ij} are elements of the covariance matrix, and $\mu_i = \lambda_i + \sum^2_{j=1} w_{ij}\mu_j(t)$ (Deco & Martí, 2007). These calculations assume that the bivariate distribution of the vector $\mathbf{v}(t)$ is Gaussian, and this fact will limit the predictive power of the analysis that we will perform in section 2. Notice that the variance β of $\xi_i(t)$ shows up in Equations (2) through (6). While the time evolution of the means of random variables v_1 and v_2 is not affected by β, the time evolution of the variance of the random variables is.

An Analytical Approximation of Binary Decision Bias Under Varied Variance

In the non-stochastic version of Equation (1), as we have seen, the attractor network's initial state determines if it will end up at F_1 or F_2 as time progresses. Initial states in P_1 will cause the system to end up at F_1, and initial states in P_2 will cause the system to end up at F_2. As soon as noise is introduced to Equation (1), this changes.

As the variance of $\xi_i(t)$ increases, the state of the attractor network gets more "jittery" as it evolves in time and moves about the phase plane. The more "jittery" the state vector becomes, the more likely it is to jump from one side to the other of the v_1=v_2 line and thus switch basins of attraction in some fixed time interval. This can be observed via numerical simulation.

Figure 4 depicts a histogram[1] of the component of the result of one thousand simulations of Equation (1) for each of β = 0.1 and β = 0.6 for 2000ms starting at the point F_0+(-½, ½). The simulations were done using the Euler–Maruyama method with a step size of 0.01ms and the variable values given in section 1. Table 1 summarizes the results of seven batches of one thousand simulations conducted in the same way. The v_1 value of F_2, denoted $F_2^{(v_1)}$, along with the v_1 values of F_1, F_0, and the starting point F_0+(-½, ½) are shown on the histogram as vertical lines. Over two seconds of simulated time, the neural network tends to settle down near either F_1 or F_2, corresponding to each of the two possible binary decision states. It can be seen that varying the variance of the randomness consumed by the binary decision-making neural network biases its decisions and that the size of the bias increases as the variance increases.

We will construct an analytical approximation of binary decision bias under varied variance motivated by these observations and justify the approximation using previous observations about the geometry of the phase plane of the non-stochastic version of Equation (1). Equations (2) through (6) completely define the bivariate normal joint density of v_1 and v_2 at time t, which we will denote as $N(\boldsymbol{\mu}(t),\boldsymbol{\gamma}(t))$ where $\boldsymbol{\mu}(t)$ is the mean vector and $\boldsymbol{\gamma}(t)$ is the covariance matrix. It follows that:

$$P(\boldsymbol{v} \in P_i, t = t_f) \approx \int_{P_i} N\left(\boldsymbol{\mu}(t_f), \boldsymbol{\gamma}(t_f)\right) dA \stackrel{\text{def}}{=} P_{approx}(\boldsymbol{v} \in P_i, t = t_f) \quad (7)$$

holds when the final time t_f is small enough that the distribution of final states is approximately normal. Here we introduce the notation $P_{approx}(\mathbf{v} \in P_i, t = t_f)$ which is used

$$\tau \frac{d\mu_1(t)}{dt} = -\mu_1(t) + \phi(u_1) + \frac{1}{2}\phi''(u_1)\sum_{j=1}^{2}\sum_{k=1}^{2} w_{1j}w_{1k}\gamma_{jk}(t) \quad (2)$$

$$\tau \frac{d\mu_2(t)}{dt} = -\mu_2(t) + \phi(u_2) + \frac{1}{2}\phi''(u_2)\sum_{j=1}^{2}\sum_{k=1}^{2} w_{2j}w_{2k}\gamma_{jk}(t) \quad (3)$$

$$\tau \frac{d\gamma_{11}(t)}{dt} = -2\gamma_{11}(t) + \sum_{l=1}^{2}[w_{1l}\gamma_{1l}(t)\phi'(u_1) + w_{1l}\gamma_{1l}(t)\phi'(u_1)] + \beta^2 \quad (4)$$

$$\tau \frac{d\gamma_{22}(t)}{dt} = -2\gamma_{22}(t) + \sum_{l=1}^{2}[w_{2l}\gamma_{2l}(t)\phi'(u_2) + w_{2l}\gamma_{2l}(t)\phi'(u_2)] + \beta^2 \quad (5)$$

$$\tau \frac{d\gamma_{12}(t)}{dt} = -2\gamma_{12}(t) + \sum_{l=1}^{2}[w_{2l}\gamma_{1l}(t)\phi'(u_2) + w_{1l}\gamma_{2l}(t)\phi'(u_1)] \quad (6)$$

Figure.3 Formulas (2) through (6).

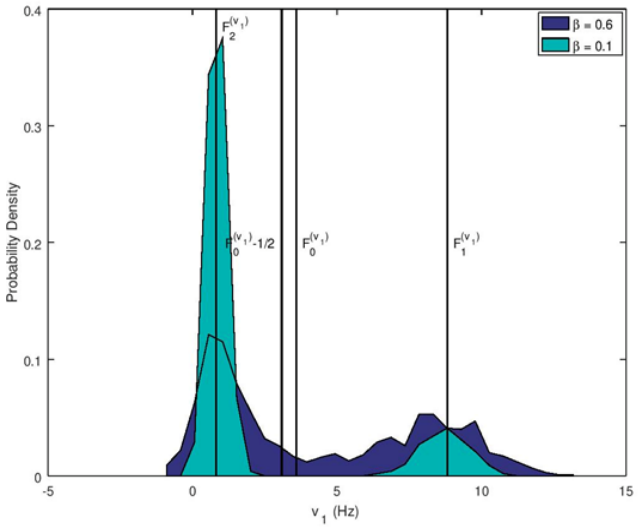

Figure 4 . A histogram of the v_1 component of the result of one thousand simulations of equation (1) for two variances initialized at $\mathbf{v} = F_0+(-½, ½)$ and ran for 2000ms with a step size of 0.01ms.

β (Hz²)	$P(\boldsymbol{v} \in P_2, t = 2000)$
0	1.000
0.1	0.819
0.2	0.722
0.3	0.648
0.4	0.605
0.5	0.576
0.6	0.532

Table 1. For each variance value, Equation (1) was initialized at $\mathbf{v} = F_0+(-½, ½)$ and executed 1000 times for 2000ms of simulated time with time steps of 0.01ms. Each final state was classified as being in either P_1 or P_2, and the ratio of P_2 states to P_1 states are shown beside each variance value.

to denote the value of our approximation of $P(\mathbf{v} \in P_i, t = t_f)$, which we have previously only computed via repeated and tedious numerical simulation. Note that the distributions of final states are not normal over long time intervals, as shown in Figure 4. However, since in the long term, $\mathbf{v} \in P_i$ implies that the decision corresponding to F_i has been reached, we can take Equation (7) to be an analytical approximation of the influence of varied variance on decision bias over short periods of time[2]. The integral can be numerically approximated using a Monte-Carlo method. It is sufficient to programmatically sample a large number of points from $N(\boldsymbol{\mu}(t),\boldsymbol{\gamma}(t))$ and then count the cases where, without loss of generality, $v_i > v_j$ and compute a point-count ratio between points in P_i and the total point count to approximate $P(v \in P_i, t = t_f)$. This kind of Monte-Carlo integration is a standard technique for numerically evaluating integrals and has applications beyond probability theory (Weinzierl, 2000, p. 11).

In Figure 5, Equation (7) has been evaluated at many variances for 30ms starting at initial state $F_0+(-½, ½)$ with every element of the covariance matrix initialized to zero using the aforementioned Monte-Carlo method. In Figure 6, simulation data used to create Table 1 is visualized to show that in this particular case, the probability distribution of **v** values is roughly normal at t =30. As the variance of the randomness consumed by the binary decision-making neural network is increased, the probability that the state vector will still reside in P_2 at the end of the 30ms time window decreases. There are regions in Figure 5 where small changes in variance can induce a significant decision bias. For example, according to the approximation, a shift in variance from 0.05 Hz² to 0.1 Hz² will induce a 14.6% increase in the probability that the state vector escapes P_2. While the parameters of the simulation in Figure 5 were chosen somewhat arbitrarily, the same sort of behavior can be observed for a wide variety of parameters when the state vector is close to the $v_1=v_2$ line at t = 0.

DISCUSSION

Here we have derived an approximation that describes how changes in the variance of the randomness consumed by a binary decision-making neural network bias the network towards one decision or the other. The approximation assumes that given a fixed initial state, the probability distribution of final states at t_f is roughly normal. The "moments method" that the approximation is based on is applicable to a wide range of neuronal structures and was originally created as a generic tool to work with equations similar to Equation (1) (Deco & Martí, 2007; Rodriguez & Tuckwell, 1996). Additionally, we have shown that under some circumstances, changes in variance of approximately 0.05 Hz² can induce a decision bias on the order of 10%. These results come as no surprise, given Deco's results showing that for simulations of Equation (1) initialized at decision states (the points we have labeled F_1 and F_2), larger variances make it more likely that the simulated attractor network settles down near the decision state that it was not initialized at (Deco & Martí, 2007, p. 9). When viewed as a computational device, a function (one of several) of the stochastic binary decision-making neural networks stud-

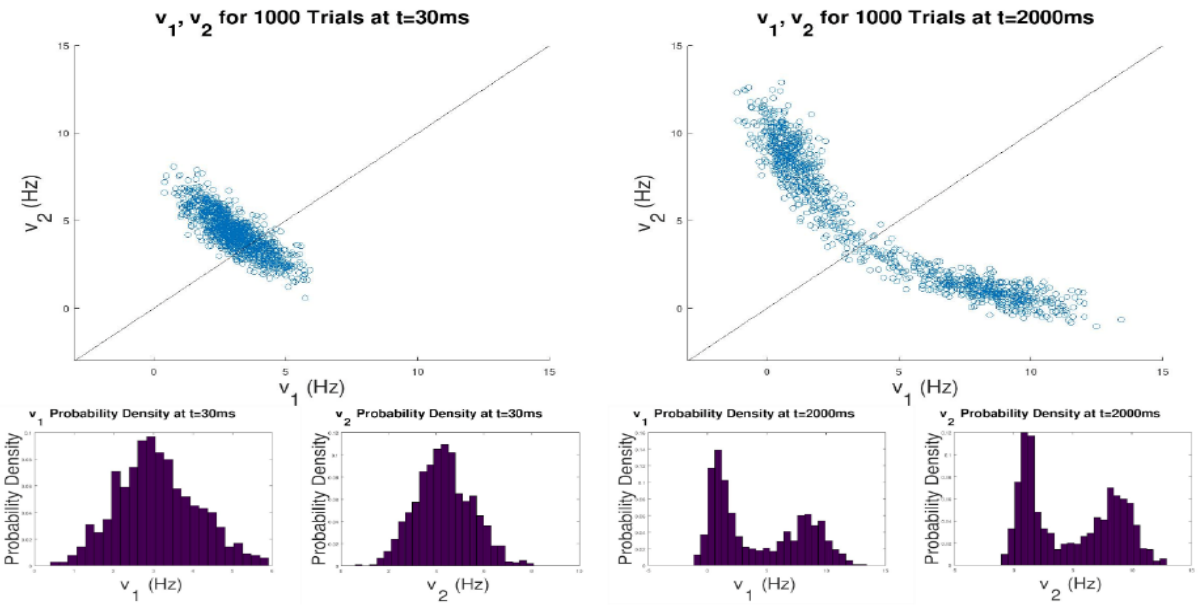

Figure 6. Simulated **v** values from the 1000 trials used to generate the β = 0.6 row of Table 1. At t =30ms, the **v** values are roughly normally distributed. At t = 2000ms, the **v** values are no longer normally distributed.

ied here is to transform small changes in the variance of the randomness that they consume into network-level electrochemical signals that can be consumed by other structures in the brain.

Assuming that the majority of stochastic brain structures respond in similar ways to small changes in the variance of the randomness they consume, a brain-independent consciousness able to exert a small influence over the variance of said randomness would likely be able to exercise significant control over the functioning of the brain. While the brain is full of small populations of strongly interconnected cells that perform tasks in relative isolation, these populations of interconnected cells are themselves interconnected, and the level of interconnectedness between them can be quantified (Tononi et al., 1994). The brain is highly recursive. A bias of equivalent magnitude to the roughly 10% bias predicted by our model when exerted on the output of a generic stochastic neural network over the duration of a single task does not seem, at face value, to offer very much control over the operation of the brain. However, due to the interconnectedness of stochastic brain structures, a bias of this size, when applied continuously over all stochastic brain structures, will compound very quickly. The computational result of a given stochastic neural network is dependent on both its input and the randomness that it consumes. If the randomness that a given structure (name it structure A) consumes is slightly biased, and its input originates from the output of another stochastic structure (name it structure B) subject to a bias of the same magnitude, then the net effect of the biasing influence on structure A will be greater than the net effect of the biasing influence on the randomness that structure A consumes. The conscious will of a brain-independent consciousness could be accumulated by stochastic neural networks over time if the results of slightly biased computations are continually being fed back into biasable structures as input.

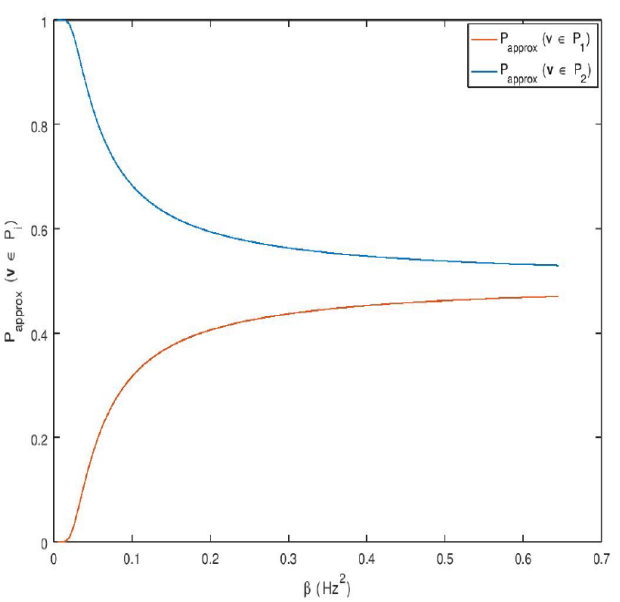

Figure 5. Equation (7) evaluated at a variety of variance values for 30ms starting at **v** = F_0 + (-½, ½).

While there are many conceivable ways for a stochastic system to be made sensitive to the effects of small changes in the variance of the randomness that it

consumes, the binary decision-making structures that we studied here accomplish this in a very specific way. The state of the system is initialized near a separatrix on the phase plane (the $v_1 = v_2$ line in the case of our model), and because of this, changes in the variance of the underlying randomness being consumed by the system effect how far the state of the system is expected to wander from its starting point over any small, fixed time interval (small enough that the probability of falling into a stable fixed point is negligible), which in turn effects how likely the system is to cross the separatrix. The system is prone to undergoing noise-induced state transitions. This type of system is common in nature. Many natural systems, from lasers to populations of viruses, are prone to undergo the same sort of noise-induced transitions (Forgoston, 2018). In the human brain, unlike in many similar systems, the noise involved in noise-induced transitions is presumably produced by a noise source that is sensitive to micro-PK. It is reasonable to suspect that any stochastic system sufficiently like the stochastic systems in the brain that derives its randomness from a noise source sensitive to micro-PK should be able to be influenced by a brain-independent consciousness in the same way that we hypothesize the brain is.

A complete theory of brain-independent consciousness must describe the dynamics of three distinct but related processes:

1. *Consciousness-to-brain communication.* How does a brain-independent consciousness drive brain activity?
2. *Brain-to-consciousness communication.* How are electrochemical signals in the brain experienced by a brain-independent consciousness?
3. *Binding.* Why is it that brain-independent consciousnesses are seemingly bound to their bodies? Why can't my will raise your arm?

The results presented here only attempt to present a partial explanation of item (1) of this list.

Our model assumes that a brain-independent consciousness can exert influence on the seemingly random firing times of pyramidal neurons, but it does not address how this influence is achieved in the first place. This problem, however, has been previously examined by other authors. It has been theorized that at the most basic level, consciousness-to-brain communication is achieved via the Quantum Zeno Effect, abbreviated QZE (Stapp, 2015). In a nutshell, the QZE is the observation that rapid, repeated observations of some measurable aspect of a quantum system will slow the time-evolution of the system in a way that the measured aspect will tend to (probabilistically, of course) become "frozen" in the state it was first measured in (Misra & Sudarshan, 1977). It may be the case that rapid, repeated probing of quantum processes in the brain by consciousness biases the states of these processes by holding them in fixed states for long periods of time (Stapp, 2015). If there are quantum processes occurring inside of pyramidal cells, then "freezing" their states for a period of time may affect the overall behavior of the cells, affecting the time at which they fire. When performed over large groups of cells simultaneously, the theorized "quantum state freezing" could conceivably produce changes in the randomness consumed by entire stochastic brain structures, perhaps causing the sorts of variance changes studied here.

If biased noise is being consumed by stochastic brain structures, observing the effects of the biased noise should be straightforward using conventional techniques. It is likely possible to directly falsify predictions made by Equation (7). *In vivo* observations of stochastic decision-making neural networks played a large role in deriving the biologically realistic models of these networks that we studied here (Deco et al., 2007; Wang, 2002). In the opinion of the author, constructing falsifiable dynamical models describing the interaction between consciousness and network-level neuronal activity should be a primary goal of Parapsychology going forward.

Implications and Applications

If it is indeed the case, as we have hypothesized, that stochastic structures in the human brain integrate consciousness-to-brain communications into network-level computations being carried out in the brain, then the results presented here have immediate implications for medicine. If a specific set of stochastic attractor networks in a patient's brain becomes damaged, it should, in theory, be possible to replace each network with a microcontroller that, when biologically necessary, numerically solves the appropriate set of stochastic Wilson-Cowan equations using randomness derived from an entropy source that is suspected to be sensitive to micro-PK (such as a quantum random number generator). Such a device, if constructed[2] with an appropriate, micro-PK sensitive source of randomness, may at least partially restore the consciousness-to-brain communication previously occurring in the replaced brain tissue. Perhaps this might allow some people immobilized due to brain damage to regain some degree of mobility.

NOTES

[1] There are no constraints on Equation (1) that stop v_i from randomly assuming negative values. Neither population

of neurons can fire at less than 0 Hz, but no attempt to reconcile this will be made here. This only becomes noticeable when some F_i is close to zero on one axis, as is the case here where $F_2^{(v_1)} \approx 0.8$.

[2] Equation (7) can be used to compute the effect of a small shift Δv in the initial value of v (which would correspond to a short-lived mean shift in the values of the $\xi_i(t)$ random variables) as $\Delta P(\mathbf{v} \in P_i, t=t_f) = P(\mathbf{v} \in P_i, t=t_f$, initial v of $v_i+\Delta v) - P(\mathbf{v} \in P_i, t=t_f$, initial v of $v_i)$ but small shifts in initial v values do not have a large effect on $P(\mathbf{v} \in P_i, t=t_f)$ in the same way that small shifts in β do, so a detailed discussion of this is not undertaken here

[3] Such a device could clearly be constructed in the general case, as making a reasonably powerful computer simulate the requisite Wilson-Cowan equations in a biologically feasible amount of time is simply a matter of increasing the simulation step size until the computer can perform the task. However, it is not immediately clear that such a device could currently be constructed to only occupy the volume of the tissue that it is replacing. Devices such as this, if found to work as intended, might have to be worn outside of the body.

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BRIEF REPORT

Exploratory Analysis of Changes in Global Parameters Around Sightings of Unidentified Aerial Phenomena

Les Coleman
les.coleman@unimelb.edu.au

Department of Finance, The University of Melbourne

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HIGHLIGHTS

Global reports of 'unidentified aerial phenomena' correlate with diverse geophysical and human events, perhaps suggesting a more complex mystery than previously assumed.

ABSTRACT

Unidentified aerial phenomena (UAP) have long been associated with earthquakes and other geophysical occurrences and are seen by government agencies in the United States and elsewhere as possibly significant to national security. Despite that, the mechanisms driving UAP are unclear. This study contributes to their better understanding by looking at UAP as more than sighting reports and conducts an atheoretical, data-driven review that seeks to identify their statistical associations with global geophysical and anthropomorphic parameters. The analysis covers the period 1995-2020 and includes 19 variables with annual and monthly frequency. UAP sightings are from NUFORC and mainly cover North America, which encompasses 17 percent of Earth's land area and is a sample of global data. Here we show that reports of UAP sightings are preceded by changes of the same sign in stock prices and of the opposite sign in airliner crashes, atmospheric carbon dioxide, and earthquakes. UAP sightings are then accompanied or followed by changes of the same sign in airliner crashes, battle deaths, earthquakes, global temperature, sunspots, and volcanic eruptions; and by changes of the opposite sign in atmospheric carbon dioxide, cosmic radiation, mental health deaths, natural disasters, and tropical storms. This analysis highlights a potentially important scientific gap whereby UAP are associated with diverse global parameters, and provides a basis for further study.

KEYWORDS

UAP, geophysics, human events, sightings, correlation.

INTRODUCTION

Unidentified aerial phenomena (UAP) comprise objects and lights in the sky that cannot be identified as aircraft or other known phenomena. Their scientific relevance has long been recognized (Florinsky, 2016; Vallee & Aubeck, 2010). As examples, Seneca compiled the Romans' knowledge of earthquake lights that are frequently observed up to several months prior to earthquakes and reported an example where "immense columns of fire" accompanied the massive Delos earthquake in 373 BCE (Seneca, ca 65); and a 1911 article in *Nature* discussed many examples of links between natural events and earthquake lights and other UAP (Milne, 1911).

Established literature now documents links between luminous shapes and Earth's magnetic field, seismology, and aircraft crashes (Kovalyov, 2022), including earthquakes (Persinger & Derr, 2013), magnetism and electromagnetism (Teodorani, 2004), tornadoes and storms (Krasilnikov, 1997), and volcanoes (Diller, 1916). Analysis of links between 73 high quality UFO reports in the United States during 1957-1977 found associations with Earth's

magnetic field, ionospheric effects, and solar flares (Accetta, 1980).

Further credibility has been afforded to UAP sightings after a number of governments see them as possibly important to national security, either as threats or powerful new technology. They engaged defense and intelligence agencies in reviews - such as the US Department of Defense (ODNI, 2021) - which highlighted UAPs' geopolitical significance. There is also literature that examines the nature of UAP observations (e.g., Druffel, Wood, & Kelson, 2000; Gross, 2013; Knuth, Powell, & Reali, 2019); provides bibliographies that cover UAP waves (Olmos, 2015) and books (Rasmussen, 1985); and offers a research guide (www.history.navy.mil/research/library/research-guides/ufo-research-guide.html).

Consistency in reports from a wide range of epochs and regions supports the reality of luminous phenomena in the sky that display variations in size, color, and shape. In addition, analyses have established their association with natural events involving large energy releases such as earthquakes, storms, and volcanic eruptions; global scale effects on Earth's magnetic field and ionosphere; and galactic effects such as radiation and Solar activity. This makes it likely that UAP sightings arise either naturally or artificially through a variety of mechanisms, including nuclear fusion, rock stresses along fault lines, plasma sources, piezoelectricity, or electric fields (Persinger & Derr, 2013).

This uncertainty and breadth of possible explanations motivate the following analysis which seeks to extend understanding of UAP sightings through a passive, data-driven search for statistically significant relationships between them and changes in global physical, demographic, and socio-economic parameters. Identifying what UAPs do beyond being observed and establishing their association with shocks that are sufficient to alter global dynamics should help better understand the phenomena.

The following sections discuss data used in the analysis, which comprise reports of UAP and time series of global parameters; then report results of statistical analyses, and the paper closes with a discussion of the results and implications for further work.

Data

The most important variable involves sightings of unidentified aerial phenomena (UAP). A number of databases are available, but this study uses the largest, longest-running dataset sourced from the National UFO Research Centre (NUFORC, https://nuforc.org/). NUFORC, based in Washington, USA, began collecting reports in 1974, and as of August 2022, had over 139,000 reports in its database, mostly for the USA (88.9 percent) and Canada (3.7).

NUFORC shifted to online reporting of UAP in 1994, and there is a structural break with prior data; so, for consistency, only data from January 1995 are included in the UAP database. After April 2018, the NUFORC database also included MADAR data that comprise an average of 39 magnetic anomalies each month that have been detected by instruments (Madar, 2019; https://madar.site/madar/more.html). As these are not aerial phenomena, they have been removed manually from the NUFORC data. This leaves 121,651 UAP observations.

NUFORC's database ignores obvious hoaxes but otherwise lacks any filters. Its verbatim reports of what observers considered to be unidentified, can – as eyewitness reports - be considered scientific data (Teodorani, 2009). Other advantages of NUFORC data are their scale and duration, and coverage of about 17 percent of Earth's land area, which – in light of a comparative analysis of UAP databases that found consistency in sightings (Teodorani, 2009) - give a significant sample of global activity.

Conversely, NUFORC data suffer two shortcomings whose impacts are impractical to quantify or remove. One is inconsistency in reporting across time. This incorporates an under-reporting bias because there is no systematic monitoring of UAP, and disincentives to report sightings from fear of ridicule or worse; an over-reporting bias since mid-2019 because of regular launches of Starlink satellites that are highly visible; and changes in observer behavior during Covid-19 lockdowns.

The second shortcoming is that sightings represent events which the observer cannot explain and are accepted at face value with little scientific evaluation, whereas other observers may subsequently offer a possible explanation for what was seen. Thus, they are of varying quality. Conversely, making any ex-post adjustment requires prejudgement as to what UAP reports should be measuring, and this is not compatible with my atheoretical approach.

Turning to analysis of the data, UAP sightings are plotted in figure 1 as a 12-month moving average. This shows a pronounced uptrend over time with interim peaks 4.1±1.1 years apart, and troughs 4.4±1.1 years apart. The length of peak to trough is 2.2±1.5 years, and from trough to peak is 2.1±0.6 years, which shows no evidence of the sawtooth pattern that is common in natural time series. Of possible relevance is that a four-year (quadrennial) cycle is common. Well-known artificial four-year cycles include Bitcoin price (Redelinghuys, 2019), leap years, the Olympics, and US presidential election. Natural four-year cycles include temperatures in Antarctica (French, Kleko-

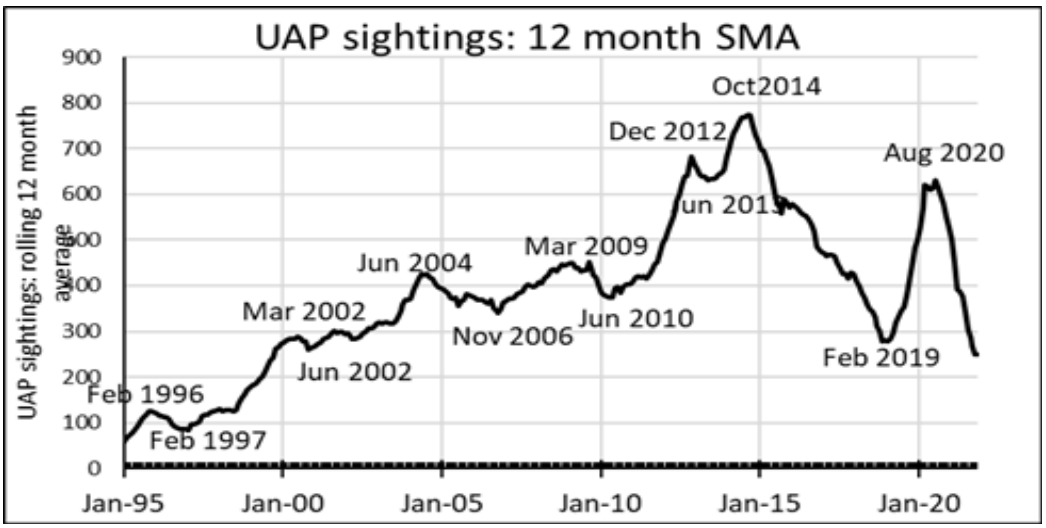

Figure 1. UAP Sighting Reports as a 12-Month Simple Moving Average.

ciuk, & Mulligan, 2020), fox, lemming, and other animal populations (Edwards & Edwards, 2011), and Jupiter's temperature (Cosentino et al., 2017). A number of variables in this analysis also display a four-year cycle, including – as shown in figure 2 - annual change in the number of earthquakes and average global temperature.

Another feature of figure 1 is a peak in UAP sightings in the second half of 2014. My own analysis of NUFORC data for June-December 2014 shows days with the highest number of reported sightings were in the first half of July (presumably somewhat elevated by Independence Day celebrations, although these could provide camouflage), mid-September, and August. Report totals by State were highest for California, Florida, Pennsylvania, New York, and Washington: and totals by shape were highest for light, circle, fireball, triangle, and sphere.

A study of data for 2014-5 did not identify any obvious explanations for the peak in UAP sightings (Krishnamurthy, Lafontant, & Yi, 2017). However, an indication of its significance is that the time series for many of the global variables in this analysis have similar peaks in 2014 or with a 1–2-year lag. Prominent examples include global temperature and battle deaths, as shown in figure 3.

The research question of this analysis is whether global UAP activity (as proxied by NUFORC sightings data) is associated with changes to any global parameters. Without a theoretical model to describe expected association, the choice of global parameters involves the risk of selection bias. To minimize this, the dataset comprises global geophysical parameters, human demographics, and socio-economic measures that have been reasonably reliable and available since at least 1995. Planetary dynamics are sourced from NASA and USGS; global demographics from WHO and World Bank (https://datacatalog.worldbank.org/search/dataset/0037712/World-Development-Indicators); and economic data from IMF. Two variables previously identified with UAP sightings were also added, namely airliner crashes and cetacean strandings. Table 1 sets out details of the 19 independent variables in the dataset, with their source and brief description.

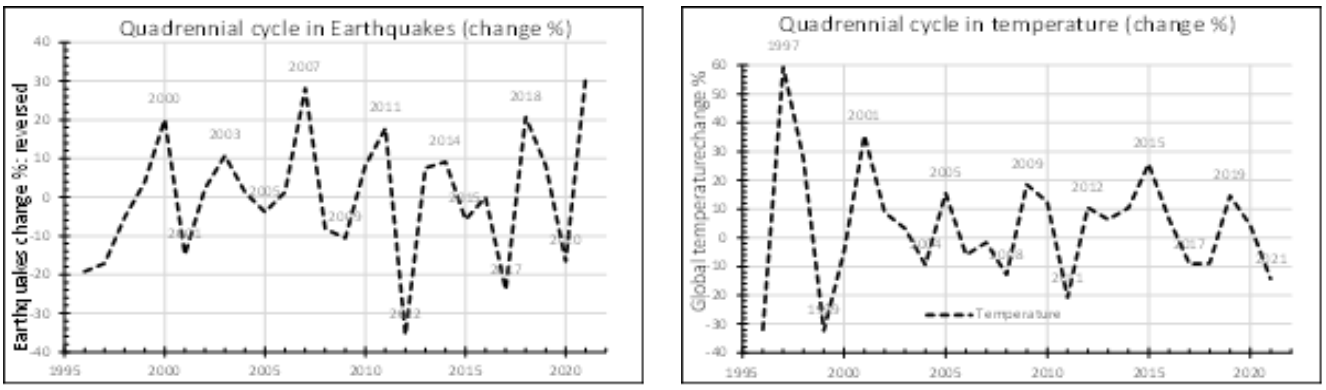

Figure 2. Four-year Cycles in Annual Change in Earthquakes and Global Temperature.

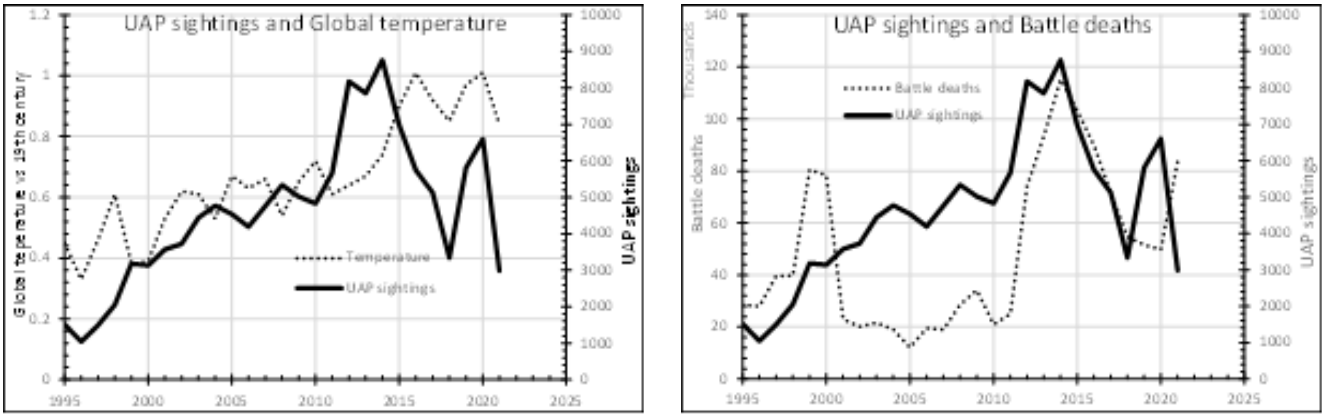

Figure 3. Global Parameters with Pronounced Peaks Around 2014

An issue with the analysis of time series is that spurious correlations can arise when values of dependent and independent variables are related to time. To avoid this, candidate variables that show monotonic trends were excluded (including those related to demographics and quality of life, such as measures of mortality and popula-

Table 1: Variables That are Tested for Links to UAP Sightings

Variable	Source	Description
Panel A: Planetary dynamics		
Atmospheric CO_2	https://gml.noaa.gov/ccgg/trends/gl_data.html	Global mean value. Monthly since 1958.
Cetacean strandings	Alvarado-Rybak et al. (2020)	Reported strandings on the Chilean coast. Monthly 1968-2018.
Cosmic radiation	https://cosmicrays.oulu.fi/	Measured at Oulu, Finland. Monthly since 1964.
Day length	www.timeanddate.com/time/earth-rotation.html	Deviations from the standard day (ms). Annual since 1973.
Earthquakes	http://earthquake.usgs.gov/earthquakes	Global earthquakes greater than magnitude six since 1899.
Geomagnetic field	www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml?#igrfwmm	Declination of Earth's magnetic field in decimal degrees. Annual since 1590.
Natural disasters	https://public.emdat.be/	≥ 500 deaths or $US(2021) 1 billion damages. Since 1900.
Sea level	https://doi.org/10.5067/GMSLM-TJ151	Global mean sea level from NASA. Monthly since 1992.
Sunspots	www.sidc.be/silso/datafiles	Total sunspot number; Royal Observatory of Belgium. Monthly since 1749.
Temperature	www.ncei.noaa.gov/cag/global/time-series/globe/land_ocean/all/	The monthly global average since 1970. NOAA National Centers for Environmental information.
Tropical storms	https://tropical.colostate.edu/archive.html#Global	Global named tropical storms. 2000-2019 only.
Volcanic eruptions	https://volcano.si.edu	Global. Annual since 1960. Smithsonian Institution.
Panel B: Demographic and Economic parameters		
Airliner accidents	https://aviation-safety.net/statistics/period/stats.php	Aviation Safety Network. Global data for commercial airliners since 1942.
Battle deaths	https://ucdp.uu.se	Uppsala Conflict Data Program. Annual since 1989.
Communicable disease deaths	https://vizhub.healthdata.org/gbd-results/	Global Burden of Disease Study: deaths due to AIDS, respiratory and enteric infections, and other communicable disease. Annual since 1990.
Excess deaths	https://data.worldbank.org/	World crude death rate minus 1993-2021 trend. Annual since 1960. Percent change.
GDP change	www.imf.org	IMF. Annual since 1980.
Mental health deaths	https://vizhub.healthdata.org/gbd-results/	Deaths due to mental disorders (rate). Global Burden of Disease Study. Annual since 1990.
Stock prices	www.msci.com/end-of-day-data-search	MSCI World stock price index. Monthly since 1970. Absolute percent change.

Table 2. Correlation Between UAP Sightings and Parameters with Significant Contemporaneous or Lagged Relationships (values of R greater than 0.5 are bolded).

	UAP sightings	CO_2	Strandings	Radiation	Earthquakes	Geomagnetic field	Disasters	Temperature	Storms	Eruptions	Battle deaths	GDP change	Mental illness
UAP Sightings	1.00	**0.86**	**0.66**	-0.04	-0.06	**0.87**	0.39	**0.63**	-0.16	**0.70**	**0.55**	-0.03	0.08
Atmospheric CO_2	**0.86**	1.00	**0.88**	0.24	-0.11	**1.00**	**0.60**	**0.86**	-0.18	**0.69**	**0.51**	-0.04	0.02
Cetacean strandings	**0.66**	**0.88**	1.00	0.32	-0.19	**0.87**	**0.61**	**0.77**	0.02	**0.42**	**0.61**	-0.20	0.02
Cosmic radiation	-0.04	0.24	0.32	1.00	0.24	0.21	0.37	0.18	-0.12	0.05	-0.13	-0.12	-0.41
Earthquakes	-0.06	-0.11	-0.19	0.24	1.00	-0.11	-0.19	-0.23	-0.34	0.16	-0.37	0.27	-0.43
Geomagnetic field	**0.87**	**1.00**	**0.87**	0.21	-0.11	1.00	**0.58**	**0.86**	-0.18	**0.70**	**0.50**	-0.04	0.05
Natural disasters	0.39	**0.60**	**0.61**	0.37	-0.19	**0.58**	1.00	**0.62**	-0.21	0.16	0.31	0.11	0.04
Global temperature	**0.63**	**0.86**	**0.77**	0.18	-0.23	**0.86**	**0.62**	1.00	-0.13	**0.55**	0.37	-0.07	-0.01
Tropical storms	-0.16	-0.18	0.02	-0.12	-0.34	-0.18	-0.21	-0.13	1.00	-0.13	0.04	-0.16	-0.19
Volcanic eruptions	**0.70**	**0.69**	0.42	0.05	0.16	**0.70**	0.16	**0.55**	-0.13	1.00	0.21	0.21	-0.22
Battle deaths	**0.55**	**0.51**	**0.61**	-0.13	-0.37	**0.50**	0.31	0.37	0.04	0.21	1.00	-0.20	0.31
GDP change	-0.03	-0.04	-0.20	-0.12	0.27	-0.04	0.11	-0.07	-0.16	0.21	-0.20	1.00	-0.23
Mental illness deaths	0.08	0.02	0.02	-0.41	-0.43	0.05	0.04	-0.01	-0.19	-0.22	0.31	-0.23	1.00

tion). The remaining variables were examined for nonstationarity using the augmented Dickey–Fuller (ADF) test. Table 3 reports results for variables that prove significant in subsequent analysis, with a non-significant value indicating that the variable is non-stationary (i.e., it trends rather than moving around a mean).

Because half the variables are non-stationary, the analysis uses changes in UAP sightings and changes in the value of individual parameters in univariate, linear regression. The model is:

$$\Delta(\text{UAP sighting reports}_t) = \alpha_n + \beta_n . \Delta(\text{Global parameter}_{s,t}) \quad (1)$$

Where α_n and β_n are constants, and Δ is an operator referring to percent change in each variable, except for cetacean sightings and sunspots, which are volatile and analyzed as the change in level. Data were analyzed using EViews 9.

Table 3. Unit Root Tests of Significant Variables

Variable	ADF test probability	
	Annual data: 1995-2020	Monthly data: 1995-2020
UAP sightings	0.304	0.194
Atmospheric carbon dioxide	1.000	0.999
Cosmic radiation	0.084 *	0.499
Earthquakes	0.003 **	
Natural disasters	0.109	0.001 ***
Temperature	0.817	0.020 **
Tropical storms	0.001 ***	
Volcanic eruptions	0.027 **	
Airliner accidents	0.697	0.001 ***
Battle deaths	0.319	
Mental health deaths	0.001 ***	
Stock prices	0.001 ***	

RESULTS

This section results from an analysis of the dataset described above. The initial step involves annual data, which are available for all variables over 1995-2020. Given the density of NUFORC data, a second set of analyses involves nine variables with monthly data.

Starting with annual data, typical relationships are shown in Figure 4. The upper charts are percent changes in tropical storms and battle deaths against changes in annual values of UAP sightings, and the lower charts are time series f° global temperature and earthquakes with UAP sightings.

Table 4 reports significant findings from linear regression using annual data for changes in UAP sightings and variables. Panel A has results of contemporaneous regressions, where three variables are significantly (≶ 0.10) related to UAP: sunspots, tropical storms, and bat-

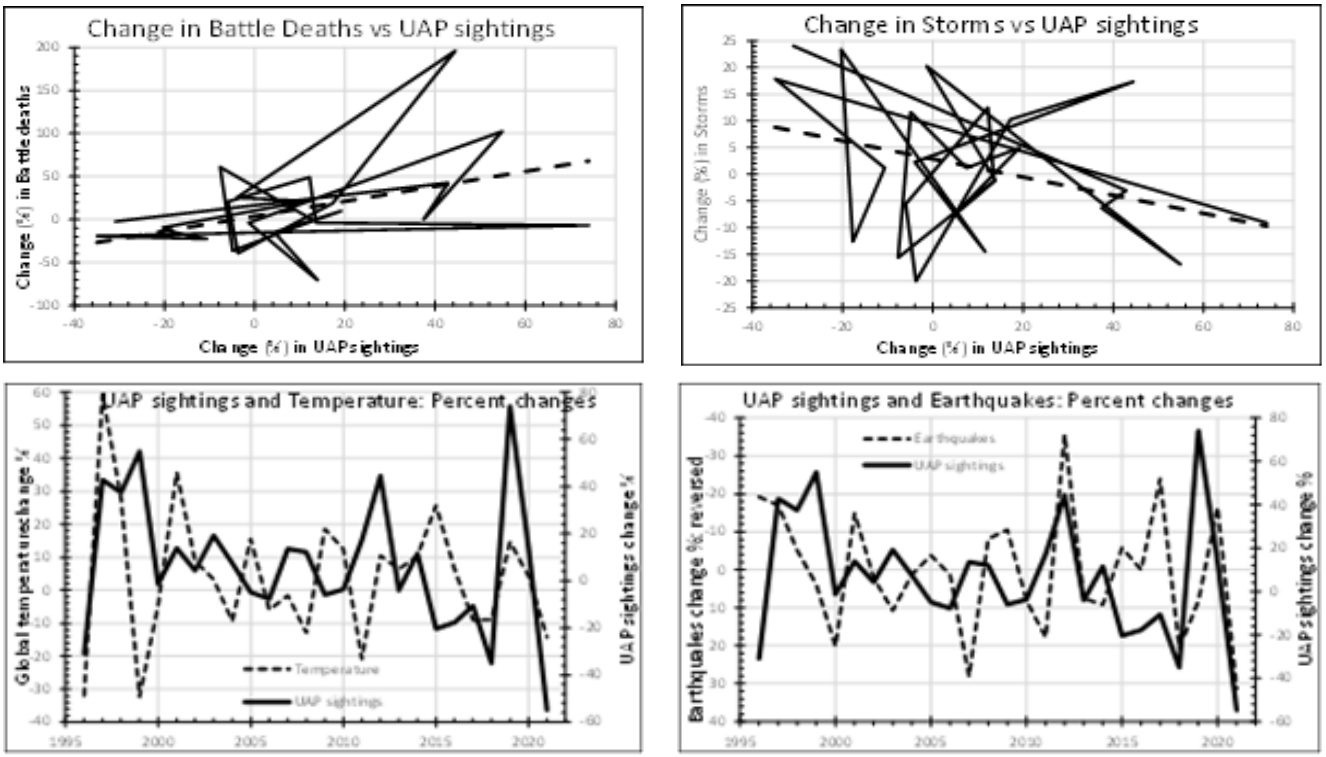

Figure 4. Typical relationships for annual data. The upper charts are scatter plots of percent changes in battle deaths and tropical storms vs. UAP sightings. Lower charts are time series of changes in UAP sightings and in global temperature and earthquakes.

tle deaths.

Panel B shows the results of linear regression of changes where leads and lags of one and two years are applied to variables. This shows that earthquakes, stock prices, mental illness deaths, and airliner accidents lead UAP sightings by one-two years, while cosmic radiation, earthquakes, natural disasters, volcanic eruptions, airliner accidents, and mental illness deaths lag UAP sightings by one-two years.

Table 5 repeats the analysis above using monthly data. This confirms the links identified in table 4 between UAP and earthquakes and natural disasters. Innovations are the lead/lag link between UAP and atmospheric CO_2, and the positive relationship with lagged global temperature.

An issue with interpreting these results is that they stem from data exploration without guidance from theoretical hypotheses, which raises the possibility of chance associations.

With 19 independent variables and leads and lags of one and two years, a total of 95 relationships are tested. Using a cut-off probability of ≦ 0.10, about nine significant links would be expected by chance, whereas results identified 15 links.

To summarize results, five variables have positive relationships with UAP sightings: battle deaths, global temperature, stock prices, sunspots, and volcanic eruptions, and three variables have negative relationships with UAP sightings: cosmic radiation, natural disasters, and tropical storms. In addition, four variables have two or four-year cycles that give both lead and lag relationships with the four-year UAP cycle: airliner accidents, atmospheric carbon dioxide, earthquakes, and mental illness deaths.

DISCUSSION

The analysis above shows significant links between the frequency of UAP sightings and dynamics of Earth (atmospheric carbon dioxide, cosmic radiation, earthquakes, natural disasters, global temperature, tropical storms, and volcanic eruptions) and its human population (airliner crashes, battle deaths, mental illness deaths, and stock prices).

These results complement those from earlier studies, as discussed in the Introduction. In particular, my results confirm previously identified links between UAP and airliner crashes, earthquakes, storms, and volcanoes. However, they do not identify links between UAP and Earth's magnetic field, ionospheric effects, and solar activity. Innovative links identified in the analysis here are between UAP and atmospheric carbon dioxide, cosmic radiation, natural disasters, and global temperature, and with a number of human parameters, namely battle deaths,

Table 4. Univariate, Linear Regression of Annual Values of Individual Parameters Against UAP Sightings for 1995-2020. Panel A Reports Regressions of Contemporaneous Values of Variables. Panel B Reports the Most Significant Results for Regressions Where UAP Reports Lead or Lag Dependent Variables by One or Two Years

Panel A: Regression of UAP Sightings and Global Parameter: Annual Percent Changes

Global parameter	Intercept	Slope (probability)	Adjusted R-sqd
Sunspots	211.46	12.00 (0.090)	0.08
Tropical storms	9.730	-0.685 (0.103)	0.08
Battle deaths	6.375	0.222 (0.028)	0.16

Panel B: Regression of UAP Sightings and Lagged Global Parameter

Global parameter	Lead (yrs.)[1]	Intercept	Slope (probability)	Adjusted R-sqd
Airliner accidents	-1	10.725	0.975 (0.023)	0.12
	+1	7.272	-0.775 (0.051)	0.17
Cosmic radiation	+1	9.575	-3.784 (0.040)	0.14
Earthquakes	-2	8.881	-0.750 (0.025)	0.18
	+2	7.688	0.573 (0.102)	0.08
Stock prices	-2	13.984	0.074 (0.011)	0.23
Natural disasters	+2	11.072	-0.319 (0.048)	0.13
Volcanic eruptions	+1	7.475	1.091 (0.058)	0.11
Mental illness deaths	-2	7.526	10.159 (0.041)	0.15
	+1	9.876	-10.985 (0.046)	0.13

[1] Number of years parameter changes after UAP sightings change.

mental illness deaths, and stock prices.

Figure 5 uses data from tables 4 and 5 to show the sequencing and relative strength of changes in parameters around UAP sightings. One-two year before UAP sightings, changes of the same sign occur in atmospheric CO_2 and mental health deaths; and changes of the opposite sign occur in airliner accidents and earthquakes. Changes in UAP sightings co-move with battle deaths, global temperature, and sunspots, and sightings move inversely with tropical storms. One to two years later come changes of the same sign in airliner accidents, earthquakes, and volcanic eruptions; and changes of the opposite sign in atmospheric CO_2, cosmic radiation, mental illness deaths, and natural disasters.

How could figure 5 be interpreted? Several points stand out. Atmospheric CO_2, earthquakes, and mental illness deaths share a four-year cycle with UAP but are out of phase by two years. Another point is that battle deaths, global temperature, and tropical storms co-move with UAP. And UAP are lagged by cosmic radiation, natural disasters, and volcanic eruptions.

UAP appear to be causal or associated with an unknown force. They affect multiple parameters, which change following a delay related to the responsiveness of the systems driving them. Thus, parameters co-move, either due to simultaneous effects by UAP, or following knock-on effects from feedback of other systems' changes.

One possible explanation is that links are natural, so that atmospheric CO_2, earthquakes, mental illness deaths, and UAP are driven in a four-year cycle by an unknown means, and their changes affect battle deaths, cosmic radiation, global temperature, natural disasters, sunspots, tropical storms, and volcanic eruptions. Thus, these exotic, ill-understood behaviors reflect some unknown science. Just such anomalies have often been indicators of incomplete or incorrect theory and catalyzed re-assessment of knowledge paradigms that progressed science.

A second, more speculative explanation attributes the sequence of changes to deliberate actions by unknown intelligence on Earth or elsewhere, which applies an unknown treatment to Earth either to cause intended changes (along the lines of terraforming that manipulates Earth: Sleator & Smith, 2019), or while conducting experiments (in accordance with the laboratory hypothesis where Earth is the subject of experimentation: Barrett, 1983). Under this interpretation, treatment proxied by UAP occurs every four years and changes variables with a lag of up to one-two years. The intelligence may normally be cloaked but needs to uncloak or come close to Earth when initiating and/or observing experiments, which leads to UAP sightings. Supporting this external manipulation interpretation is that sunspots and cosmic radiation also vary with UAP sightings, which indicates impacts beyond Earth.

The data and findings above are insufficient to draw conclusions about the nature of UAP, but three points are

Table 5. Univariate, Linear Regression of Monthly Values of Individual Parameters Against UAP Sightings for 1995-2020. Panel A Reports Regressions of Contemporaneous Values of Variables. Panel B Reports the Most Significant Results for Regressions Where UAP Reports Lead or Lag-Dependent Variables

Panel A: Regression of UAP Sightings and Global Parameters: Monthly Percent Changes

Global parameter	Intercept	Slope (probability)	Adjusted R-sqd
Atmospheric CO_2	5.310	-14.474 (0.011)	0.02

Panel B: Regression of UAP Sightings and Lagged Dependent Variable

Global parameter	Lead (mos.)[1]	Intercept	Slope (probability)	Adjusted R-sqd
Earthquakes	-18	6.054	-0.058 (0.078)	0.02
	+25	0.057	0.056 (0.103)	0.01
Atmospheric CO_2	-24	5.316	-14.00 (0.017)	0.02
	24	5.366	-11.984 (0.040)	0.01
Natural disasters	+24	5.840	-0.037 (0.014)	0.02
Temperature	-3	4.347	0.172 (0.098)	0.01

[1] Number of months parameter changes after UAP sightings change.

noteworthy. First, UAP are not solely anthropocentric as depicted in the conventional UFO and SETI paradigms (Elliott, 2015). Certainly, sightings have strong relationships with human deaths, and other studies have shown that sightings are concentrated around population centers (Carlotto, 2021). Beyond that, though, the analysis here and in previous studies show that UAP are also associated with diverse impacts on Earth's geodynamics, including incident radiation, rotation, vulcanism, temperature, and natural disasters, and also impact sunspots and cosmic radiation.

Second, an increase in UAP sightings is accompanied by rises in airline crashes, battle deaths, global temperature, and volcanic eruptions; while a decrease in sightings increases cosmic radiation, mental illness deaths, natural disasters, and tropical storms. The net is that any change in UAP sightings brings damage.

Third is that UAP have a variety of impacts with leads and lags in relationships with geophysical parameters and social factors, and there is matching diversity in their reports which include lights and objects of various sizes, shapes, and behaviors. This diversity suggests UAP may be more than one type of phenomenon or have multiple functions.

IMPLICATIONS AND APPLICATIONS

This analysis points to several areas for further research. One is to examine the UAP-parameter links to better understand the science involved. This would re-evaluate known mechanisms that could manipulate global parameters through influences such as the cosmic microwave background radiation, which bathes Earth from all directions: and consider gaps in understanding of possibly relevant theories such as gravity which are evidenced by anomalies such as dark matter and dark energy (Loeb, 2021).

Research could test additional global parameters for links to UAP sightings, including those already suggested, such as power outages. The approach here could also be applied to other UAP databases, and results combined to compare different explanations (del Olmo, 2015a, 2015b).

Evidence that UAP sightings have a strong geophysical focus challenges paradigms underpinning SETI programs and UFO research, which assume an anthropocentric focus for any extra-terrestrial interaction (Tarter et al., 2010). Moreover, if ETs exist and do not intentionally conceal their UAP, they may view Earth in the same way as explorers viewed Africa, the Americas, and Australasia; that is, they came for plunder, not peace, and ignored occupants of the land while they rifled it. Instead of viewing ETs as scaled-up humans seeking to learn from interaction with us, models of exo-civilization development and ET motivations may need to be more nuanced.

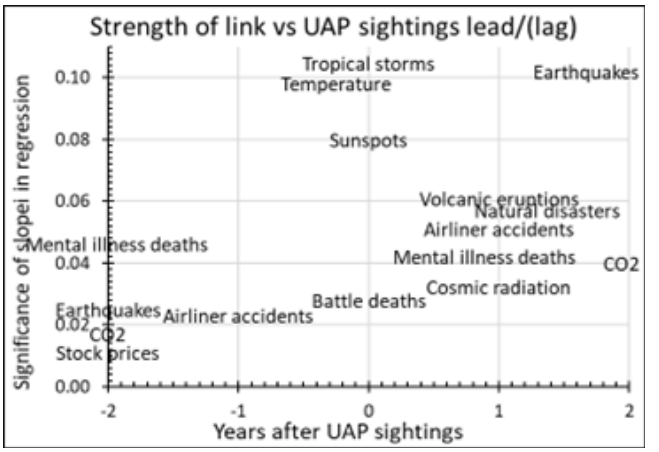

Figure 5: Strength of Relationships Between UAP Sightings and Variables (t-stat of slope in regression) as a Function of UAP Sightings Lead/(Lag).

A final research opportunity is to search for any possible global experimenter. However, it is not certain that such a project should be launched. The cost may be high, especially if surveillance technologies are employed. In addition, it would be unlikely to succeed if an experimenter with the technology to manipulate Earth did not want to be detected. Moreover, if the search did succeed, that would end this experiment, and the experimenter may decide to start over with a fresh set of unsuspecting Earthlings.

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BRIEF REPORT

A Method for Demonstrating Superluminal Communication Using Conscious Intent to Influence a Quantum-Entangled Link

W. John Wilkinson

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HIGHLIGHTS

Quantum entanglement might allow faster-than-light (or 'superluminal') communication but only with a very low amount of data transmitted per second.

ABSTRACT

It is fair to say that Bell's Theorem leaves a nasty taste in the mouths of many physicists because test results seem to suggest that non-local, i.e., superluminal, communication of some sort is going on all around us and maybe not just at the quantum level. But Bell's Theorem has been aptly demonstrated to date, and Quantum Mechanics (QM) is, if not the most successful theory devised by man, certainly one of them. To some, and especially to Einstein, one of the least favorable aspects of QM is its statistical nature. This paper embraces QM's statistical nature and employs quantum entanglement to show that superluminal communication may be possible albeit, most likely, initially, at a very low bit rate

KEYWORDS

Superluminal, consciousness, quantum, entangled, statistics.

INTRODUCTION

This paper makes use of two key experimental set-ups. The first is a thought experiment described in Nick Herbert's book Quantum Reality (Herbert, 1985). In it, he makes use of a quantum entangled randomly polarized photon interstellar link to explain the Einstein-Podolsky-Rosen (EPR) paradox and Bell's theorem (Herbert, 1985, pp. 199-231). The second makes use of almost three decades of data gathered through the Princeton Engineering Anomalies Research (PEAR) lab and others, suggesting conscious intent may be capable of modifying a quantum entangled randomly polarized photon stream.

In Nick Herbert's thought experiment a spaceship acting like an "interstellar lighthouse" midway between Earth and Betelgeuse (540 light-years away) directs a Green light beam towards Earth and a Blue light beam towards Betelgeuse. The spaceship only emits correlated (entangled) pairs of photons; one Green, one Blue, and the attribute measured at each location is photon polarization. When measured at the same angle, their polarizations always match; when measured at 90 degrees to each other, they always miss. At angles in between, the result is probabilistic. The detector stations at Earth and Betelgeuse use calcite crystals to set the measurement angle – vertical polarization results in the UP detector being triggered; horizontal polarization results in the DOWN detector being triggered (For a more detailed ex-

planation of the measurement setup, please see (Herbert, 1985, pp. 139-141).

Now to quote directly from his discussion on superluminal signaling (Herbert, 1985, pp. 238-239):

> In the EPR photon lighthouse, the natural quantum process that blocks [superluminal] signaling is quantum randomness. Put yourself on Betelgeuse with Blue observer. No matter how she sets her Blue crystal, she receives a message from the central spaceship which consists of a 50-50 random pattern of ups and downs. When Green observer on Earth moves his calcite we know (via Bell's theorem) that his actions must change Blue's sequence of marks. Some of her ups change to downs and vice versa; if this did not happen, the correlation would be weaker than is in fact observed. However, these changes in the details of Blue's marks involve a shift from one random pattern to another equally random pattern. Since all random sequences look alike .... Blue is not aware of this Green initiated change. The situation seems to be that Green can send superluminal messages but Blue cannot decode them."

Everything up to this point is as expected and well known – superluminal messages using entanglement are hidden by quantum randomness, and to quote from above "... all random sequences look alike." But do they? Look what happens if we introduce a "gremlin" into the system, i.e., something that has an effect that is unlikely and difficult to control but not impossible.

THE PAULI EFFECT

There is some, typically anecdotal, evidence that suggests that some people may have the ability to influence electronic equipment and machines in general, whether intentional or not. It is said about Wolfgang Pauli that he could merely enter a laboratory with sensitive electronic equipment and cause that equipment to fail. People who knew and worked with him referred to it as the Pauli Effect (Radin, 1997, p. 131).

Another potential example of the Pauli Effect was described by James McDonnell, the patriarch of the McDonnell Aircraft Corporation. He noted that there had been so-called "gremlins" observed in [presumably the electronic systems of] aircraft under test during very emotional circumstances (Chene, 2021). He was so concerned about this problem that in 1979, he provided funding to Dr. Robert Jahn, then Dean of the School of Engineering and Applied Science at Princeton University to study it. From this funding, the Princeton Engineering Anomalies Research laboratory was born and continued its work until 2007. During this period, a large body of data was collected primarily using computer-controlled random-event generators (REGs) that are essentially electronically generated coin flips. This data seems to indicate human consciousness can have a small but very definite effect on random processes as a proxy for non-local human/machine interactions (Dunne et al., 1992; Jahn, 1982; Nelson et al., 1996). Besides the PEAR data, a limited number of other experimenters over many years using REGs as well as dice have found similar results (Radin, 1997, pp. 133-146).

If we look at just the PEAR data, results from their "benchmark" database of REG studies comprising some 750,000 trials per intention and 91 operators, an average effect size on the order of 1 per 10,000 bits is observed (Dunne et al., 2005, p. 706) and for a 'gifted' operator 2-4 per 1000 bits (Jahn et al., 1987/2009, p. 102).

> In fact, when the results of thirteen distinct experiments encompassing a variety of random and pseudo random noise sources comprising a total of nearly six million trials, are combined in a meta-analysis, the overall correlation with operator intention exceeds seven sigma ($p = 6.5 \times 10^{-11}$). (Dunne et al., 2005, p. 707).

Clearly, something is going on. Although we may not have a good understanding of the phenomenon, can we make use of it?

Many of the typical criticisms of this type of research are discussed in Margins of Reality (Jahn et al., 1987/2009, pp. 49-55). In particular, the book states "Without question, the dominant experimental frustration in this field is the inability to replicate on demand previously observed anomalous effects, not only at other laboratories with other participants, but even in the original facility, using the original participants, under apparently identical experimental circumstances." This is further addressed in (Dunne et al., 2005, pp. 707-708), where failed attempts at replication at other laboratories are discussed in some detail. Clearly, not being able to replicate results on demand is a major concern.

If for the moment, we don't concern ourselves with how gremlins do what they do or the difficulty of inserting and controlling them and instead, we just assume that we can make use of them, then let's see what effect they have on the scenario described earlier with the interstellar lighthouse thought experiment.

A GREMLIN IN THE SYSTEM

Once again, we note that no matter how the Blue observer sets her calcite, she sees only 50% ups and 50% downs (50/50) in a random sequence of ups and downs from the spaceship. The Green observer changes his calcite, and we know that his actions change Blue's random sequence instantaneously, but it is still random, and no information is sent.

Now imagine that we have a gremlin toggle switch controlled by an experienced operator, which when ON, releases a gremlin into the system to do its thing, and when OFF, retrieves the little mischief maker so it can do no harm. We flip the toggle switch, and a gremlin is let loose into the Green measurement system on Earth. This gremlin has the ability to affect the random received photon stream such that more ups than downs are received. But it takes 20 minutes (say) to achieve a clear and statistically significant change in the random sequence from 50/50 to > 50.1/49.9 (say) ups/downs cumulative average that Blue observer can detect. As this shift in the mean occurs at Green station, it also instantaneously appears at the Blue station on Betelgeuse, where it is detected as a statistical anomaly. We now toggle the gremlin switch to OFF. The random sequence goes back to 50/50 ups/downs, which is instantaneously transmitted to the Blue observer as well. If we let the 50.1/49.9 random sequence equal a '1' bit and the normal baseline 50/50 sequence a '0' bit, we can now communicate superluminally with Blue observer on Betelgeuse 540 light-years away.

IMPLICATIONS AND APPLICATIONS

This paper makes use of two key experimental setups to show that superluminal communication may be possible. The first is a thought experiment employing a quantum entangled randomly polarized photon interstellar link between Earth and Betelgeuse. We know from Bell's theorem that if we measure or manipulate the polarization of one photon on Earth, it's twin will be affected instantaneously on Betelgeuse. (See, Rauch et al, 2018 for the latest Bell test and results.) However, communicating over this superluminal link is, as far as we know, blocked by quantum randomness. The second is the PEAR lab data which gives a strict methodology for modifying the mean of a random bit stream using conscious intent. This paper is a thought experiment that combines the two – a randomly polarized quantum entangled photon stream modified by conscious intent to thwart quantum randomness, thereby creating a superluminal communication link.

Through conscious intent, an experienced operator may be able to influence random processes making them statistically different within a reasonable time period. These differences can be used to send 'bits' superluminally on an entangled communications link. Unfortunately, until we find better operators or somehow train operators to be more proficient, the bit rate of our superluminal link is only on the order of 3 bits/hour, if that!

To reiterate, superluminal communication should be possible if we allow ourselves to take an unconventional approach to the problem. The work of pioneers like Dr. Robert Jahn, Brenda Dunne, and others, with their rigorous scientific study of non-local human/machine interactions, suggests that we are responsible for the gremlins in our systems. But can they be controlled, and will they perform on demand? For the moment, the answers seem to be 'maybe' and 'unlikely'. We know replicating results on demand and at other labs has proven to be elusive. Until the replication issue is adequately addressed, it is difficult to see "conscious intent" being used as a tool in an otherwise mainstream physics experiment employing quantum entanglement, which, no doubt, in itself, is difficult to do.

However, mainstream physics has its own issues with consciousness. One such issue is described in a recent New Scientist article as follows. "... But physics, which aims to describe the universe and everything in it, says nothing about your inner world. ... our brains are made of matter – so, you might think, the states of mind they generate must be explicable in terms of states of matter. The question is: how? And if we can't explain consciousness in physical terms, how do we find a place for it in an all-embracing view of the universe?" (Lewton, 2022, p. 38).

In the author's humble opinion and not being a member of either community, perhaps it is time for psi researchers and physicists to tackle the problem of consciousness together by sitting down and comparing notes.

My purpose in writing this paper is simple: to challenge the view that communicating superluminally over a quantum entangled link (i.e., the type of link described in Nick Herbert's book) is impossible. It is formulated as a thought experiment, but I would expect an actual test of the concept in some fashion could be performed, perhaps, even, without the need for gremlins – though I don't know how.

FURTHER THOUGHTS

A. At first glance, it may seem ridiculous to propose an experiment for long-distance communication that does not even achieve the bit rate of a Morse code telegraph link. However, in the future, when we wish to communicate with a remote platform in space that could take messages days or weeks, or even years to reach at the speed of light, a few bits per hour without transmission delay would be a

dramatic improvement.

B. To better discriminate between the two binary states, we could use a gremlin that is good at causing more ups than downs and another that is good at sending more downs than ups. Using a single gremlin that, on command, could shift the mean up or down within a given 20-minute test period would be the best.

C. The PEAR experiments could be run at various bit rates (also referred to as "counting" rates, or "sampling" rates) at the discretion of the operators. These were 10, 100, 1000, and 10,000 b/s. It may seem that the higher the bit rate, the faster statistical significance could be achieved. I am certainly not an expert in the running of the PEAR experiments or in the analysis of their data. But my reading of their literature suggests that increasing the bit/sampling rate beyond a certain point (which appears to be 1000 b/s) either makes a negligible difference or is unpredictable in its effect or they did not have the time to properly study its effects. (Jahn, 1982, p.149; Jahn et al., 1987/2009, p.99, p.114); (Nelson, 1996, p.113). The more important parameter, I believe, is an operator's proficiency in flipping bits in a bit stream. As mentioned previously, this varies from 1 to 40 bits in 10,000. Therefore, whether you receive a million bits or a thousand, the ratio of flipped bits to total bits is the same. As long as the flipped bits in either direction (mean shifted up, PK+ or mean shifted down, PK-) consistently exceeds the 'noise' in the stream characterized by the wandering baseline (BL curve), the shift in the mean should be detectable.

D. The selection of a 20-minute period to achieve a significant statistical shift in the mean was not entirely arbitrary. PEAR test data suggests a 500- trial tripolar session (PK+, PK-, and undisturbed baseline) would take most operators less than one hour to complete (Jahn et al., 1987/2009, p. 99). Though difficult, this would imply that an average operator could shift the mean up or down within 20 minutes.

E. The human/machine interaction experiments carried out at the PEAR lab used ordinary volunteer subjects who claimed no special talent in this field. It may be possible to find people or couples, or groups that are particularly adept at introducing gremlins into a system and controlling them thereafter (Dunne et al., 2005, p.709).

F. To communicate in both directions, a similar setup is required at both ends. One may then ask if the operator at one end can influence that station's bit stream, can he/she influence the remote station's bit stream directly rather than going through an entangled quantum link? Data at the PEAR lab and others would seem to indicate this should be possible. But why stop there? Why not go to a direct mind-to-mind telepathic link? Could we, someday, bypass the whole messy business of communication equipment and have direct mind-to-mind thought transference? Perhaps. Would it be superluminal? I don't know. But a cursory internet search of the latest information on telepathic research would suggest that a scientific experiment involving "true" mind-to-mind thought transference, i.e., without the need for intervening sensory equipment, is a long way off. (Jennings, 2018; Iozzio, 2014).

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ESSAY

Mothman, The Silver Bridge Collapse, and the Folklorization and Commemoration of Actual Events

Jack Daly
jjd6529@psu.edu
Pennsylvania State Harrisburg

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HIGHLIGHTS

The social (con)fusion and commodification of two dramatic historical events might have helped to build and sustain the famed 'Mothman' legend.

ABSTRACT

By examining the songs, media, and material culture associated with the legendary monster Mothman, this paper shows how folklore can become commodified and what issues may arise as a result. By using Paredes' theory of "folklorization" and McDowell's concept of "commemoration," legend scholars can track historical developments across space and time to understand the metamorphoses a legend undergoes and why. Ultimately, this paper uses the term "narrative hijacking" to describe the process in which a historical event such as the Silver Bridge collapse of 1967 is overshadowed by its association with a legend, which in this case, is the story of the Mothman.

KEYWORDS

Monster, legend, Mothman, Point Pleasant, folklore.

INTRODUCTION

The legendary monster "Mothman" has cemented its status in popular lore thanks to the success of John Keel's 1975 book *The Mothman Prophecies* and the 2002 movie of the same name. Despite its popularity, this creature spawned a significant rift among the people who were affected by the real-life events behind the monster. Tragically, on December 15, 1967, 46 people died as the bridge that connected Point Pleasant, West Virginia, and Gallipolis, Ohio, collapsed. Point Pleasant had been the epicenter of Mothman sightings, and the monster became indelibly linked to the bridge disaster. This paper examines the commemoration and folklorization of this event, investigating how it has become associated with a large bird-like creature that came to be known as Mothman.

An examination of the narratives and material culture surrounding Mothman and the Silver Bridge collapse, including songs, literature, and film, shows an intriguing interplay between the outsider and insider perspectives regarding the events and raises important questions regarding the commodification of legends. In this paper,

I will show some of the complications that arise as actual events become folklorized, and how the narratives surrounding historical events can be hijacked by people with a significant economic incentive. Ultimately, my argument is that the ways in which the events surrounding the Silver Bridge collapse have been commemorated and folklorized have resulted in what I term a "narrative hijacking" in that the popularity of Mothman has overshadowed the actual events of the bridge collapse.

To put my article in context, I will provide background information about Mothman and the Silver Bridge collapse. A literature review of folklorization and commemoration will also be provided, which will contain a review of the literature that has been published about Mothman. To build on my argument, I will provide evidence from two songs: Ray Anderson's "The Silver Bridge Disaster" and Fish Fisher's "The Mothman Song," to show the significant difference between how people dealt with the events. A discussion of the book and the movie *The Mothman Prophecies (2002)* will be included. Finally, I will show how the popularity of the movie led to further commemoration and folklorization.

Literature Review

Latin-American folklorists used folklorization to describe the way an event became folklorized by way of artistic production and other displays of culture. This concept was popularized in the realm of American folkloristics by Americo Paredes, particularly in his work about Jose Mosqueda. Drawing upon the work of Paredes, John H. McDowell developed the theoretical framework of "commemoration." This concept focuses on the specific function that the forms of folklore exhibit. Each of these theories is applied to historical events. In the case of the Silver Bridge collapse and Mothman, the disaster is an actual event that transpired. The aftermath of the history, and the folklorization and commemoration efforts enacted, are particularly telling, and the frameworks provided by Paredes and McDowell lend a helpful hand for analysis.

Paredes' article "Jose Mosqueda and the Folklorization of Actual Events" established the structure upon which this essay is built. In his work, Paredes discusses the folklorization process linked to Jose Mosqueda. Mosqueda was arrested, indicted, and later died in jail due to his involvement with a train robbery that occurred near the border of Texas and Mexico in 1891. By tracing the development of corridos, or ballads, that recounted the event, Paredes shows how the narrative surrounding the story shifted. The original corridos of Jose Mosqueda were more of an accurate depiction of what actually happened while also reflecting how people along the border felt. However, as time went on, the narrative changed. People's roles were altered, and Mosqueda transformed from a simple robber to reflect the heroes of border ballads, and the song itself morphed from an outlaw ballad to a border-conflict ballad (Paredes, 1971, pp. 10-14). Similarly, songs arose about Mothman and the Silver Bridge. In this case, however, the center of attention is not on a single song that changes over time, but rather it is on the shift in focus from the bridge to the creature.

In his article "Chante Luna and the Commemoration of Actual Events," John H. McDowell intentionally draws on the theory of folklorization. He says that he takes his "inspiration from Paredes in this paper, as indeed I have done through my entire academic career" (McDowell, 2005, p. 40). McDowell is clear that he is not merely applying Paredes' theory to another ballad, and he creates the concept of "commemoration" to analyze the events surrounding Chante Luna. What sets commemoration apart from folklorization is that it serves a particular function, which is that a historical event is commemorated to push a narrative.

Chante Luna is an outlaw who is captured due to help by two of his associates and is transported towards Chilpancingo. At a barrier, Chante is told he will be delivered to federal agents. He kills one of his partners and then dies in a gunfight with the federales (McDowell 2005, p. 53-54). This story seems straightforward enough, but the corridos it appears in show marked differences. In the corrido form, it is "clear that this good man was framed by the government, accused of a murder that he did not commit" (McDowell, 2005, p. 53). Individuals that would be sympathetic to his cause composed corridos that reflected an ethos of anti-government corruption. As such, it makes sense that Luna is depicted as "a bold man of action" (McDowell, 2005, p. 54). On the contrary, a newspaper article from the time tells a very different story, painting a portrait of Chante as a criminal and murderer while suppressing the names of the individuals involved and therefore erasing their memory. The newspaper, as opposed to the corrido, comes from a place of sympathy for the federales rather than the people. McDowell makes the point that "every teller has a stake in the tale, and this stake influences their take on the story" (McDowell 2005, p. 61). Like the situations surrounding Mosqueda and Luna, the stake of the individuals in the events of the bridge and Mothman influence their presentation of the events.

Like McDowell, I do not merely wish to recapitulate the theories of those who have come before me. Instead, I apply their theories simultaneously. The events which transpired in Point Pleasant in the late 1960s are uniquely multifaceted in that there is a historical event, the bridge

collapse, but on top of that, there is a legendary creature imbued with supernatural abilities which have become the focal point of the events. This stands in stark contrast to the stories of Mosqueda and Luna. Furthermore, while their focus was on corridos and newspaper articles, I use songs, books, movies, and material forms to show how the events have resulted in an ongoing rift between the parties involved.

Mothman Background

Over a thirteen-month span between November 1966 and December 1967, the town of Point Pleasant, West Virginia, was inundated with mysterious sightings of what has now become known as Mothman. The phenomena got its start on November 15, 1966, when Mr. and Mrs. Scarberry and Mr. and Mrs. Mallette saw a creature that they could not explain as they were driving near a remote and abandoned munitions storage site near Point Pleasant known as the TNT area. They described seeing a being that "was shaped like a man, but bigger... Maybe six and a half or seven feet tall. And it had big wings folded against its back" (Keel, 1975, p. 77). They added that "it was those eyes that got us... It had two big eyes like automobile reflectors" that were "hypnotic" (Keel, 1975, p. 77).

The next day, a press conference was called, and the witnesses were interviewed by local reporters. An investigator named Mary Hyre sent the story to the AP wire, and "the bird was the chief topic at supper tables throughout the Ohio valley" (Keel, 1975, p. 78). From the onset, the creature was called a bird, not Mothman, but later that day, a copy editor coined the term "Mothman," playing off the popularity of Batman. This narrative of hijacking and sensationalism has carried on into today as the monster's popularity has become the focal point for commodification rather than the bridge disaster.

Shortly after the Scarberry's and Mallette's encounter, Point Pleasant was flooded with sightings. Two volunteer firemen had a sighting of a giant bird by the TNT area. They said that "It was definitely a bird... But it was huge. We'd never seen anything like it" (Keel, 1975, p. 82). Once again, the creature was described explicitly as a bird, but the media narrative at this point had attached the enigmatic moniker "Mothman", and that was where the focus lay. Keel notes that "Television crews and newsmen from other states hovered around the old generator plant, hoping to glimpse the monster" (Keel, 1975, p. 86). The familiar pattern of paranormal, voyeuristic tourism that is prevalent in Point Pleasant today is here in its nascent stages.

A journalist and ufologist named John Keel traveled to Point Pleasant, originally to research UFOs, but his presence changed the Mothman legend forever. Keel was a Fortean: a school of thought named after Charles Fort. Forteanism focuses on paranormal and unexplained phenomena and is an "examination of the way in which anomalous events emerge into public awareness and are subsequently framed through, at times antithetical frameworks" (Dixon, 2007, p. 191). In many ways, it is an interrogation of consensus reality. He had come to Point Pleasant to inquire about UFO sightings, and then the bird sightings started. It was a perfect storm. Keel jumped on the situation, and ran with the Mothman story, his Fortean lens obfuscating his view of the events. Eight years later, he published *The Mothman Prophecies*, which made the story of Mothman even more popular while diminishing the lives lost in the Silver Bridge disaster.

People were frantic, searching for an answer. An Ohio professor posited that the creature was a rare sandhill crane (Keel, 1975, 88). No one had an explanation, but those who saw it "agreed on the basic points. It was gray, apparently featherless, as large – or larger – than a big man, had a wingspread of about ten feet, and did not flap its wings in flight. Its face was a puzzle. No one could describe it. The two red eyes dominated it" (Keel, 1975, p. 88).

Keel says that over the years between 1966 and 1967, over a hundred adults saw the creature (Keel, 1975, p. 88). Then the unthinkable happened. On December 15, 1967, the Silver Bridge connecting Point Pleasant and Gallipolis, Ohio, collapsed. Red lights on both sides of the bridge led to a build-up of cars that the structure could not withstand. Eye-bar 13 broke, and the disaster ensued. Cars fell into the Ohio River below, and 46 people died. It is, to date, the deadliest bridge collapse in United States history. The lore surrounding Mothman is that it is an omen of death and that its presence predicted the disaster. The sightings stopped after the collapse, but the fact remains that real people died and that something was being seen. Thirteen months after the sightings began, they stopped after eye-bar thirteen snapped and led to a disaster that changed Point Pleasant forever.

Mothman Songs

There have been several songs made about the Silver Bridge collapse and Mothman. For the purpose of this paper, I will be covering two different songs: Ray Anderson's "The Silver Bridge Disaster" and Fish Fisher's "The Mothman Song." Each of these songs deals with the occurrences in Point Pleasant in a harshly different manner. Anderson focuses solely on the bridge disaster, while Fisher focuses on the legends surrounding Mothman. Interestingly, Fisher's performance, which I have used

as my example, is done at the annual Mothman festival, taking place in Point Pleasant. The festival was set up by a local following the movie's release and is used as a means to capitalize on its popularity. This gathering has drawn much ire from many other locals but still remains a complicated issue as it greatly benefits the town's economy. Thus the musical forms that have been folklorized and commemorated have contributed to the rift and are also used for markedly different purposes.

Following the work of Paredes and McDowell, I also am using song in my study. However, they both used ballads or songs which have a narrative structure. I, on the other hand, am using songs that don't tell a story but rather contain a historical overview of the situation. Furthermore, the ballads of Jose Mosqueda and Chante Luna were shown to have changed over time, while the songs of Anderson and Fisher have remained the same. Instead of comparing how the narrative components of a song change over time, I am comparing two different songs to show how those songs exemplify the different ways people have dealt with historical events.

Ray Anderson's "The Silver Bridge Disaster," released shortly after the collapse in December 1967, captures the sentiment of the time, which was of how sad it was that the disaster happened. The verses show that the song was used as a way to mourn and deal with the tragedy that had happened. For the sake of brevity, the whole song won't be included, but rather important verses will be quoted.

The lyrics constantly stress that actual people lost their lives: "There were husbands and wives, little children that lost their lives." Part of the divide that has occurred between the people who focus on Mothman and the people who focus on the Silver Bridge is that the former's commodification of the legend trivializes the real people who died. This song shows that the focus immediately after the bridge collapse was on the disaster and not the monster.

The song also functions as a coping mechanism to come to terms with the tragedy. These lines show as much: "Oh my friends, do you know that we're a traveling, day by day as we journey along, and someday we must cross this chilly river 'cross the bridge into our eternal home. Let's prepare now to meet all our loved ones." The phrases "we must" and "our loved ones" are bonding terms that place stress on the community and a shared sense of loss. Anderson then moves on to say that one day we will cross the river (death) and be united with our loved ones. The Christian ethos of West Virginia is invoked, and the people are reminded that despite the terrible loss, they will be able to see their loved ones in the afterlife.

Fish Fisher's performance at the 2015 Mothman Festival in Point Pleasant stands in stark contrast. By this time, nearly 50 years after the disaster, the perspective has changed. No longer is the focal point the real people that had died, but rather the mystery surrounding the legend of Mothman. Following the popularity of the movie's success, vendors and artists have a financial incentive to capitalize on the commercial value. Again, whole lyrics will not be provided, and important quotes will be referenced.

The popular lore of Mothman has become the focal point. References such as Mothman being "Chief Cornstalk's ghost or an alien," the "buzz on the television," and that he "sends premonitions" are straight out of Keel's book. The only mention that the disaster is also tied to Mothman's role and the question of whether the creature was a harbinger of death or an agent of protection. Here we see how the influence of both the book and the movie has resulted in a performance situated within a specific context. The festival was created as a result of the opportunity to commodify the legend following the movie, and the song focuses on deep lore from the book, which is altogether absent from Ray Anderson's song, which of course, predates them both. Thus there is a temporal shift in perspective dictated by a purpose: from the disaster to the monster, from coping mechanism to financial gain.

John Keel and *The Mothman Prophecies* (1975)

In 1975, John Keel published his book *The Mothman Prophecies*, which detailed the events that plagued Point Pleasant during the late 1960s. The book contains everything from UFO sightings, musings on ultraterrestrials, speculations of Mothman's link to Tibetan "tulpas," and, of course, Mothman itself, as well as the Silver Bridge collapse. Eventually becoming a *New York Times* bestseller, this work led to the 2002 movie by the same name. Without this book, it is entirely plausible that the Silver Bridge disaster would not have nearly the historical recognition that it holds today, and Mothman's place in monster lore would be immensely less significant. Although these are both factors that have led to an economic resurgence in the town, the book has contributed to the rift which now exists surrounding the situation. It has created what I term a "narrative hijacking" in that it has made the story about Mothman rather than the disaster, and it was a forerunner of tension that exists within the emic and etic perspectives.

My concept of narrative hijacking is similar to Jeannie Banks Thomas' "invasive narrative," though it differs in significant ways. Thomas says that "an invasive narrative is not a story that locals live *by*; rather, it is a story that locals live *with*, whether they like it or not" (Thomas, 2015,

p. 51). The original context of Thomas' invasive narratives is Salem and its association with witch trials. The difference between the invasive narrative and a narrative hijacking is that in the case of Salem, the story of the witch trials is at the center of the narrative, whereas in the case of Mothman, the Silver Bridge Collapse is, as I argue, the real point of concern, and that the legendary monster has usurped the historical event as being the point of focus.

Keel's book has played a major role in the popularity of Mothman and the narrative surrounding Point Pleasant attached to it. I would argue that his personal stake in the legend and the way that he understood what was happening was shaped by his Fortean worldview and deep interest in the paranormal. As such, it is not surprising that Keel came away from the situation with his bias confirmed: that there is a Fortean creature in Point Pleasant, that the UFO sightings, the Men-in-Black, the telepathic messages, and even the bridge disaster itself are all intertwined. Dixon says, "the figure of the Mothman, then, becomes the fulcrum around which the character of Truth, along with the associated constructs of reality, cause-effect, explanation, coherence, and identity are thrown into doubt" (Dixon, 2007, p. 191).

Clearly, as we have seen through Ray Anderson's song, the bridge disaster was on the minds of people after the event had happened, but that song was made just months after the fact. Keel's book was published eight years later and has become a staple of both Fortean and monster literature. In many respects, this book hijacked the narrative from being about the disaster and the tangibility of the lives that were lost and the families that were ruined and made it about the monster.

Keel had become convinced that Point Pleasant was what Dixon terms an "extra-geography," a space "whereby the rigid spatial categorizations of cartographers and planners provoke, and are on occasion overturned by, flights of imaginations and fancy" (Dixon, 2007, p. 189). This occult journalist went into the situation looking for Forteanism, and, in a biased way, it is exactly what he found. Keel affirms this as much: "I realized the folly of trying to measure the circle from some distant point, so I picked a microcosm on the edge of the circle – a place where many manifestations were occurring simultaneously, and I hit the jackpot immediately" (Keel, 1975, pp. 12-13). In other words, To Keel Mothman and the Silver Bridge were absolutely connected, and so he conflated the two. For others, however, that was certainly not the case.

So it was Keel's lens, his preconceptions, and personal biases which led him to see the story of Mothman and the Silver Bridge as one and the same. Perhaps it is the power of the title of both the book and the movie that led to the narrative hijacking, the shift in perception from the Silver Bridge to Mothman. If the title was "The Silver Bridge Prophecies" or even the more alliterative "Point Pleasant Prophecies," the rift would be diminished.

A further rift that Keel's work contributes to exists between emic and etic communities and their relation to the events. Emic and etic are terms used by folklorists to distinguish between insider and outsider perspectives; emic corresponds to the insider, and etic corresponds to the outsider (Dundes, 1962, p. 101). This distinction existed in the 1960s during Keel's time and continues to manifest itself as the commodification of the legend, which the Hollywood movie contributed to, has exerted its power and influence over the small town of Point Pleasant.

One way that this emic and etic conflict plays out in Keel's book is through the portrayal of the so-called "Men-in-Black." These familiar figures, which are cemented in extraterrestrial lore thanks to the movies starring Will Smith and Tommy Lee Jones, appeared in Keel's work. In fact, Keel is credited with coining the term. Interestingly, these characters were erased from the film, just like other real-life characters that appear in the book.

Keel depicts these men and women as being distinctly "other." He focuses on their Oriental features and their foreignness and thus concludes that they must be alien. He says that:

> "What troubled me most was the fact that these mystery men and women often matched the descriptions given to me by contactees who claimed to have seen a UFO land and had glimpsed or conversed with their pilots; pilots with either pointed features or Oriental countenances, dusky skin (not Negroid) and unusually long fingers," (Keel, 1975, p. 34).

Keel was quick to confirm his theories in even the presence of people who did not look like him, and Dixon points out that between 1960 and 1970, West Virginia experienced a great increase in immigrants from the Philippines, Japan, and China (Dixon, 2007, p. 201) so it is reasonable to conclude that these weren't extraterrestrial visitors but rather people from this demographic.

Keel himself occupies somewhat of a liminal space as far as emic and etic perspectives are concerned. He was not from Point Pleasant, but he became closely ingrained with the community, particularly with figures such as Mary Hyre, a local reporter, and Woody Derenberger, a local who had a UFO sighting and informed Keel that he had been getting telepathic messages from a man named Indrid Cold whom Keel understood to be intertwined with Mothman.

The emic and etic rift continues to play itself out today and is complicated by the fact that there is consternation within the emic community. Hollywood, the ultimate etic, continued the narrative hijacking that Keel started with the movie, which has been met with cynicism by the locals. Koven notes that movies with folkloric features can reflect contemporary belief traditions (Koven, 2008, p. 3). The fact that the movie featured the monster and not the disaster reflects the shift in focus. Some locals chose to capitalize on this popularity by way of creating festivals, statues, tours, and museums. So the rift that Keel's xenophobia started was exacerbated by Hollywood and caused tension within the "insider" perspective.

Keel's Role, Ostension, and Mothman Anomalies

While Keel played a crucial role in the popularization of the Mothman legend, I would argue that there have been three major phases in the story's development. First is the initial phase, which involved the first reports of Mothman sightings. This occurred during the beginning of the 13 months of sightings starting in 1966 and ending in 1967. During this phase, newspapers ran stories about the monster, Keel was on the ground conducting fieldwork, and Point Pleasant became a hub for ostensive actions. The second phase can be called the "Keel phase," during which Keel wrote articles about Mothman, culminating in the 1975 publication of *The Mothman Prophecies*. The third and final phase began in 2002 with the release of *The Mothman Prophecies* movie. This period is marked by a renewed interest in Mothman and new tourist attractions being put into place in Point Pleasant.

David Clarke's article "The Mothman of West Virginia: A Case Study in Legendary Storytelling" provides a good summary of the development of each of these phases. On November 17, 1966, reporter Mary Hyre, whom Keel was in continuous contact with, reported in the Athens, Ohio messenger that four people in Point Pleasant had been chased by a "man-like thing" with wings and red eyes, flying at 100 miles an hour (Clarke, 2022, p. 267). These four were the Scarberrys and the Malettes, who reported their experience to Deputy Millard Halstead. This story was distributed in a publication for troops called *Pacific Stars and Stripes* and was met with further newspaper stories until the title "Moth Man" was applied to the monster, which stuck (Clarke, 2022, p. 267).

While this essay suggests that the presence of the Mothman narrative today has spawned antagonism in Point Pleasant, in part due to the commercialization of both a monster and a disaster, the development of a legend's popularity is more complex than the simple formula of story + tourism = money. The story of Mothman was extremely popular during this initial phase, largely without Keel's guiding influence, as there were eight years between the bridge collapse and the publication of his book. As Clarke notes, in the months after the original stories were reported, the TNT area of Point Pleasant became a hub for legend trips (Clarke, 2022, p. 267). Folklorists use the term "legend trip" to describe a journey to a location associated with a legend. A legend trip is a form of ostension, a term used by Linda Dégh and Andrew Vázsonyi to describe the acting out of a legend (Dégh & Vaszonyi, 1983). During this period, hundreds of sightings were reported in Point Pleasant, many of which were collected by Keel. So people were seeing *something*, and these sightings invited both locals and outsiders to participate in the legend by performing ostensive acts.

Keel joined in the legend, tripping himself, as he visited the TNT area in search of Mothman. During his first trip, the journalist Mary Hyre and a woman named Connie Carpenter were among those accompanying him. Connie previously had an encounter with Mothman and told Keel that the being she saw had a wing span of ten feet and glowing red eyes with a "hypnotic effect" (Keel, 1975, p. 30). Subsequently, Connie was stricken with klieg conjunctivitis, a condition of the eyes marked by redness and swelling. During their visit to the TNT area, Connie said she saw Mothman's eyes. Keel reentered the site, and while he was alone, Mary Hyre saw a "tall figure running," and a woman named Mabel McDaniel heard a metallic, hollow noise, which Keel denied making (Keel, 1975, pp. 98-99). Mary Mallette's ear began to bleed, and a local policeman, Deputy Sullivan, said that he had seen something. These anomalous encounters, coupled with physical effects, provided in a memorate form by Keel, indicate that *something* was happening in Point Pleasant. With the sheer volume of sightings reported, it is no wonder that the legend and allure of Mothman spread so rapidly.

Another Point Pleasant area resident who was at the core of both Mothman legend trips and anomalies was a man named Woodrow "Woody" Derenberger. On November 2, 1966, Woody was driving home when a chimney-shaped vehicle sped by him and stopped in the middle of the road. A man stepped out of the UFO, which was hovering in midair. The being introduced himself telepathically as Mr. Cold. Woody was instructed by Mr. Cold to report his experience to the authorities, which he did, and the story was recounted in the local press, radio, and television. After his encounter, Woody's farm became a destination for legend trippers, who hoped to glimpse the craft for themselves (Keel, 1975, pp. 67-69). While discussion of Mothman is typically focused on the bird-like creature, Keel's narrative and the legends abounding in

Point Pleasant during the late 1960s include anomalies such as UFOs, telepathy, and precognition.

Woody Derenberger was not the only person in the Point Pleasant area to see a UFO. In fact, Keel's text is full of UFO sightings. He details how a woman named Mrs. Kelly witnessed a metal disk above her children's playground, which featured a humanoid being standing outside of it in midair. Mary Hyre witnessed a UFO herself, and so did customers, including a police officer, of Tiny's, a restaurant outside Point Pleasant (Keel, 1975, pp. 55-56). Keel came to call the 13 months between 1966 and 1967 the "Year of the Garuda," named for a divine bird from Hinduism. He notes how folklore of flying beasts is present in most cultures throughout the world (Keel, 1975, p. 41). It is not strange, then, that stories of winged creatures appeared in West Virginia. While people were sighting something, whether that be sandhill cranes, military experiments, or Mothman itself, the acts of ostension by locals and outsiders alike show a communal desire to interact with age-old legends of supernatural flying beings.

There were more anomalies that added to the allure of the Mothman story. Keel details how he began to receive messages from what he refers to as "the entities" about disasters such as plane crashes that turned out to be true (Keel, 1975, p. 241). This included a warning of an impending disaster in Point Pleasant, which is often interpreted as the Silver Bridge collapse. Mary Hyre told Keel that she had a precognitive dream about people drowning in a river and Christmas packages floating on the water (Keel, 1975, p. 274). This is eerily similar to the historical events of the bridge collapse. Keel also says that acquaintances of his began to receive phone calls from him that he never made and suggests that somebody, or something, was imitating his voice to make these calls. While I would argue that the third phase of the Mothman legend, beginning with the movie in 2002, was affected the most by capitalistic drives, interest during the first phase, much of which is detailed in Keel's book, was driven by ostensive action related to Mothman itself, rather than to the legend of Mothman, as was the case in the third phase.

In 2002, *The Mothman Prophecies (2002)*, starring Richard Gere, was released, starting what I consider the third phase of the Mothman story. Naturally, this movie sparked a renewed interest in the monster, and with that, more ostensive acts mainly focused on local tourism. Some Point Pleasant locals, such as Jeff Wamsley, saw an opportunity to capitalize on this popularity. Wamsley says:

> "Since the movie came out, it's just been wow! I knew it would. I was selling Mothman stuff before the movie came out. I was working on my first book **(**about the Mothman**)**, and somebody called me and said, "Hey, you know, they're doing a movie with Richard Gere in it!" and I knew right then that the floodgates (would open) and it would just be like BOOM**!"** (Kruse 2015, p 323)**.**

Since then, Wamsley has created a Mothman Museum, a Mothman Bus Tour, and a Mothman festival.

There is a duality at play when it comes to the use of Mothman to boost tourism. On the one hand, Kruse notes how "small towns in Appalachia and other regions have a vested interest in attracting tourists" (Kruse, 2015, p. 313). Point Pleasant is a unique case study in this regard, as the bridge disaster left it literally disconnected from a good deal of its economic origins, as those who would have come to the town from across the Ohio River were no longer able to. Furthermore, researchers have noted how small towns such as Point Pleasant are vulnerable due to larger market forces causing trends such as population decline and, thus a weakened economy (Wirtz, 2011, p. 13). However, the resurgence of Point Pleasant as a place because of the commercial success of the movie has left it in a position to capitalize on tourism in a way that many small towns aren't. Still, it is Mothman, and not the Silver Bridge, that draws outsiders in, and some residents just "roll their eyes when it comes to the Mothman" (Kruse, 2015, p. 323).

Denny Bellamy, the Executive Director of the Mason County Convention and Visitors Bureau, works with the Mothman bus tour in an attempt to "weave the history sites together to form a heritage tourism landscape that intersects with Mothman lore" (Kruse, 2015, p. 320). He notes that people on tour inevitably link Mothman to the Silver Bridge, which he states explicitly the "locals don't like at all" (Kruse, 2015, p. 321). This point is key to stress, as it affirms indeed that there is antagonism within the community. The popularity that Mothman imposed on Point Pleasant led to this rift. Still, small towns like this would be remiss if they were to pass on such a lucrative opportunity. Charles Humphries, the Executive Director of the Mason County Development Authority, says of the decisions made to boost tourism by way of Mothman that he "had people wanting to run me off! Some of them tried! I still have people that hate the Mothman here in town. But I saw it as an opportunity to get our name on the map" (Kruse, 2015, p. 326).

The ways in which the actual events have been folklorized and commemorated in Point Pleasant stretch beyond the tours and museums. Both the Silver Bridge collapse and Mothman have been commemorated by ma-

terial forms that stand in marked contrast to one another. A plaque commemorating the Silver Bridge collapse sits down by the riverside. It is very plain and acts as a means to remember those who lost their lives. In contrast, a huge metallic Mothman sculpture was commissioned by the Point Pleasant Main Street Organization and sat in a prominent position in town. Herein lies the difference between the way that these two aspects of the same event have been dealt with in a different way: the plaque is meant to remember, the statue is meant to draw people in and further folklorizes the actual events, and is a continuation of the narrative hijacking.

Researchers have noted that there is a trend of "people traveling to destinations to recapture the distinctive sense of place portrayed on screen" (Alderman et al., 2012, p. 213). The tourism that has been driven towards Point Pleasant is largely due to this trend. However, the movie was not shot in Point Pleasant, so travelers who desire to interact with the legend in this regard are getting more of a simulation rather than an authentic experience. Furthermore, the tourism boost of Point Pleasant has allowed people to engage in legend-tripping and ostensive practice in new ways in regard to Mothman.

Implications and Applications

By applying Americo Paredes' theory of "folklorization" and John H. McDowell's theory of "commemoration," legend scholars are able to trace the diachronic development of contemporary monsters. The case of Mothman shows how the interplay between emic and etic perspectives of legends spawn significant social problems, particularly when commercial interests are at stake and when people's lives are significantly altered due to events tied to the legend. This research helps to show the complexities at work as folklore becomes commodified and how local communities become disenfranchised in the process.

Conclusion

The renewed interest in the actual events tied to the 1967 Silver Bridge collapse has led to unique and complicated antagonism between the insider and outsider perspectives, resulting in inter-group strife. John Keel's book largely shifted the focus from the tangibility of the tragedy towards the mystery of the legend. The release of the 2002 movie opened up an opportunity for Point Pleasant to capitalize economically, and in many ways, it allowed the locals to reclaim their power. Still, this move was met with resistance and cynicism while the deaths caused by the Silver Bridge collapse live on in the collective memory of the town.

This work should cause an expansion of how the theories of folklorization and commemoration can be applied to actual events. Folklorization and commemoration spread to the material realm and even into popular culture. Despite the fact that there is strife and disagreement in Point Pleasant over how this situation was handled, this is an example of how an actual event can be turned into folklore, as would be the case in Keel's book, transmitted into popular culture in a movie, and then reclaimed back into folk culture through material means such as festivals, art, and music.

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ESSAY

Emotion: The Connective Tissue of Atmospheres and Haunts

Michael Jawer
emotiongateway@hotmail.com

Emotion Gateway Research Center

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HIGHLIGHTS

"Haunted" atmospheres might turn on the quality or intensity of feelings expressed by individuals, even if they are no longer in that location or no longer living.

ABSTRACT

Just as a small band of scholars has endeavored to explore the phenomenon of "atmosphere" – i.e., the characteristic feel of a particular situation, circumstance, artifact or era – another group of researchers has shed light on the defining characteristics of "haunts," those places where the atmosphere may, to some people, seem strange, spooky or off-putting. The fields of atmosphere studies, hauntology, and spectrality attest to these investigations. However, scholars of atmosphere rarely refer to haunts, while scholars of hauntology and spectrality insufficiently emphasize the affective core of atmospheres. This paper argues that affect – which nearly all studies acknowledge as the key element of atmosphere – is equally central to the phenomenon of haunts. Since affect is a property of living creatures, the paper proposes that haunted atmospheres attest to the quality or intensity of feelings expressed by individuals, even if they are no longer in that location or no longer living. Just as atmospheres can be sensed but not grasped, just as they are ineffable yet discernable, and just as they are fleeting yet can also linger, they resemble feelings, moods and ghosts. The term "presence," which recurs throughout atmosphere studies, hauntology, and spectrality, is closely considered for its connection with concepts of time, immediacy, and memory. Three experiences of the author are presented as touchstones for evaluating the possibilities discussed. The paper concludes by discussing our species' "ocular-centrism," i.e., its tendency to conclude that what can be seen and definitively measured is real whereas what is invisible and shifting is less real or not at all.

KEYWORDS

Atmospheres, emotion, haunts, presence, affect, spacetime.

INTRODUCTION

The Covid pandemic has, unfortunately, taught us many things. One of them is that some people miss being in the office with their colleagues...while others (the more introverted among us) enjoy being the sole worker in their home office. But one thing we can presumably all agree on is that the work atmosphere is much different on a screen versus being in person. The dynamics are vastly altered: you can't read body language; tone of voice seems an isolated cue; it's hard to know if a silence is uncomfortably prolonged or merely routine; and jokes (especially dry ones) will mostly zip past people without benefit of a smile, a wink or a guffaw.

The difference between being in-person and virtual was pointed up recently by two comedic actors – Dwayne Johnson and Kevin Hart – discussing their animated movie, Doggone Heroes. Each plays a canine called upon to

help DC Comics superheroes who have been kidnapped. In an interview (Reinstein, 2022), the two actors said that they mostly recorded their parts separately but that "we made it a point to get together and record a handful of our biggest scenes together. Our chemistry is really dynamic and really jumps off the page. And when we're together in person, it just becomes a different energy in the room and the air shifts."

"The air shifts"...what an interesting statement. It reflects an intangible *something* between people – an energy that we somehow pick up on. The energy, the 'atmosphere' of a crowded bar where the patrons are cheering for their favorite team on TV is obviously different from that of a chapel memorial service, where people are gathered to eulogize or mourn someone they all knew (to choose two examples at polar ends of a spectrum). In the first case, the atmosphere will be raucous; in the second, somber or subdued. We could choose any number of other examples: the way hope seems to evaporate from a football stadium when the home team is intercepted in the final minute...the joyful feeling in a musical theater when the performers are belting out a number and reveling in each other's company...the studious quiet of a public library...or the 'devotional' ambiance of a church, synagogue or mosque, where the worshipers are praying to some extent individually and to some extent communally.

What about when no other people are around? Can a deserted shoreline 'feel' desolate? Can a sun-dappled forest 'feel' serene? Can a cemetery visited at midnight 'feel' spooky? I shall posit that no such atmosphere is truly possible without more than one person – or, rather, more than one *creature*, present. The reason I amend to "creature" is the presumption, explored most recently in my book *Sensitive Soul* (Jawer, 2020), that many other animals besides humans feel and emote. Those feelings may well be evident in an atmosphere.

Consider the term *atmosphere.* It's defined variously as "the gaseous mass or envelope surrounding a celestial body...and retained by [that] body's gravitational field"..."a psychological environment: *He grew up in an atmosphere of austerity"*...and "the predominant tone or mood of a work of art." The word stems from the Latin *atmospheara* (literally "vaporous sphere") and, in turn, from the Greek roots *atmos* (breath or vapor) and *sphaera* (ball or globe) (Morris, 1981, 83). Words with related roots include weather, wind, vent, and ventilation (Morris, 1981, 1547). A close cousin is the Sanskrit word *atman*, meaning "breath," "spirit" or "soul" (Morris, 1981, 83). The concept extends to meteorology and environmental science, as in "atmospheric pressure" or "the earth's upper atmosphere." A term often used synonymously, *ambiance,* is defined as the atmosphere surrounding someone. It relates to the word *ambient*, which means "surrounding" or "encircling" (from the Latin *ambire*, "to go around") (Morris, 1981, p. 41).

The literal atmosphere in which we all exist – the very air we breathe in and exhale, moment to moment – is, of course, transparent. Unless we're unfortunate enough to live in the midst of smog, we never see it. Despite our being so thoroughly immersed in it, the air, as one writer puts it, represents "the most outrageous absence known to this body" (Abram, 1996, p. 225). nevertheless, the atmosphere is the very same medium through which we see, hear, smell, and feel. Whether it's the warmth of sunlight or the coolness of shade...the smell of rain-drenched pavement...the pulsating bass of a rock anthem...or the shout of a familiar voice...all such sensations convey to us through the air.

Is it mere metaphor, then, when we describe a gathering – or even a place itself, absent of people – as exuding an "oppressive sadness," an "electric vitality," or a "casual charm"? Returning to Dwayne Johnson and Kevin Hart, can we legitimately say that "the air shifts" in a room when different people arrive, betokening "a different energy" or a different vibe that can be sensed by those on the scene? Can we really "air" our grievances or "clear the air" after an argument?

At the very least, such language takes weather – *atmospherics* – as its baseline. Since our individual moods tend to be transitory, and since the collective mood of a place (composed of people) appears to shift just as easily, we tie descriptions of feelings and emotions occurring within situations to the weather patterns everyone is familiar with. As a for-instance, we all feel relief after a storm has moved through without damage, just as we feel more comfortable in low humidity versus high humidity. Our bodies shiver to contain heat in the midst of cold, and sweat to stay cool in the midst of heat. It's only natural to compare angry feelings to a storm, sad or depressed feelings to an overcast or foggy day, and buoyant, loving feelings to the emergence of sunshine and warmth. ("Here comes the sun," sang George Harrison. "It's been a long, cold, lonely winter" (Harrison, 1969)).

Three Illustrations

That's not necessarily *all* that's going on when we consider atmosphere or ambiance, however. I'm going to describe three situations in which only I was present, and in which I nonetheless registered distinct feelings that it was well-nigh impossible to attribute to anything in particular.

Situation 1*:* My wife and I were house hunting. This was the third or fourth house we had visited; it was in an

appealing neighborhood blocks from where we ultimately purchased. The upstairs seemed fine; I recall the kitchen was small or might have needed a bit of work. The downstairs also seemed fine until I walked toward one particular corner, which immediately felt somehow forbidding or unsettling. The feeling was strange and wholly unexpected but it also seemed distinct and tied to this particular part of the downstairs. I asked my wife, who was elsewhere on that floor, if she would stand where I was while I moved off. This we did; later she told me that she hadn't registered anything out of the ordinary. (I decided not to ask her for her impressions then and there.) Walking back to that spot, I tried to figure out what might be prompting the uncomfortable feeling. I noticed that the entire floor was halfway below ground; could I be feeling something akin to claustrophobia? If that were the case, why would I be feeling it in one corner of the room and not in another – nor, for that matter, standing in the middle of the room? I still have no ready explanation for the feeling, but the discomfort – the palpable feeling of disturbance – dissuaded me from liking the house.

Situation 2*:* My wife and I were on vacation in Tennessee. We had just visited Lookout Mountain, a lovely spot near Chattanooga overlooking the Tennessee River – and the site of a Civil War battle in 1863. My wife entertained my request to visit the Chickamauga battlefield, a short distance away in Georgia, where a far bloodier battle had been fought a few months earlier in 1863. The locale of that battle – actually a series of engagements across a huge swath of land over two intense days – is today a peaceful, bucolic site. It is dotted by scores of statues, plaques and large granite memorials carved to honor military leaders, battalions, and skirmishes won and lost on both sides. Bonnie and I got a map from the battlefield park office, tuned our car radio to a frequency where one can hear relevant details on each site, and drove to see what we could see.

At one particular location – the second we stopped at, if memory serves – I got out of the car to look around. As I was walking, a feeling stood out for me in one particular spot, quite near a plaque I had stopped to read. I felt it in my solar plexus, a little like a buzzing. "Huh," I thought, and wandered a bit further, noting that the strange feeling subsided as I walked toward a more wooded area. I decided to approach the matter scientifically, walking back along the path I had taken, then circling the area, then approaching the strange spot once more. Aside from the plaque, nothing else was stuck in the ground. I wondered if the details of the battle etched into the plaque had perhaps activated some unconscious sympathy toward the combatants on my part. If so, why would the feeling not have remained as I walked around? Back in the car, my wife must have been wondering what was going on. Why was Mike this peripatetic? I returned to the car and explained to her this weird and unforeseen situation. We drove to several more Chickamauga sites where I got out and trooped around, wondering if anything similar would recur. It didn't.

Situation 3*:* Over many years, one particular room in my house – not the whole room, just one side of it – has consistently felt odd to me. Not every day and not at all times, but unpredictably. At such times that part of the room feels somehow 'fuller' than the surrounding area. I don't perceive a presence or even a full-fledged feeling; that section just feels unquiet. There doesn't seem to be any pattern to the sensation, which can occur any time of the day or night. This room serves as my wife's office and many gadgets are plugged in thereabouts – laptop, printer, desk lamp, phone. An adjacent outer wall is also where water seeped in years ago; when we bought the house, it turned out mold had grown there, which we remediated. A new floor was installed and I had the outside wall parged and waterproofed. Any or all of that could be at play. However, the sheer irregularity of it is baffling. One other interesting angle is that I never feel this when my wife is at her desk with the electronics running – only when the room is seemingly empty and quiet.

Such inchoate sensations and feelings are part and parcel of many allegedly haunted locations. An accomplished British journalist, Will Storr, wrote about one such place he had made it a point to check out for himself. Writing in the present tense, he records: "I take my sleeping bag up the stairs and into the haunted room. It's horrible in here. It's as if the air is made of invisible sponge" (Storr, 2006, p. 279). Another investigator elsewhere wrote, likewise, that the particular room felt distinctly fuller than normal (Rogo, 1978, p. 187). What could possibly be eliciting these 'atmospheric' perceptions?

Atmosphere and the Built Environment

To begin to answer this question, let us consider atmosphere less in the context of air, breath or weather and more in terms of the built environment: the indoors of houses, rooms, and enclosed spaces. Here, atmosphere can be defined as "a state of resonance and identification (sensorimotor, emotive, and cognitive) between an individual and the surrounding built space" (Canepa et al., 2018). Within this framework, architectural elements such as form, proportion, materials, color, finish, texture, and sound all contribute to a given atmosphere, because feelings (equivalent to "resonance" between the person and the surrounding space) will arise in occupants of or visitors to the space "when they interiorly establish an

embodied simulation" of those elements (Canepa et al., 2018). The elements of a space, in other words, "induce the brain to react, generating a specific emotional state" (de Paiva, 2018).

While the brain will ultimately establish such impressions, all manner of sensory input is required – including the proprioceptive and vestibular senses, which allow the brain to form a representation of the body's configuration and posture, its position and movement in space, and the possibilities for action in that space (Jelić et al., 2016; Gallese & Sinigaglia, 2010). The process typically plays out unconsciously. Only sometimes do we realize "Hey, the teak in this room has me feeling comfortably nostalgic" or "The way the sun streams through those curtains sure is brightening my mood."

To understand how this works, we must realize that human beings are far more than our brains. As I have argued elsewhere (Jawer, with Micozzi, 2009, p. 5), our brain can be likened to an orchestral conductor. While the conductor elicits the music, he or she does not create it. The music, i.e., consciousness, is formed from sensory input with feeling itself the premier component, the lead player, in this conscious 'symphony.'

In every instance, then, one's sense of being in a set of surroundings – and what we feel about those surroundings – is built on automatic, pre-conscious processing. The thinking self is not directing the action, the action is 'bubbling up' from below. And to take the concept one step further, it can be argued that we have no self completely independent from the environment we're in. We're never *not* immersed in some atmosphere. Indeed, none of us would be here if it weren't for our being immersed in our very first environment – our mother's womb (Jawer with Micozzi, 2009, pp. 103-104). One's sense of self, therefore, arises from and is reinforced by continuous interaction with the external environment (Legrand, 2006).

Another architectural concept will be helpful here, namely *affordance*. An affordance is a possibility for action provided by the environment or, alternatively, the relation possible between the environment and the person *in* that environment (Gibson, 1986). A chair, for example, affords sitting; neither the chair nor the person sitting is the affordance; they share the affordance, i.e., the possibility of sitting. Similarly, a door affords the possibility of passing through, while a staircase affords the possibility of ascending or descending (Pallasmaa, 2011). And beyond these literal possibilities, any environmental feature presents the possibility of unconscious association. The chair may remind one of a family member who used to lounge in something similar; for someone else, the door may represent a passage from one age, challenge or circumstance to another. "From the perspective of unconscious psychic life," writes a Jungian psychologist, "everything around us shimmers as potential symbol" (Chalquist, 35).

Ultimately, the atmosphere of a space can itself be considered an affordance for feelings arising in the percipient, given the totality of whatever elements are present there (Ellard, 2019).

Atmospheres and Emotion

A small but dedicated band of psychologists, neuroscientists, and philosophers has, for the past 10 years or so, been shedding light on this curious phenomenon of atmosphere. Much in line with what I've presented so far are these statements: "Atmospheres are affective phenomena, which are grasped pre-reflexively, manifest spatially, [and] felt corporeally" (Trigg, 2020). And: "Atmospheres are pervasive: they are everywhere, we're always in them, enveloped by them" (Slaby, 2020). An important point here is that atmospheres are plural – they can and do differ in different situations. The atmosphere of a party is considerably different from the atmosphere attending to a funeral; the atmosphere in an art museum is equally distinct from that of a political convention. The differences owe to any number of reasons: the material features of the space; the number of people present; and, most especially, what those people are feeling and expressing. Philosopher Dylan Trigg, who has written extensively on atmospheres, notes "the gradated nature of shared emotion, ranging from thin to thick, primitive to complex, and momentary to sustained" (Trigg, 2020). (It bears mention that Trigg (2013) is one of the rare scholars of atmosphere to explicitly address the uncanny.)

He proceeds to consider a most interesting question: What does it mean to say that emotion is diffused in space through an atmosphere? "When we enter a room," he writes, "and sense a specific atmosphere there – let us say an eerie atmosphere – then it would be difficult to pinpoint [the source]. Specific phenomenal features may present themselves in a more focal way than others – modes of lighting, a disquieting silence, specific architectural aspects, etc. – but those features are expressive articulations of an atmosphere, which is irreducible to localized things" (Trigg, 2020). He quotes the late philosopher Gernot Böhme as remarking that, in a given atmosphere, "a certain tone of feeling" seems to "fill the space" (Böhme, 1993). The atmosphere is thus "indeterminate and unequivocal" at the same time. Much like a mood itself, I would add: while we can't say for sure why we are feeling something sometimes, or where the given feeling came from, we may nonetheless feel it keenly. In a partic-

ular place or at a particular event, such an environmental impression, while amorphous, can yet be palpable.

A qualifier is necessary here. Unlike the weather, which exerts a fairly uniform influence, a given atmosphere may not be perceived equally by everyone present. One person may not register the feel of a particular place or event whereas others do. The former could be tired, or preoccupied, or have a different cultural standard, or hold a preconceived notion that prevents her/him from perceiving what others do. Likewise, a particular person might be so highly invested in the event or locale that her/his impressions differ to a large extent from others on the scene. (Trigg, 2020; Böhme & Thibaud, 2017). Another researcher, Jon Slaby, puts it this way: "We can behold atmospheres from a distance, sense their presence without being ourselves in their affective grip. We can see, grasp and neutrally describe the jubilance of the party, the tension of the meeting, the enthusiasm of the crowd and also the sadness or despair enveloping a friend in mourning, without being affectively involved ourselves" (Slaby, 2020). Bottom line: the level and type of *attunement* among individuals will inevitably vary.

While it may be impossible to pinpoint just how any atmosphere is constituted, "there is nevertheless a weight to an atmosphere [that] is gauged in and through the *lived* body" (Trigg, 2020, emphasis original). As living, sentient creatures, we express what we're thinking and feeling at the same time as we're gathering what *other* people are thinking and feeling – through their gestures, tone of voice, touch, gaze, and other body language. Furthermore, "the very expressivity of emotions renders them public affairs, which are, in varying degrees, extended spacially" (Krueger & Szanto, 2016). It is a short step, therefore, from what is termed *embodied interaffectivity* to an atmosphere. Indeed, emotions themselves can be seen to have atmospheric effects (Fuchs, 2016). In the pithy phrase of philosopher Tonino Griffero, "atmospheres are feelings poured out into space (Griffero, 2016). Think how much the atmosphere of an event can become charged given the forceful remarks of an impassioned speaker, or how the energy level of a gathering drops precipitously when the 'life of the party' leaves. We say, in the first instance, that the speaker "grabbed us" and that, in the latter case, "the air went out of it." These expressions are not mere colloquialisms. Research asserts that any atmosphere is diffused spacially (in the air, as it were) and grasped affectively (viscerally, under the skin) (Trigg, 2020). Griffero compares the effect on people to that of the wind (Griffero, 2020) – a wind blowing, one might say, under the surface.

Under the surface, ineffable, unseen...atmospheres can, in any case, exert a palpable presence. How extensive this effect is may depend on the degree to which individuals are invested in the given situation. An illustration comes, from all places, from virtual reality. In VR studies, the term *presence* occurs often. It refers to the degree of immersion in the virtual environment, i.e., the extent to which the person believes himself or herself to be physically present in that space (Draper, Kaber & Usher, 1998). Presence can be gauged by markers such as heart rate, skin conductance, and skin temperature, not to mention by the person's 'virtual' behavior. It should come as no surprise that a higher level of presence is associated with greater activation of feelings (Riva et al., 2007).

Ineffable Presence

Could a degree of presence – virtual, invisible, yet somehow woven into the pre-conscious, subterranean fabric of our existence – account for the sensations I experienced in the three situations described earlier? The feelings apparently evoked in such instances may lead the surroundings (even outdoors, on a battlefield) to gain the reputation of "haunted." Here, the literature concerning atmospheres is highly relevant, even though few investigators attempt to explicitly address haunts.

A significant jumping-off point exists in the work of philosophers Gilles Deleuze and Félix Guattari. They suggest that "affects are becomings" – that an intense feeling can go beyond the body mind that produced it and merge with or effectively *become* the atmosphere (Deleuze & Guattari, 1994, p. 164; Deleuze & Guattari, 1997, p. 256). Recall that the Latin *atmospheara* translates to "vaporous sphere," then picture a feeling as an exhaled breath. Where does the exhalation end and the rest of the enveloping *atmos* begin? There is no bright line. Recall, too, the shifting and ephemeral nature of atmospheres, which, like emotions or moods, can be sensed but never grasped. Atmospheres are tantalizing, present but evanescent, never fully coherent.

The same, of course, can be said of ghosts. Are they real? Are they not? Whatever they may be, they are certainly not material. Yet a reputedly haunted place (or, for that matter, a person haunted by a memory) is unmistakably colored by...something. That 'something' doesn't turn up on cue but, like an emotion, it manages to convey a certain force, a certain presence.

This insubstantial quality – of forming and dissolving, hinting at tangibility while being essentially indefinite – is beautifully captured by the singer-songwriter Al Stewart in his song Charlotte Corday (Stewart, 1993). Not just the words themselves but the very mood of the song conjure up ghostliness (atmospherics at the very least):

If you hear a step upon your stair tonight
If you see a shadow in the candle light
It's only your imagination leading you astray
See her for a moment, then she'll slip away
The ghost of Charlotte Corday

She wanders down the hallway in a long black dress
And lingers by the fireplace like a faint caress
Just what it is that brings her here no man alive can say
See her for a moment, then she melts away
The ghost of Charlotte Corday...

The clock ticks in the dark and now the night is still
The air is like a murmur on the window sill
All at once there's someone there that only you can see
Seeking the forgiveness that will set her free
The wind has taken away

The words she wanted to say
The sky now turning to gray
The dawn is turning away
The ghost of Charlotte Corday

In a fascinating 2009 paper, geographer Ben Anderson considers how feelings can haunt – in the sense of 'perturb' – a given space. Consistent with other research surveyed here, he remarks that atmospheric "intensities may remain indefinite even as they effect...Something... exceeds rational explanation and clear figuration...Yet... the affective qualities [perceived] by those who feel it are remarkable for their singularity" (Anderson, 2009). He also remarks on the curious fact that something so diffuse and hard to pin down can nevertheless feel 'full.' (Recall the writer I quoted who said the air in an allegedly haunted room seemed as if it were "made of invisible sponge.")

Anderson notes that both atmospheres and affects can emanate, radiate, surround, suffuse. He quotes Böhme: "On entering a room once can feel oneself enveloped by a friendly atmosphere or caught up in a tense atmosphere. We can say of a person that s/he radiates an atmosphere which implies respect, of a man or a woman that an erotic atmosphere surrounds them (Böhme, 1993). Slaby agrees that "Atmospheres are what we mean when we sense and say that 'there is something in the air' – or rather, they *are* the ambient air itself insofar as it is situationally charged with an energetic texture" (Slaby, 2020).

Sports fans and concert-goers can attest that such experiences are not only commonplace but presumably magnified amidst thousands of other, like-minded people. To choose a recent for-instance: toward the end of the 2022 Major League Baseball season, all-star pitcher Shohei Otani of the Los Angeles Angels was on his way toward a no-hitter against the Oakland Athletics, until he surrendered back-to-back singles in the eighth inning. The communal feeling in the stadium was captured by this sportswriter's description: "The exhilaration of Ohtani's mastery precipitated through the announced crowd of 31,293 as the innings wore on, each pitch more precious than the last. The "M-V-P" chants grew louder and, after the final out of the seventh inning...the crowd's energy became more than emotion, but a physical electricity" (Mitchell, 2022).

Parents of college-age children will be familiar with another, calmer 'emanation' of feeling. When accompanying one's kids on tours of college campuses, it becomes clear that each campus has a distinct tone or vibe, which prospective students quickly find appealing ("this seems like a really good place for me") or unappealing ("I can't see myself going here"). As Anderson observes, while such atmospheres are impersonal – relating to a collective locale or communal situation – they can still be felt as intensely, definitively personal (Anderson, 2009).

Connections With Culture and Time

Place isn't the only source of atmosphere. A painting, song, novel, movie, season, a country, even a decade or an era can create – or be associated with – a particular kind of feeling. The tenor of the Star Wars series is vastly different than, say, a Martin Scorsese film. The feeling a reader gets from the E. L. Doctorow novel *Ragtime* is poles apart from Stephen King's *The Shining*. American popular music of the 1950s would seem to come from a different planet from the "acid rock" of the 1960s, let alone the moods invoked by contemporary rap, hip-hop or R&B. Decades themselves – the events, personalities, fashions, crazes – can be said to leave distinctive imprints in their wake. The "tenor of the times," especially in particular places, is nonpareil. Consider jazz-age Paris versus, say, the Haight-Ashbury neighborhood of San Francisco circa 1967: the feelings associated with the one would never be confused with the other. Similarly, the effect of a painting such as Picasso's Guernica could not be farther removed from, say, the impression evinced by an Andy Warhol artwork. (Speaking of impressions, the Impressionist school of painting represented by Monet, Renoir, Cezanne, and other *fin de siècle* artists pioneered 'atmospheric' effects on the canvas. Swirls, dabs, dots, and blotches of paint – not to mention repeated layering – conjured shifting light, textures, images, moods – in

short, *impressions* rather than the clearly delineated figures and scenes that had been conventional in painting up until that time.)

Time itself plays a role in atmosphere. To begin with, consider that the elements of weather (of literal atmospherics), e.g., wind, rain, snow, fog, clouds, sun, are necessarily shifting and transient. Furthermore – and casting back to architecture – features of built spaces often induce perceptions related to time. Walking up or down stairs, as a simple example, takes time. Narrow spaces cause our perception of time to lengthen as we feel more constricted. A space with plenty of room to move or many options for moving, on the other hand, distracts us from ourselves and causes felt time to move faster. The age of built features likewise exerts an influence. "Weathered" surfaces suggest the passage of years, while a brick fireplace (as a for-instance) may prompt a sense of familial nostalgia. A skylight or glass roof, in contrast, suggests modernity and engages us directly in the present (Wittmann, 2019). Atmospheres, therefore, encompass time – both objective (clock time) and subjective (interior, psychological) time.

Most fundamentally, however, we must recognize that time and place are fused and ultimately indistinguishable. "Space is in its very nature temporal and time spacial," observed the British philosopher Samuel Alexander (Benjamin, 1966). Any moment occupies a given place and any spot exists in time. This fact supports my contention that intense feelings – particular to a given time and place – may live on within the atmosphere they contributed to or helped generate.

How, exactly, might this occur? In *The Spiritual Anatomy of Emotion*, I suggested that it might be through a mechanism involving a torrent of unreleased energy in the body (equating to unexpressed or dissociated feeling), a brain structure known as the orbitofrontal cortex, and the body mind's stress handling system called the hypothalamic-pituitary-adrenal (HPA) axis (Jawer with Micozzi, pp. 78-9, 91, 94-95, 115-117, 130-133, 159, 199-202). (The HPA axis is the conduit for the well-known "fight or flight response" – except that there is a third pathway, "freeze," which is implicated in this particular scenario.) The equation would be, roughly:

The energy of unexpressed feeling in the body
+ A preoccupation held in the brain
as processed through the orbitofrontal cortex and
HPA axis = A transmutation of feeling energy
into the atmosphere.

Emotional Contagion

The above is obviously speculative. Beyond the difficulty in conceiving a way to test the hypothesis, the presumptions themselves (namely: that feelings comprise energy; that the physical, emotional, and mental parts of ourselves are not just contingent but unified; and that the energy of repressed or unacknowledged emotion could be displaced into the surroundings), are miles from being scientifically accepted. Yet many highly regarded psychologists *have* shed light on a closely related phenomenon, that of emotional contagion. And emotional contagion (simply put, the way people 'catch' emotions and transmit them to others) is universally acknowledged.

We know feelings flow from the inside out – but it's also true they go the opposite direction. "If I can make you smile," observes Malcolm Gladwell, "I can make you happy. If I can make you frown, I can make you sad. Emotion, in this sense, goes outside-in" (Gladwell, 2002, p. 85). Research has found that many emotions can be passed from person to person – often without either one realizing it – in a matter of milliseconds. This is because, during conversation, individuals unconsciously tend to mimic and synchronize the other person's facial expressions, posture, and body language. This 'attunement' extends to speech rhythms, volume and pitch, and word choice. We do this automatically because of our natural interest to be in synch with the people we come into contact with, or, at the very least, to try to understand their frame of mind. The effect is more pronounced the closer someone is to us – so we are more likely to catch another's mood if they are a family member, friend or roommate, or work colleague (Colino, 2006).

Through emotional contagion, our own mood can be considerably brightened or depressed, depending on who we bump into and how much they mean to us. Unsurprisingly, more charismatic people are apt to be powerful *transmitters* of emotion while the most empathetic among us tend to be powerful *catchers* of emotion (Isabella and Carvalho, 2016; Verbeke, 1997). Interestingly, the research shows that 'live' interactions are not necessary for emotion to be transmitted. Television and movies will do the trick (Isabella and Carvalho, 2016), as will music and, increasingly, social media (Tucker, 2021; Brooks, 2021).

Emotional contagion, as taken up in academia, is known as "affect studies." Scholars speak of *embodied interaffectivity, affective attunement,* and *mutual incorporation*: the way people respond to one another, reflect and resonate with each other's gestures, postures, gazes, voices, words, facial expressions (Fuchs, 2016). The prompts are not limited to what we see and what we hear. Smell – in the form of pheromones – may also be involved (Brennan, 2004, pp. 9, 68-69). The feelings being transmitted are not merely mental; they are expressed in

such a way that other people understand them and are affected by them (even virtually, when the person doing the transmitting is not physically present). In this sense, emotions resemble ideas. Just as ideas can 'infect' someone, get them angered, excited or dismayed, physiologies often change when emotions are conveyed. But this is more likely to happen with emotion because of the more animate ways that feelings are expressed. An idea, in contrast, is more static. It may 'leap off the page' but is relatively serene compared to a highly charged feeling.

Affective Spaces, Affective Subjects

Thomas Fuchs, a philosophy professor at Heidelberg University, writes of the "shared intercorporeal space" that is all around us. He notes that "we do not live in a merely physical world; the experienced space around us is always charged with affective qualities. We feel, for example, the hilarity of a party, the sadness of a funeral march, the icy climate of a conference, the awe-inspiring aura of an old cathedral or the uncanniness of a somber wood at night" (Fuchs, 2016). He draws upon the concept of affordances that I cited earlier, noting how environmental features present salient qualities based on their potential for action or their relation with the individual(s) in the given situation. For example, a door affords the opportunity for entrance or exit, a tree affords the possibility of shade, a breeze affords the opportunity for comfort or discomfort (depending on the air temperature), a wall necessarily encloses and a roof necessarily shelters. He further observes that objects themselves inevitably have a certain appearance or expressivity – evoked by shape, contour, color, façade or veneer. This is why spaces are atmospheric, especially when people inhabit them. (I would add animals, which often bring a presence and personality all their own.)

Ultimately, Fuchs asserts, "the affected subject is engaged with an environment that itself has affect-like qualities." Yet, because these influences are typically subliminal, their resonance with us only emerges into consciousness at a certain level of intensity (Fuchs, 2016). This goes some way toward explaining why I might have felt ill at ease in the situations mentioned earlier. Specific features – of the corner of the house my wife and I were visiting and, equally, of our downstairs office – might have snuck 'under the radar' and caused me to feel uncomfortable. The Chickamauga Battlefield location might likewise have been affecting, less because of affordances in the vicinity and more because of my latent knowledge of the battle's bloodiness.

What remains a question, however, is whether spaces can exert such an effect in and of themselves, absent the "embodied interaffectivity" generated by another person close by. This is the case for many allegedly haunted places. Of course, it can be argued that one's imagination will be more hyperactive when it is *not* tempered by the presence of someone else. I can only say that, in two of the instances I've personally experienced, I confronted my odd feelings scientifically – in the one instance experimenting with the computer, clock radio and lights being turned off and on and, in the other case, by walking hither and yon to gather if the feeling in my solar plexus was replicated at any other spot. It could be that the collective, underlying expressive features of these places – their "unitary dynamic Gestalt" (Fuchs, 2015; Jawer at al., 2020) – had an effect beyond anything I could differentiate or identify. Yet the absence of people remains a puzzlement. Imagine a rally without protesters, a party without revelers, a church without worshippers. I suppose one could still sense 'something in the air,' be impressed or turned off. Through the features of the space and their associated affordances, impressions could presumably still form at a pre-conscious level.

Even so, I believe an essential, active ingredient is missing – the feelings generated by live, animate bodies. Affects, says Fuchs, "are at the very heart of our existence" (Fuchs, 2015) and I fully agree. Even the late Teresa Brennan, the staunchly materialist author of *The Transmission of Affect* – which outlines how feelings circulate to others in our midst through attuned, reciprocal physiologies – referenced the heart as the prime generator organ and receptor organ of feeling (Brennan, 2004, pp. 114-115). Implicit in such language is recognition that emotion is the prime mover of life. For this reason, I have difficulty accepting that an "exhilarating atmosphere," a "tense environment," an "oppressive climate," an "icy atmosphere," or a "frightful situation" could come about absent genuine emotion emanating from energetic creatures nearby. My contention finds support in the statement of anthropologist (and atmospheres theorist) Friedlind Riedel, who believes that where "a multiplicity of bodies cohere," there is atmosphere (Reidel, 2019). Turning the equation around, another scholar puts it this way: "To sense presence is to sense relations" (Bell, 2017). I suggest this is true for any haunted locale: that living bodies – who radiated energy at one time into the surroundings – are responsible for the odd feelings evident to some people today. Furthermore, that the present gatherings of living bodies and the energy *they* radiate can serve as a 'transducer' for energetic impressions that were formerly spilled out into the environment.

Example of a Haunt

Consider this intriguing case. It concerns the Merchants House Museum in New York City, where the Tredwell family lived from 1835 to 1906. While the house operates as a museum documenting the life and times of this family, spectral presences are said to manifest within (Franz, 2021). Given that the furnishings and other objects the Tredwells lived with remain in the spaces they inhabited, their very presence could easily 'afford' ghostly impressions. Even in 1936, a writer commented that "The atmosphere of another century and another way of life pervades [the old house]." In 1990, the museum's executive director remarked that "the atmosphere is so tangible: it's 1850 and the Tredwells are coming up the stairs." Today, the museum staff note that "its immersive nature allows visitors to brush up against a past that is almost present" (Franz, 2021).

From the paper that describes this allegedly haunted place, it is worth excerpting some perceptive observations about the characteristics of *houses* that lend themselves to haunts:

> Houses [are] where the majority of people died, where people mourned, hosted wakes and sat shiva, and where the material of domestic life served as a mnemonic landscape invoking the deceased...houses contain lives, current and past, and become a place of intersection, a place "full of invisible borders and boundaries and locations." [Hudson, 2017, p. 78]. [Merchant House's] bedroom in particular...[is] a site of hauntings as this was "where people most often breathed their last, [and] it was also the room where deep emotions were most frequently manifested. It was a place for dreaming, having sex, exchanging intimate confidences and solitary anguish" [Davies, 2007, pp. 47-48]. In Merchant's House, many ghostly appearances and hauntings have occurred in the in-between spaces of stairwells, hallways, and doorways or in the intimate sites of bedrooms. While other parts of the house have been sites of spectral encounters as well, these spaces are where ghosts and visitors encounter each other most frequently, layering new relationships across the boundaries of liminal space" (Franz, 2021, p. 385).

The reference to ghosts (real or imagined) crossing boundaries echoes the "indeterminate" nature of atmospheres themselves.

I find a pair of anecdotes concerning Merchant's House to be especially revealing and shall quote them verbatim. Here is the first:

> In March 1991, during renovation, the furniture and collections of the house had to be packed away; however, as the work progressed members of the museum staff became increasingly aware of strong, almost angry, energy – so powerful that at times it required great strength of will to climb the stairs...the sense of ill-boding and hostility was occasionally so oppressive, staff members would find excuses not to climb the stairs (Bellov, 2007, p. 13).

Here is the second:

> ...around the winter holidays, particularly around the museum's Victorian Christmas events, there is the most spectral activity in the house..."the way they decorate the house for Christmas is beautiful...when you walk in there it's a different mood...it's a happy mood." The ghosts follow patterns of coming and going that coincide with the environment of the house (Franz, 2021, quoting Bellov, 2007, p. 13).

Funnily, the Merchant House's docent training manual had, in the 1960s and '70s, this prominent statement: "DO NOT TALK ABOUT GHOSTS!" Nevertheless, the presences persisted (Franz, 2021).

What I am proposing is that any atmosphere – or any haunting – reflects a comingling of bodily energy (past and present), body minds (to initially sense and then to turn those sensations into conscious perceptions), and – perhaps most crucially – emotion. It is important to realize that the vast majority of this dynamic takes place under the surface, in a field of joint time and space that is "pre-dimensional" (as one atmospheres researcher puts it) (Griffero, 2018) or "pre-personal" (in the words of a fellow philosopher) (Riedel, 2020). "Pre-dimensional" references a space without surfaces, lines or points; "pre-personal" references a sphere of influence preliminary to individual identity. Atmospheres, then, reflect a literally sub-liminal entanglement between emotion, the immediate environment, and the individuals who happen to be in it.

A Social Conception of Ghosts

Even if you reject this new angle on emotion, atmospheres, and haunts, scholars have presented other avenues for considering how we may gather a kind of ghostly presence in certain places. To begin, it will be helpful to distinguish "place" from "space." The easiest way to do

so is to think of outer space – bereft of life and endlessly uniform – as the ultimate uninhabited space. In contrast, wrote the late architect Christian Norberg-Schulz, "the spaces where life occurs are places...A place is a space which has a distinct character" (Norberg-Schulz, 1980 p. 5). Architects should know, as their job is to envision – and then design – places where people can live, work or play.

As to their "distinct character," sociologist Michael Bell takes as his axiom that any place is uniquely *personed* by the lives of the people (I would suggest "creatures") living there. And their ghosts – "that is, the sense of the presence of those who are not physically there – are a ubiquitous aspect of the phenomenology of place." Bell explains that the term ghost or spirit springs from "one of the deepest social sensibilities...our sense that there is a kind of a quickening, an originating essence, within every person." A ghost, therefore, is "a felt presence...that possesses and gives a sense of social aliveness to a place" (Bell, 1997). The inhabitants themselves may be long gone but the places they frequented contain vestiges of those departed.

Bell argues that the experience of ghosts is actually quite commonplace:

> Although the cultural language of modernity usually prevents us from speaking about their presence, we constitute a place in large measure by the ghosts we sense inhabit and possess it... Who has not experienced that flood of images of people long gone, or people when they were younger, while revisiting an old "haunt," as we say? Who has not had that slightly chilly, and yet very warm, feeling of almost being able to see your friends from when you were eight dashing down the sidewalk as you walk through the neighborhood where you grew up? Who has not had that sense, while creeping into some room where one really should not have been, that someone unseen was watching? Ghosts also help constitute the specificity of historical sites, of the places where we feel we belong and do not belong, of the boundaries...by which we assign ownership and [heritage]. Ghosts of the living and dead alike, of both individual and collective spirits, of both other selves and our own selves, haunt the places of our lives (Bell, 1997, p. 813).

This definition of ghosts, or of haunts, goes some distance toward explaining the odd feelings I experienced in the three examples I sketched at the outset of this paper. Perhaps, in the case of my wife's office (which is, after all, 'her' office), I sense a carryover of her presence when she isn't there – courtesy of everything in that room that reminds me of her. Yet this raises a problem, namely that I don't feel anything remotely similar in the room next door, which is my daughter's former bedroom. A recent college graduate, she's moved out of the house. Since she no longer lives here (and my wife does), I should logically miss her more and be more receptive to whatever 'spirit' may convey in her room. Furthermore, what I feel in my wife's office is infrequent – just now and again – limited to one section of the room, and disquieting rather than nostalgic. Based on Bell's construct, I should be feeling something warmer, something homey.

Similar shortcomings apply to the situation I described in the below-ground living room of the house Bonnie and I were considering buying. For a start, no furniture or belongings of any kind were present to 'afford' a sense of who had been living there. There were only the four walls, the floor and ceiling, and the stairway from the floor above. Additionally, I experienced the strange feeling in one particular spot – just as I did on the Chickamauga battlefield. In the latter case, at least, I might have been primed to anticipate something strange because of latent associations between battlefields, traumatic violence, and specters. Again, however, the experience was precisely localized. It also occurred mid-day, with bright sunshine and no shadows to play tricks. Perhaps the prefect quiet of the place played a role, yet my experience was not duplicated a few feet away, not at any other spot we stopped at later on that afternoon.

Bell's Uncanny Experience

Bell acknowledges that one's apprehension of 'ghosts' in the social environment can span the gamut from rooted, friendly and affirming to unsettled, uncanny or scary. Regarding the latter, he relates an interesting anecdote that took place more than 25 years ago, when he was teaching at Iowa State University. It is worth quoting the full, ultimately 'spooky' story, since it leads with further context regarding Bell's conception of the ghosts of place:

> The building where I work [East Hall] is about a hundred years old, one of the oldest on my campus. And it is filled with ghosts. When I first arrived here, people delighted in telling me stories of who had had which office at various times. Not surprisingly, I heard the most about those who had previously been in my own office. Two of the previous occupants came by and made a special point of telling me about how

they had arranged the room when it was theirs and changes they had made that one could still see, such as the hanging of a blackboard or the building of the bookshelves that run quite a way up toward the thirteen-foot high ceiling....

These conversations were not merely about instrumental matters. I was being told about the ghosts in my office. I was being told by others that they still felt a sentimental attachment to that room, that they still possessed it and it possessed them to some degree. And when my mind is wandering from my work, I have sometimes imagined those two previous occupants reaching for a book off one of the highest shelves or engaged in earnest consultation with a student.

These ghosts are fading, at least for me. To some extent this is because – and I hope this does not constitute carrying the metaphor of "ghosts" for describing the social experience of place too far – I have engaged in a number of rituals of exorcism. I have given the office a thorough cleaning on several occasions...I took out the air conditioner...got rid of all but one file cabinet... installed a desktop light...and moved the desk to under the window...These changes were about more than personal preferences. They were also about infusing the preferences of my person, my ghost, in the material environment of that room, that interior place, and exorcising the ghosts of others...

Current students make somewhat edgy jokes about [a] "genuine" ghost of East Hall, and one student has reported to me her rather shivery feelings about that unseen presence... Such a ghost may have visited my office. A close friend of mine had suddenly died, leaving behind his wife, two young children, and a career that was just showing signs of taking off and making an important social contribution. The circle of those who knew him felt his death to be not only a great loss but a terrible injustice. On the day he died, but before I had learned of his death, I was at work and spent the whole afternoon in my office. Finally, near the end of the day, I stepped out for perhaps five minutes. When I returned, I discovered a small crowd outside my door. Those high bookshelves had collapsed in my absence, showering the floor with books and papers and an old iron rotating fan weighing some 25 pounds which 1 had foolishly stored on the top shelf – and which landed quite close to my desk. There had been no earthquake, no nearby construction work, nothing understandable to cause the fall. (The carpenter who later came to fix them said he had seen track shelving pull away from a wall, but never collapse like these had done, leaving the tracks intact.) It was incredibly fortunate that the shelves had fallen during the only minutes when I was out of the office. Colleagues pitched in to help me clean up, and we made nervous jokes about imaginary headlines like "Scholar Killed by Avalanche of Books." We all put it down as "just one of those things" (Bell, 1997, pp. 825-827).

It was, indeed, one of those uncanny things – so coincidental with Bell's friend's death that one cannot help but wonder at some camouflaged meaning. I have written fairly extensively about such stunning synchronicities in my Psychology Today blog (Jawer, 2015a, 2015b, 2017a, 2017b). What the vast majority have in common is either a severing or a reminder of close emotional bonds.

Bell would presumably take issue with my opinion, as he writes "The ghosts of place are, of course, fabrications, products of imagination, social constructions...They do not exist on their own" (Bell, (1997). Yet his conception of presence is not confined to the intersection of person, place, and memory. He also suggests that a person's presence can adhere to her/his possessions – that the bookshelves in Bell's college office, for example, would necessarily continue to contain an 'essence' of whoever built them, even if that person were physically apart from them and even they were sold to someone else (Bell, 2017). The implication is that presence, in some manner, can convey. Perhaps feelings themselves can, too.

Hauntology and Spectrality

The subject of atmospheres has a parallel in *hauntology*, a field examining departures from certainty and reliability. The term "hauntology" was introduced by the late philosopher Jacques Derrida, who applied it toward Karl Marx's proclamation, in the Communist Manifesto, that "a specter is haunting Europe – the specter of communism" (Derrida, 1994). Recognizing that "to haunt" implies not being objectively present – and drawing upon his recognition that what we call the "present" is ever-vanishing – Derrida coined hauntology to apply to any case of temporal or ontological disjunction, in which 'being,' for instance, is challenged by 'non-being.' Hauntology has since been invoked in many fields: philosophy, first and foremost, but also music, politics, literary criticism, and anthropology. The research I shall cite here addresses the term as it applies to prospective 'middle ground' between

dualities: between being and not-being, density and emptiness, certainty and hesitancy and, above all, presence and absence.

It would surely be helpful at this juncture to examine the very word *presence*. Defined as "immediate proximity in space and time" (Morris, 1981, p. 1035), (i.e., being here now), its Latin root (signifying "to be") is also found in the words *essence* and *essential* (Morris, 1981, p. 1515). But note the prefix "pre" in presence. The implication is that, whatever the essence that is here now, it had a before, a pre-being (Bell, 2017). Perhaps this is akin to what Derrida had in mind in his assessment of Marxism's ongoing effects in the evanescent present.

A close cousin to hauntology is *spectrality,* which attempts to describe the quality of that which haunts. One spectrality researcher homes in, for example, on the nature of "ghost towns" – noting that they are characterized by abandonment, emptiness, decay, ruin, and neglect. While divorced from the present, they nevertheless suggest an opportunity to commune with the past (Sterling, 2014). This is the case with any museum, I might add, but with great care taken to preserve and 'present' whatever relics or artwork is on display – versus abandoning and neglecting them. We don't have to set foot in a ghost town or a museum, moreover, to feel we are partaking of the past. Whenever we look at a photograph or peruse an audio or video recording, we are immersing ourselves to some degree in the past, whether it is a history we personally recollect or a history suggested to us by the nature and details of what we are seeing or hearing. The past, therefore, is never truly gone nor inaccessible. It beckons in our rear view or at the periphery, specter-like.

Spectrality's focus on traces of the past – in the form of relics, mementos, abandoned or ruined places – inevitably relates to feelings. After all, "abandoned" easily translates to "feeling abandoned," and empty, neglected or decayed places easily summon up melancholy, ruefulness, and regret. In my estimation, however, the literature on spectrality (and hauntology, for that matter) falls short of explicitly regarding affect as foundational. Nor do these fields establish emotion as the 'connective tissue' with atmospheres of any kind, whether the locales are considered ruined or something strikingly different.

Fortunately, song and poetry often bridge what academia does not. An especially lovely conjuring of absence and melancholy is the song Empty Chairs by Don McLean (McLean, 1971). His rendering of someone forlorn at a lover's departure is replete with atmospheric touches:

I feel the trembling tingle of a sleepless night
Creep through my fingers and the moon is bright
Beams of blue come flickering through my windowpane
Like gypsy moths that dance around a candle flame

And I wonder if you know
That I never understood
That although you said you'd go
Until you did, I never thought you would

Moonlight used to bath the contours of your face
While chestnut hair fell all around the pillowcase
And the fragrance of your flowers rests beneath my head
A sympathy bouquet left with the love that's dead...

Never thought the words you said were true
Never thought you said just what you meant
Never knew how much I needed you
Never thought you'd leave, until you went

Morning comes and morning goes with no regret
And evening brings the memories I can't forget
Empty rooms that echo as I climb the stairs
And empty clothes that drape and fall on empty chairs

And I wonder if you know
That I never understood
That although you said you'd go
Until you did, I never thought you would

Notice the songwriter's use of affordances in the lyrics – the clothes that should afford wearing, the chairs that should afford sitting, the rooms that should afford being lived in. The song, however, was published 15 years before the concept of affordances was. The sense of indeterminacy, of feelings and circumstances in flux, is set early on, with references to "a trembling tingle," flickering moonlight, and a candle flame. Furthermore, it is hard to say just when these lovers broke up – was it a year ago, a month ago, yesterday? All we know is the mood of the narrator and the atmosphere he is living in. Whatever happened, he cannot forget. While the physical connection with his lover has been severed, even the pillowcase reminds him of her fragrant hair. The past continues to resonate in this place that, for him, is haunted.

Neither hauntology nor spectrality proposes that ghosts exist. But they recognize that "the living present is scarcely as self-sufficient as it claims to be...that we would do well not to count on its density and solidity, which might under exceptional circumstances betray us" (Jameson, 1999). The two fields thus approach a phenomenological view of reality. Philosophers Edmund Husserl and Martin Heidegger notably considered the present

something other than a fixed moment between the past and the future. Husserl held that the present is "thick" because it arises from and looks back on the past (via our memories and felt associations) while also anticipating the future (through our hopes, desires, and expectations). Heidegger likewise regarded the present as uniting the past and future, so that lived experience continuously spans these contexts (Stolorow, 2007, p 19).

Enchantment

Throughout this paper, I have asserted that feelings – in their fluidity and indeterminacy – both resemble and contribute to atmospheres. I have likewise argued that feelings are part and parcel of ghosts and haunts. That which haunts is nebulous, neither wholly past nor fully present, seeming to form but then slipping away. Yet haunted places are just that: places. Whether indoors or outdoors, they are *located* somewhere rather than extending infinitely. As one researcher points out, particular kinds of atmospheres "are arguably the prototypical spatial form of hauntology" (Buser, 2017).

When a person is in such an atmosphere – for that matter, in any atmosphere that comes unbidden, that challenges our preconceptions, that confronts us with a tingle of the unknown – we may find ourselves "enchanted." *Enchantment* is the term currently used to describe the "mix, on the one hand, of excitement, awe, and wonder and, on the other, of unease, dislocation, and unpredictability." The location may seem to be "momentarily transform[ed]...into something charged with the strange and anomalous" (Holloway, 2010). Ghost tours – which seem to have proliferated in most every city – are popular because they hold the implicit promise of enchantment, of encountering the unknown through spooky stories, legends, and atmospheres. By visiting places where tragic violence or injustice allegedly took place (especially at night), we learn a bit of history while finding ourselves enthralled or unsettled. The implication that a ghost might linger is attributed to the given atmosphere while offering those on the tour a potential taste of the uncanny. Spectrality is invoked, the present hearkening to echoes of the past (Holloway and Kneale, 2008).

Enchantment is undoubtedly a commercial goal – and not just of ghost tour operators but of heritage tour operators in general, museum exhibit curators, history documentarians, and movie producers (think of everything from "Fantasia" and "Close Encounters of the Third Kind" through to "Poltergeist" and "The Blair Witch Project"). However, it is entirely possible to be confronted with something atmospherically strange and yet be merely curious or puzzled. This was my reaction in each of the three situations related earlier. The possibility of a 'haunt' did not occur to me until reflecting on those situations later.

The Influence of the Unapparent

I began this paper by referencing the Covid pandemic. When one thinks about it, the fact that harm spread so widely, and yet so inconspicuously, through the air is quite remarkable. It points up how much we're bound to miss. There are so many wavelengths across the electromagnetic spectrum we're not privy to: x-rays and microwaves we don't see and a myriad of sounds we don't hear. So many smells that beckon to our dogs yet slide right past us. Magnetic 'lines of force' that orient a thousand creatures – whether in the sea, on the land or in the air – and guide them through their vast migrations (Tyson, 2003), but of which we ourselves are unaware. This disparity raises a logical question: is it appropriate to legitimize what we can see and touch and measure but denigrate or dismiss what is unapparent? Is the imperceptible any less real?

The answer is obviously no. In his extraordinary recent book, *An Immense World*, science journalist Ed Young reminds us that "every animal can only tap into a small fraction of reality's fullness. Each is enclosed within its own unique sensory bubble, perceiving but a tiny sliver of an immense world....Not all is as it seems...everything we experience is but a filtered version of everything that we *could* experience. It reminds us that there is light in darkness, noise in silence, richness in nothingness" (Yong, 2022, pp. 6, 14).

In the emotional realm, feelings, intuitions, atmospheres, and ghosts point up what Griffero has dubbed "the phenomenology of the inapparent." He comments:

> Traditional Western ontology puts substances, things in themselves, before relations ...being before becoming...and the central field of vision before what is vague, ephemeral, and [peripheral]....Unfortunately, these parameters end up exiling everything that is vague, flowing, atmospheric...[But] the variable and the ephemeral, the fluid and the vague, are no less "real" phenomena than the permanent (Griffero, 2020, pp. 31-32).

Picture our existence, Griffero says, as "the affective brushstrokes of a painting, rather than the accuracy and schematic simplification of a map." The denial of what we cannot see or cannot pin down is, he remarks, "ocular-centrism, completely tantalized by boundaries of stable and knowable objects" (Griffero, 2020). What is

intangible, amorphous or mercurial, however, is no less real. The wind can blow strongly: it can gust, topple trees and houses. Further, as feelings demonstrate every day – and quite profoundly – the evanescent can be thoroughly meaningful. Feelings weigh on us, even if that weight isn't subject to objective measurement.

This is not to imply that "truthiness" should prevail over truth, the gut instincts should take precedent over bona fide evidence, nor that guesswork should supplant careful investigation. It is simply to affirm that what is in the air can be highly relevant even if it is intangible. Like the ghost of Charlotte Corday, faint impressions can nonetheless register consciously. Traces of emotion – especially if potent in the original brew – may, I believe, still be discernible.

Griffero puts it this way. To say "the mood is shifting" means not only that one senses the shifting mood; it means that the shifting mood is what one senses. While elusive, it can be absolutely present. The wind analogy is apt: like feelings (and atmospheres), it can seemingly come out of nowhere, ebb and flow, die down with the same inexplicable immediacy with which it rose. Yet the wind often enough has a describable quality, a character. We say, for example, that a breeze is gentle or sweet, that a gust is harsh or biting (Griffero, 2020). Atmospheres – and perhaps the emotional perturbations I equate with ghosts – provide hints of *their* character as well.

Movement and Feelings

In the final analysis, what is most important in life are not things we can hold in our hand or 'bound' precisely. What most everyone would agree is of enduring importance are values, memories, friendships, loves, passions, challenges, accomplishments, knowledge, wisdom, wholeness, acceptance, satisfaction. None of these is static; if they were, they would lose their allure. Life itself is always moving, always changing – with time itself impossible to halt or catch. We are born wriggling and crying; our movement never ceases until death. Movement is essential to all of our senses. The world around us moves, too – from the daily weather to natural and human events with the potential to change our lives. Fundamental human concepts have their origin in movement, e.g., far and near, this side and that, fast and slow, weak and strong, abrupt and sustained, etc. Every one of our actions and decisions reflects a certain degree of movement, on a spectrum from hesitant to forceful. Indeed, as Aristotle observed nearly 2400 years ago, movement is the foundational principle of nature and of life (Sheets-Johnstone, 2017).

Emotion is consonant with movement. Our feelings flow. So do our thoughts, of course, but typically with less consequence. Feelings *animate* us. And, of course, they are energetic. On the best of days, we feel exuberant, joyful, motivated, and full of vigor. On the worst, we feel sapped, depressed, 'at a loss,' and slowed to a crawl. Both emotion and movement are foundational to everything else. They span time and space – yet are ultimately insubstantial.

The poet Rainer Maria Rilke opined: "We must assume our existence as broadly as we in any way can; everything, even the unheard of, must be possible in it." Courage is required, he added, "in the face of the strangest, the most astounding and the most inexplicable" (Rilke, 1904). It is time to summon up such courage to consider ghosts in the same vein as feelings and atmospheres. Existence is a vast riddle and its depths remain to be plumbed. Ironically, our most prosaic, everyday experiences – of feelings and atmospheres – have much to reveal. They are, I posit, the keys to much more.

Implications and Applications

The approach presented here points toward the value of research that considers two 'sides of the coin' equally: first, the particulars of a space that contribute toward any discernable atmosphere that visitors or occupants may report and, second, the emotional styles that are characteristic of those visitors or occupants.

As regards the 'heads' side of the coin (particulars of a space), a paper I had the pleasure of contributing to posits six factors likely to figure in any reputed haunt – each factor reflecting a different way in which the given space affects the people occupying or visiting it. Those factors are: 1) Affordance (the degree to which the space suggests different uses or makes one curious to explore); 2) Ambiguity and Threat (how much the space prompts feelings of discomfort based on cues that more or less indicate a threat); 3) Immersion and Presence (the extent to which one eels fully present and invested in the space); 4) Legibility (the ease with which one can recognize the layout of the space and navigate easily in it: 5) Memory and Associations (the degree to which one feels that the space is comfortably similar to any other space); and 6) Atmosphere (the dominant tone or mood of the space) (Jawer et al., 2020). Clearly, atmosphere can be broken down into many components, such as room dimensions (including ceiling height), building materials (color, texture, warmth), lighting (quality and amount, ambient or artificial), sound (noisy, quiet, resonance of the space), temperature, humidity, air flow, electromagnetic fields (emanating from electronic equipment in the space or from external sources), age (of the space, built features,

and furnishings), and personalization (the extent to which the space reflects the history or personal taste of the current or prior occupants). In any case, researchers would do well to apply the six major factors noted above – and perhaps others yet to be developed – in their assessments of purportedly haunted places. I am gratified to know that a forthcoming paper will hone in on these environmental aspects (Houran et al., in press), just as a landmark 2020 paper examined the literature pertaining to ambient variables (Dagnall et al., 2020).

As regards the 'tails' side of the coin (emotional style), recall Bell's principle that every place is uniquely personed by the people occupying it – whether current or past (Bell, 1997). To the extent that the personality of those individuals can be gauged in a standardized way, their contribution toward any particular atmosphere that might be evident can be reasonably taken into account. The most important trait to be ascertained, I suggest, is not emotionality *per se* but the individual's degree of expressiveness.

One means of comparing/contrasting different people's emotional style is the Boundary Questionnaire (BQ) developed by the late psychiatrist Ernest Hartmann (Hartmann, 2011)[1]. While the full BQ encompasses 145 items and typically takes an hour or more to complete, Hartmann and colleagues developed a short-form BQ of just 18 items (Kunzendorf et al., 1997)[2]. Additionally, Rawlings developed a 46-item BQ that is of equivalent reliability to the original (Rawlings, 2001). I commend these questionnaires based on my proposition that highly "thick boundary" people are likely to engender hauntings whereas highly "thin boundary" people are likely to apprehend the emotional perturbations that attend to a haunt (Jawer with Micozzi, 2009, p 441.) (A survey intended to appraise a person's sensitivity – developed by psychologist Michael Pluess and colleagues – is a good complement, in my estimation, to the Boundary assessment (Pluess et al., 2020).

In sum, I expect that the approach taken in this paper will advance a fuller appreciation of the role of feelings in the phenomenon of atmospheres, and especially in atmospheres of the supposedly haunted kind. It need not matter whether feelings are experienced or expressed in situations present or past; they are equally valid representations of embodied interaffectivity. This paper is further intended to spur researchers toward embracing a holistic view of haunts (indeed, of any atmosphere). Such a view will acknowledge that all creatures inevitably affect one another by virtue of their presence – and that, just as they are affected by their environment, all creatures exert environment effects. Emotion, which is arguably the most significant force that can affect another, has priority in this holistic view of person acting on place and place acting on person. The most enlightening and effective research will not only consider atmospheres as a unified "gestalt" but seek to understand the strange feelings that may spontaneously arise in given situations (and especially in reputedly haunted situations) as indicative of that gestalt.

NOTES

[1] An encompassing view of Hartmann's work is available at http://ernesthartmann.com/.

[2] The short-form BQ can be taken online at http://youremotionaltype.com/boundaries/quiz.html.

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ESSAY

The SOREM-Led Induction Method (SLIM): A Novel and Theoretically Grounded Approach to Eliciting Out-Of-Body Experiences

Peter A. Hollier
peteralanhollier@gmail.com

HIGHLIGHTS

A new method seems to reliably produce out-of-body experiences (OBEs), which are normally very difficult to elicit and particularly in sleep labs.

ABSTRACT

In parapsychological literature, out-of-body experiences (OBEs) appear closely correlated to the phenomenon of sleep paralysis (SP), with some authors referring to the SP state as a "gate" or "launching pad" for OBEs. Given the notorious difficulty of eliciting OBEs voluntarily using conventional methods, this paper proposes a novel methodology for eliciting OBEs, involving the induction of SP as a precursor condition. The relationship between sleep onset rapid eye movement (SOREM) sleep, SP, and OBEs are discussed, as is the work of earlier researchers who first elicited SOREM and sleep paralysis in the sleep laboratory. The results of preliminary testing of this methodology are briefly described.

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INTRODUCTION

The phenomenon of the out-of-body experience (OBE) is one of the most intriguing areas of parapsychology and the study of anomalous experience. The notion that a consciousness can seemingly exist independently of a body directly raises a number of questions of a metaphysical nature while simultaneously flying in the face of everything we seemingly know about contemporary science. Despite this, reports of OBEs are ubiquitous in parapsychological literature and appear to exist in virtually all cultures and regions in a "strikingly uniform" manner (Shiels, 1978). The phenomenon engenders a number of philosophical questions regarding the nature of the world and the self (Metzinger, 2005). More solid research and data are desperately needed in this area before we can begin to understand the etiology and nature of ecsomatic experiences.

Therein lies the stumbling block. OBEs remain one of the most problematic branches of parapsychological research—and this is particularly true in clinical studies. OBEs are notoriously unreliable and unpredictable.

When they occur, they often seem to occur spontaneously, almost at random. Some individuals appear prone to multiple OBEs, while the majority of the population will never experience a single OBE (Alvarado, 1986). A handful of individuals—"natural projectors"—claim to be able to induce OBEs voluntarily, however, when placed in the unusual environment of the sleep lab, results are typically disappointing (cf. Tart, 1998). Consequently, scientific research and associated data regarding OBEs "is missing due to the fact that they occur so rarely" (Sellers, 2018).

What is required for this area of research to move forward in parallel to other areas of scientific investigation would be a methodology or protocol which would assist subjects in eliciting OBEs in a more reliable, predictable manner. Such a methodology, in fact, would be the "Holy Grail" of OBE research and would be of tremendous value in related research fields such as NDEs, alternate states of consciousness, as well as parapsychology generally. The purpose of this article is to highlight the research which has been conducted in this area already and present a few (albeit broad) brush strokes to indicate such a potential methodology.

Sleep Paralysis and Hypnic OBEs

One of the most intriguing factors of the OBE phenomenon is its association with another subject matter of psychology, one far better researched and more deeply understood than OBEs—*sleep paralysis*. Sleep paralysis (SP) involves the experience of REM atonia whilst conscious and aware of one's environment; it typically occurs during sleep onset or offset (Hishikawa, 1976).

Sleep paralysis has been strongly correlated with out-of-body experiences since the earliest literature on the subject (Blackmore, 1999; Buzzi & Cirignotta 2000; Cheyne et al., 1999). One of the most fascinating aspects of early reports of OBEs—from a perspective of sleep psychology—is that their authors very clearly describe sleep paralysis, despite the fact that SP was neither a well-known nor clinically understood entity at the time of their reports. Dr. C. E. Simons (Simons, 1894), Caroline Larsen (Larsen, 1927), Sylvan Muldoon (Muldoon & Carrington, 1929), Oliver Fox (Fox, 1939) and others all appear to describe sleep paralysis well before it was widely known as a clinical diagnosis. Although reports of what is today known as sleep paralysis can be found going back centuries, SP was only recognized as diagnosis by the American Academy of Sleep Medicine Diagnostic Classification of Sleep and Arousal Disorder as recently as 1979.

The following account, appearing to describe SP in association with OBE-onset, was first published in 1929:

> I seemed to know that I was reclining upon a bed but still bewildered as to my exact location. I tried to move, to determine my whereabouts, only to find that I was powerless—as if I adhered to that on which I rested. *Adhered*—that is the exact sensation. If conscious at the beginning of exteriorization, one feels fairly glued down, stuck fast, in an immovable position. A peculiar fact about this phenomenon is that one can be conscious, yet unable to move.... No sooner had the sense of hearing come into being than that of sight followed. When able to see, I was more than astonished! No words could possibly explain my wonderment. I was floating! I was floating in the very air, rigidly horizontal, a few feet above the bed. (Muldoon & Carrington, 1929, p. 6)

The apparent initial presence of SP—now an established fact of sleep science—in such early OBE literature would also seem to point to some level of authenticity in these reports, given that the nature of SP as an entity was not widely known to the general public of the time.

The relationship between sleep paralysis and OBEs has been a subject of great perplexity since the earliest days of psychic research. In a previous paper, I presented the hypothesis that—far from being just loosely connected to OBEs—sleep paralysis is a *necessary condition* for the type of OBEs experienced by the individuals referenced above (Hollier, 2022).

It may be argued that SP cannot be a "necessary" condition, as not all OBE reports include the presence of sleep paralysis as a prodrome, or precursor. This is true. However, it might be the case that SP is still a necessary condition for a specific *subcategory* of OBEs; many varied forms of experience are grouped under the general heading "OBE," and there is no reason to believe that they all operate under identical mechanisms (Sellers, 2018). The sense of disassociation an individual might experience while under extreme physical or mental stress is very different from a lucid dream, wherein the dreamer sees their physical body; likewise, a vestibular-motor illusion promoted by virtual reality technology is highly distinct from the formless, mystical type of intoxication induced by some psychedelic compounds. Despite their obvious differences in nature, all of these experiences have been labeled "OBEs".

In contrast, sleep paralysis tends to appear in OBE reports where awareness is likened to normal (or even *supernormal*) waking consciousness, and where full autoscopy takes place—the subject can seemingly move about and perceive their environment despite being "outside" of the body. This type of OBE might be considered the clas-

sic "astral projection"-type OBE, found so commonly in the early literature (Crookall, 1960). These OBEs are also almost exclusively predormital (occurring prior to sleep) or postorbital (occurring after a period of sleep), and for this reason, they might be called *hypnic* OBEs, for want of a better term. It is this subcategory of OBE for which I hypothesized that SP is a necessary condition.

Sleep Paralysis as a "Launching Pad" for Voluntary OBEs

Sleep paralysis is associated with numerous negative associations in modern culture; for example, a sense of sinister presences, dark figures, etc. In reality, SP appears to be a more complex phenomenon than its largely negative reputation allows for. Far from being exclusively distressing, current research indicates that pleasant episodes of sleep paralysis are "a fairly common experience" (Kliková et al., 2021). Further studies indicate that whether sleep paralysis is a negative or positive experience appears to depend upon the subject's attitude; with qualities such as curiosity, sensitivity, and a willingness to explore predicting positive experiences (Denis & Poerio, 2017).

Sleep paralysis also seems to function as a "gate" (Hufford, 2005) of sorts for quite profound OB experiences. In perusing the (now extensive) "how to" literature available regarding OBEs, virtually all authors—older through to contemporary—stress the utility and value of SP as a precursor to an out-of-body experience; many highlight specific techniques for leveraging an SP episode into an OBE (for example, Conesa-Sevilla 2004; Fox, 1939; Monroe, 1971; Muldoon & Carrington, 1929; Newport, 2009; Raduga, 2011). Emphasis is placed on the role of sleep paralysis as a "reliable launching pad to an OBE" (Hurd, 2010).

Psychological analysis seems to agree, indicating that SP experiences generally comprise three fundamental categories; the first two being imagined intruder or incubus-type experiences, with the third type involving illusory movement experiences, as well as OBEs (Cheyne & Girard, 2009). These OBEs occurring via sleep paralysis are common, with one study finding over 20% of SP experiencers reporting associated OBEs (Blackmore, 1999); they can be "perceived as episodes with more positive emotions, such as happiness, love, peace, tranquility, hope, euphoria, and curiosity" (Herrero et al., 2023) in comparison to other SP experiences. Whereas negative SP experiences are predicted by factors such as traumatic history (Abrams et al., 2008), OBEs generally manifest in subjects with a more positive mindset, specifically "openness to experience" (Denis & Poerio, 2017). Terrillon states:

> If no attempt is made to move, that is, if the fear is overcome or if it is mild, another complex of phenomena sets in: what seems to be a "phantom body" slowly slips away from the physical body. There seems to be a dissociation from the immobile physical body, and consciousness is perceived to reside within the phantom body. At that point, the immediate surroundings of the room may be "seen," sometimes vividly, by the phantom body, and a sensation of rising and/or floating, sometimes rolling, is experienced. (Terrillon, 1993, p. 99)

This quote leads us neatly to the methodological thrust of this piece. If sleep paralysis really acts as a powerful "gateway" or "launching pad" to out-of-body experiences, then if we are seeking to more reliably induce OBEs, why not directly apply techniques which elicit *sleep paralysis*—and then leverage that state directly into an OBE?

Conventional OBE Induction Techniques

If the hypothesis that SP is a necessary condition for hypnic OBEs is correct, it would follow that conventional techniques to induce such OBEs—such as visualization, suggestion, dream-based techniques, binaural beats, etc.—are all misguided and would remain impotent in the absence of sleep paralysis (Hollier, 2022). There is no evidence that SP can be induced by conventional methods intended to elicit OBEs, and this may go a long way to explaining why the traditional corpus of OBE-induction techniques—despite their long history and apparent popularity—have such a shockingly low "hit rate" in producing actual OBEs in normal sleepers.

A more logical route—in fact, the *only* logical route—towards eliciting OBEs would be to *first* induce sleep paralysis; the resulting SP state could then be leveraged by the subject directly into a full-blown OBE using traditional techniques.

A handful of methods exist to induce OBEs by eliciting SP. The oldest and most popular of these is probably mind-awake, body-asleep (MABA), which has a provenance going back to at least the 1920s (Fox, 1939). There are several variations on the basic MABA method, which essentially involves lying perfectly still during either sleep onset or offset in the hope of eliciting SP. Unfortunately, MABA has a vanishingly low rate of effectiveness in normal sleepers because it was developed—like all conventional OBE techniques—in the absence of a solid theo-

retical comprehension of SP (Hollier, 2022). For a better understanding of SP, we need to turn to the science of sleep psychology.

Sleep Paralysis and SOREM

We now appreciate, broadly, the mechanisms behind sleep paralysis. SP is a consequence of minimum-latency sleep onset rapid eye movement (SOREM) sleep (Hishikawa & Kaneko, 1965). Sleep is biphasic, consisting of rapid eye movement (REM) sleep, and non-rapid eye movement (NREM) sleep (Colten et al., 2006). REM sleep is associated with higher levels of awareness in the form of dreaming, and may play a role in memory transfer (Purves et al., 2001). During REM sleep, the brain puts the muscles into a state of atonia, or paralysis, so that we do not "act out" our dreams while asleep (Peever et al., 2014). In contrast, NREM sleep is associated with a non-awareness condition; its different stages promote memory consolidation as well as the regrowth and repair of muscle, bone and the immune system (Patel et al., 2022). We typically enter sleep via NREM, and 75% of sleep is spent in NREM (Patel et al., 2022). Thereafter, REM and NREM cycle rhythmically through the night, over a period of roughly 90-110 minutes; the first REM period is brief, but time in REM increases into the distal part of the night (Patel et al., 2022).

Whereas humans can survive and function normally without REM sleep—patients taking certain antidepressants such as MAO inhibitors can have little to no REM sleep for significant periods—NREM is essential for normal functioning and survival (Purves et al., 2001). This may be why NREM is prioritized by the organism, and why we almost exclusively enter sleep via NREM; since a full night of sleep is never guaranteed, it makes evolutionary sense to fulfill our most pressing need, the need for NREM, earliest in any given sleep period. There are rare occasions, however, where this usual course of events is reversed, and individuals enter sleep via REM instead of NREM. This is called sleep onset REM (SOREM) sleep, and it generally occurs due to disordered sleep schedules (Miyasita et al., 1989) or neurological conditions such as narcolepsy (Amira et al., 1985). When we fall asleep, the NREM condition normally "turns off" our awareness and we lose consciousness; however, if REM latency—the time it takes for a subject to enter REM after falling asleep—is non-existent or very brief (at most, approximately two minutes), then the subject *retains* conscious awareness, while experiencing the REM state, including atonia: the result is sleep paralysis (Hishikawa & Kaneko, 1965). Thus, "minimum-latency" SOREM is the ultimate cause of sleep paralysis. If REM begins much later into sleep, then conscious awareness is downgraded by the sleep process, and the subject either falls into hypnagogic hallucinations or a regular dream state (Hishikawa & Kaneko, 1965). SP can also occur during sleep offset; REM sleep can perseverate when we awaken, not just when we fall asleep (Hishikawa & Kaneko, 1965). The process is simply reversed.

Despite the clear association between REM and SP, it is a mistake to label SP experiences as merely "dreams"; REM dream content is typically different from SP imagery (Mayer & Fuhrmann, 2021). It is also a mistake to assume that episodes of SP are exclusively randomly occurring events; not only is it theoretically possible to induce SOREM sleep and SP in normal subjects, but it has been done many times in the sleep lab. Rigorous Japanese studies have demonstrated that SOREM sleep and SP can be reliably elicited, even in normal sleepers. Akio Miyasita and colleagues were the first to deliberately elicit SOREM; they achieved this by applying sleep interruption techniques, or SIT (Miyasita et al., 1989). When carried out correctly, the SIT protocol disrupts the normal architecture of sleep cycles, and essentially "tricks" the organism into entering sleep via SOREM as opposed to the usual NREM. SOREM and SP exist along a spectrum of REM latency; the only major difference between one and the other is that SOREM is generally defined as REM occurring anywhere up to fifteen minutes into sleep (Reiter et al., 2015), whereas SP requires minimum latency (<120 seconds) to occur. Therefore, the same SIT protocols which elicit general SOREM, when efficient enough, will also induce sleep paralysis (Takeuchi et al., 1992).

Since Miyasita's team's trials, the mechanisms of using multi-phasic sleep-wake patterns to induce SOREM and sleep paralysis have become better understood, the research has been replicated, and the protocols have improved upon (Takeuchi et al., 2002). Modern approaches can be considered remarkably reliable in eliciting SOREM; although SOREM is normally a rare occurrence, being seen in less than 1.0% of general sleep clinic samples (Cairns & Bogan, 2015), more highly evolved protocols have proven capable of eliciting SOREM in up to 87.5% of interrupted nights (Sasaki et al., 2000). It is the author's belief, based on his own practical research, that—given the correct application of the multi-phasic sleep-wake protocol—SOREM and SP can be elicited at rates nearing 100%.

SLIM: SOREM-Led Induction Method

Using this research as a theoretical basis, the author has developed a methodology to induce OBEs which can be called the SOREM-led induction method (SLIM). SLIM comprises three areas: "set and setting"; SP induction

protocol; and OBE "disassociation" techniques (see Table 1).

Unfortunately for enthusiastic amateurs, due to the nature of SP induction, it is impossible to perform SLIM alone—a sleep lab with at least one trained operator is required (in the absence of specialized equipment that could perform both polysomnography and the role of the operator). However, for any researchers with the requisite resources looking to explore SLIM, a few notes on each leg of the SLIM tripod may be of utility (See Table 1).

SP Induction Protocol/Ultradian Dynamics

The SP induction protocol is the most crucial aspect of the methodology—for it to be optimally effective, it must be carried out via an algorithm based on a mathematical model of ultradian dynamics. For this reason, it might be of utility to touch upon this model briefly.

The dynamic of ultradian cycles—the alternating rhythm of NREM and REM sleep phases—has previously been explained by oscillator models, wherein NREM and REM drives display an excitatory-inhibitory action which can be described by a set of Lotka-Volterra equations (McCarley & Hobson, 1975). (Lotka-Volterra equations are often used in biomathematics to describe the dynamics of competition, such as predator and prey populations.) These equations have since been resolved into a limit cycle mathematical model (Massaquoi & McCarley, 1992).

A simplified (but incomplete) non-mathematical analogy for ultradian dynamics would involve visualizing NREM and REM as distinct drives—or "pressures"—competing cyclically for space within the same sleep window. Because the need (pressure) for NREM is greater than for REM at the end of our waking day, when we initially fall asleep, we enter sleep via NREM; once NREM pressure drops below a critical level, it is "overpowered" by REM, which in turn starts to deplete in pressure. This battle of nocturnal pressures continues, as the organism swings back and forth between states, in a pendulum-like fashion. This pendulum, however, is asymmetrical; for example, NREM is favored earlier in the night, REM increases later on. Some models account for this by assuming that the "pressure" is not simply reduced linearly, but also ebbs and flows, wave-like, from NREM, REM, or both (cf. Le Bon, 2013).

SP induction is performed by monitoring a subject during sleep, via polysomnography; following the completion of a sleep cycle plus a 40-minute portion of the new NREM phase, the subject is awoken for

Table 1. The 3 Fundamental Aspects of SLIM

1.	**"Set and Setting"**
a.	The education of a subject in the positive aspects of SP. Subjects are taught what to expect in the SP condition, and how to relate to it. A safe and comfortable environment for the protocol is established.
b.	Subsequently, subjects are instructed in classical techniques for transforming SP into an OBE.
2.	**SP Induction Protocol**
	An algorithmic procedure based on a mathematic model of ultradian dynamics is followed to induce a state of sleep paralysis in the subject.
3.	**OBE "Disassociation" Techniques**
	Once SP is established, the subject applies the techniques acquired in the "set and setting" instruction work to pass through the SP stage, and achieve/sustain/terminate an OBE.

approximately sixty minutes. Upon returning to sleep, the subject's propensity for REM will be very high—with the NREM phase window having "passed" as they were awake—while their competing pressure for NREM will be correspondingly low, having already been depleted to some degree in the earlier cycle/s and phase portion. Consequently, when the individual returns to sleep, they are far more inclined to enter sleep via REM. Whether this occurs seems in part due to individual differences; some subjects may have a lower predisposition for entering sleep via REM for various reasons. The selection of which sleep cycle to interrupt is also a key factor; the interruption of later cycles proportionately increases likelihood of SOREM due to decreased NREM pressure, however some subjects will find returning to sleep more difficult after being awakened later in the night. With some "fine tuning" of the variables involved, minimal latency can invariably be achieved in a motivated subject through the correct application of a multi-phasic wake-sleep algorithm based on the mathematical model referenced above.

This model explains why conventional OBE induction techniques are ineffective; minimum latency SOREM is a prerequisite condition of hypnic OBEs, however any sleep-onset OBE induction techniques will be met with failure because normal sleepers enter sleep via NREM. Even methods which include nocturnal awakenings are mathematically highly unlikely to result in the "sweet spot" of minimum latency SOREM, unless they hit the mark by chance. Incidentally, this model also explains why SP is more often experienced by individuals with neurological disorders, sleep disorders or altered sleep schedules, as opposed to normal sleepers (Ohayon et al., 1999); it's because SOREM is more likely to occur when a normal sleep schedule—which naturally relieves NREM pressure as a priority—becomes disrupted or less efficient. It may similarly explain the traditional belief that unhealthy individuals or poor sleepers tend to be "natural projectors," more likely to experience an OBE (cf. Muldoon & Carrington, 1929, chapter II), because these individuals are subsequently more prone to SOREM and SP states.

OBE Disassociation Techniques

OBE techniques are drawn from the large body of practical "how to" OBE literature. This literature has a provenance going back at least a century and given its ubiquitous nature and easy availability we can afford to be brief here. Once SP is established by the subject via simple self-testing (for example, the inability to raise a hand), subjects can then perform "disassociation," from the body, by rolling over, rising up, spinning out, etc. Types of sensory experiences (vibrations, auditory experiences, etc.) are cataloged, and the subject instructed in how to deal with them. Techniques of locomotion during OBEs are discussed, as are methods of sustaining OBEs and "returning to the body". (For those desiring further reading, the work of Muldoon & Carrington, Monroe, and Conesa-Sevilla is particularly useful.)

Brief Precis of Pilot Studies

SLIM is not just an abstract theory—the author has already conducted unpublished preliminary research, albeit with a small sample of subjects (four individuals over 57 total test nights). Research until this point has seemed to confirm the findings of the Japanese studies, i.e., that SOREM and SP can be reliably induced in normal sleepers; and that, with the application of a multi-phasic sleep-wake algorithm derived from the mathematical model of ultradian dynamics, SP can be elicited in slightly over 80% of experimental nights. Where SP was elicited, over 50% of these episodes (24 nights out of 46) resulted in self-reported out-of-body experiences of varying orders in subjects who were trained in the requisite "disassociation" techniques.

CONCLUSION

OBEs—specifically, OBEs of the hypnic subcategory—are not the random or spontaneous phenomenon sometimes suggested by previous authors. Rather, they are a SOREM-based category of experience, related to hypnagogic experiences, or sleep paralysis—of which they are a sub-syndrome. Through the induction of SOREM and SP using scientific protocols, it is possible to elicit OBEs consistently and reliably.

IMPLICATIONS AND APPLICATIONS

It is the author's conviction that through the intelligent application of SLIM, a new phase of research into OBEs can be inaugurated, where OBEs can be reliably elicited in the sleep lab.

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STUDENT AND CITIZEN SCIENCE

Electromagnetic Field (EMF) Profile and Baselines at a Non-Haunted Control Location

Dave Schumacher
davidschumacher5@gmail.com
The Center for the Exploration of Survival and Parapsychology

Kenny Biddle
kbiddle@centerforinquiry.org
Committee for Skeptical Inquiry

Tim Vickers
tim.wv.vickers@gmail.com
Independent Researcher

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HIGHLIGHTS

It is commonly assumed that unusual electromagnetic fields (EMFs) characterize 'haunted' sites, but long-term monitoring likewise found complex EMFs at a 'non-haunted' house.

ABSTRACT

There has been little to no environmental and experience data collected at randomly selected non-haunted control sites despite the call for researchers and field investigators to do so over twenty years ago. Electromagnetic Fields (EMFs) and their association and correlation with haunted locations and haunt-type phenomena have been studied by both academics and hobbyist ghost hunters/paranormal investigators. The field has progressed over the years with mixed results and some within site controls. However, there is still a lack of data collected at non-haunted control locations, and many questions remain on how to collect and analyze baseline data. The current study was conducted to collect multi-hour multiple-run baseline EMF data to explore EMF profiles and to better understand how EMF readings can vary temporally across a 3-axis EMF meter at a non-haunted control site. Results showed that a non-haunted control site had complex time-varying magnetic fields during long-term data collection periods at various days and times, similar to locations deemed to be anomalous. Limitations of the study are noted, and future research is suggested.

KEYWORDS

EMF, haunted locations, baseline locations, haunt phenomena, measurement.

INTRODUCTION

Houran and Brugger (2000) noted that data collected during investigations of haunting and poltergeist cases is limited due to the absence of data from independent control sites. They recommended; "...that field investigators study events that occur at randomly selected control sites whose salient characteristics match those of the target sites, as well as for each investigation of a target site try to set up a control investigation of a similar house whenever possible" (p. 41). Despite this call to action, there has been little to no data collected at randomly selected control sites outside of target research sites (Dagnall et al., 2020).

Field research investigating the potential link between magnetic fields and locations where people have reported haunt-type phenomena has been ongoing for the last several decades (Braithwaite, 2004; Braithwaite et al., 2004; Braithwaite & Townsend, 2005; Laythe &

Houran, 2019; Laythe et al., 2017; Laythe & Owen, 2013; Maher, 2000; Roll & Persinger, 2001; Terhune et al., 2007; Wiseman et al., 2002; Wiseman et al., 2003). These prior studies have mainly examined magnetic fields in target areas within site baselines and controls.

However, the results of these studies have been varied in terms of significant findings for both mean and variance. For instance, Maher (2000) found no significant differences in peak and mean magnetic field magnitudes, while Roll and Persinger (2001) found that the magnetic field strength varied spatially throughout a reportedly haunted location. Wiseman et al. (2002) showed an overall significant relationship between variance in the magnetic field strength and unusual experiences when data from two locations at Hampton Court Palace were combined. Post-hoc analysis indicated a significant difference in mean field strength in The Haunted Gallery, while data from The Georgian Rooms showed significant results for variance but not for the mean magnitude of EMF. Another study by Wiseman et al. in 2003 conducted research at two locations – Hampton Court Palace and the South Bridge Vaults in Edinburgh. They found a significant correlation between variance in the strength of the magnetic field and the number of unusual experiences at Hampton Court Palace but no correlation between either mean magnetic field strength or variance and unusual experiences. Relatedly, magnetic field strength, variance, and pulsing was found to be different in a bedroom at Muncaster Castle when comparing the head of the bed, where people reported numerous anomalous experiences, to the center of the bedroom (Braithwaite, 2004; Braithwaite et al., 2004).

Additional studies also compared target sites and control locations outside of the study location. Terhune et al. (2007) conducted a study to analyze contextual variables and the incidence of photographic anomalies at a haunted site and control site. Part of this study was to explore the differences in the EMF mean and variance between inter-site target and control locations and intra-site active and inactive areas of the target site. The results showed a suggestively greater peak magnetic field strength and variability between control and active sites within the same location. However, there was no correlation between photo print anomaly ratings and peak magnetic field or variance. Laythe and Owen (2013) placed EMF meters inside and seven feet outside of the target site and used a distributional approach to analyze the data. Their data showed a significant difference in EMF magnitude and variability between the haunted location and an area just outside of the building. Mean differences inside the location were 50% to 100% greater than outside. They also found that reported objective anomalous phenomena were significantly associated with serial magnitude spikes. The significance was driven by EMF expansion (i.e., five or more serial spikes in a second happening more frequently than expected).

However, more recent studies showed a correlation between subjective and objective anomalous experiences with EMF variability (Laythe et al., 2017; Laythe & Houran, 2019), replicating the findings from Laythe and Owen (2013) above. Variability was analyzed by assessing EMF-expansion or EMF-suppression, defined by the number of spike 'hits' (**+/-** 2-3 standard deviations) per unit of time before, during, or after the subjective or objective experiences.

ARIGS, Citizen Scientists, and EMF Measurement

Despite the above, research into the potential role of magnetic fields at ghost and haunt locations has not been restricted to academics conducting formal research studies. Hobbyist ghost hunters and paranormal investigators have also explored the potential correlations between magnetic fields and ghost and haunt phenomena. However, substantial issues remain with citizen scientist groups and the appropriate use of the equipment necessary to measure EMF.

Equipment is often used by Amateur Research and Investigation Groups (ARIGs) during ghost hunts (Baker & Bader, 2014; Booker, 2009; Hill, 2017; Hill, 2010; Houran, 2017; Potts, 2004). Electromagnetic Field (EMF) meters are discussed in ghost hunting guides and are used extensively by ARIGs (Hill, 2017; Parsons, 2015; Radford, 2017; Taylor, 2007). However, EMF meters have mainly been used inappropriately during ghost hunts and paranormal investigations, especially regarding the collection of controls (i.e., have not collected data in non-haunted locations) and the formulation of baseline data (Biddle, 2017; Radford, 2017).

The most common meters used by ARIGs include the Safe Range EMF (commonly known as the "K2"), the Lutron EMF-822A, the Mel-Meter, and the Cell Sensor (also known as "The Ghost Meter"). These are all single-axis meters, meaning they either aggregate the readings from three axis to provide one overall "estimate" of EMF magnitude or represent the magnitude of an electromagnetic field on one axis at a specific time. Notably, a meter truly only measuring one axis always contains errors in its readings, as the variation of the other two axes will contaminate the "single axis reading", due to the variation and change of the magnitude of the other axes. Over the previous decade, general observations indicate these meters are most often held firmly in one position and are not rotated on any axis, much less all three. Again, when

these meters are genuine 'single-axis' meters, they require the user to rotate the meter on all three axes – X, Y, and Z – and calculating the average magnitude with the following equation MAGNITUDE = $\sqrt{X^2+Y^2+Z^2}$, usually within a +/-5% accuracy.

The overarching point is that slight differences in the orientation of the meter can cause drastic changes in the measurement of magnitude displayed by the meter because of both the position of the meter in relation to X, Y, and Z axis, as well as the aggregation process. For example, while rotating a Mel-Meter on a single axis next to a microwave oven (plugged in but not active), measurements ranged erratically between 0.3 mG to 70 mG. As a more formal example of the above, Laythe and Houran (2019) showed significant changes in both single-axis and sum of all three-axis measurements during anomalous perturbation of a target object. Therefore, multi-axis sensing EMF readings and data logging are preferred as they are more precise and detailed for an accurate understanding of EMF activity in the environment.

It is standard practice for ghost hunters (ARIGs) to arrive at a suspected haunted location and begin collecting measurements for baseline readings, which most often consist of a single electromagnetic field (EMF) meter. This activity usually consists of moving from room to room with the meter held in an outstretched hand, taking note of any high and low readings. This activity is performed either during setup of the ghost hunter's equipment or immediately after setup is complete, and usually takes approximately ten to twenty minutes to complete. Whatever readings are obtained during this short time become the standard in which future readings are compared and how anomalies are determined. ARIGs are under the impression that this common practice provides accurate readings to establish a reliable baseline for later comparison. However, from above, it should be clear to the reader that single-axis handheld readings are confounded by both single-axis aggregation and positioning. Further, EMF readings, baseline or not, can and do change over time (see Laythe & Owen, 2013, for an example).

Further, there are a plethora of events that can affect mains frequency EMF readings, from automatic lights turning on/off, cooling and heating systems cycling On/Off, automated machines, pumps, radio interference, refrigeration units cycling power, and so on. Regarding mains frequency powered appliances in a home, faulty/damaged wiring and electrical overload can lead to power surges, increasing EM field strength ("5 Causes of Power Surging," n.d.). Internal power surges are also caused by devices that cycle On and Off throughout the day, such as refrigerators and air conditioners. The extra drain on the electrical system is most often noticed at night when the lights are On and are observed dimming, particularly in old or faulty electrical wiring. This is due to electricity being diverted from other appliances (the observed lights) to the high demand of the A/C unit or refrigerator ("Power Surges Cause & Effect," n.d.). All these variables, and more, need to be considered and accounted for in the data collection and analysis method being used by citizen scientists as some factors may not affect readings in a meaningful way, yet EMF environmental context, in terms of faulty high-power appliances, can easily confound readings despite the above.

There are several factors besides standard electrical appliances, that will also affect the readings obtained by EMF meters, such as distance from the EMF source, due to the Inverse Square Law (Tipler, 1987) and the amount of electrical current passing through the electrical lines and their potential shielding. Generally, EMF-generating sources decay at about a power per foot (i.e., 100 mG is 10 mG at a foot away) (Thide, 2004; Tipler, 1987). It is a common myth that powerlines and other large sources of EMF flood the environment (cf. Laythe et al., 2017). An understanding of the inverse square law would mean that intruding sources of EMF greater than five to ten feet away will not typically impact the magnitude readings of the EMF meter. It is also important to acknowledge that EMFs not only have a magnitude but direction. EMFs can be either vectors or fields, and they are comprised of both electric and magnetic vector fields. The direction of the induced EMF is determined by the right-hand rule. The

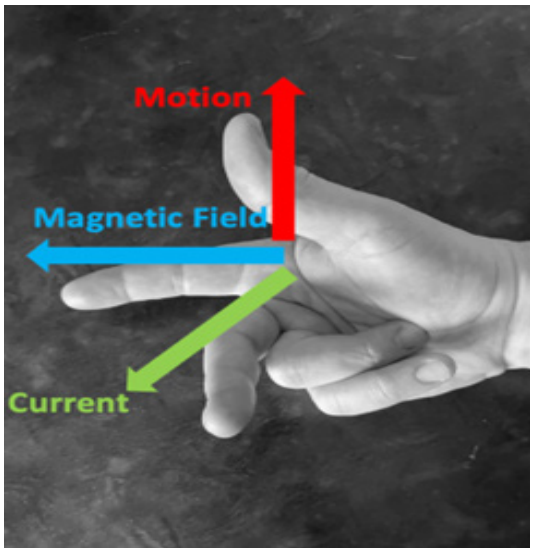

Figure 1. The thumb is the direction of motion of the conductor, the index finger is the magnetic field direction, and the middle finger is the direction of the induced current. Each finger describes one of the three dimensions.

thumb is the direction of motion of the conductor, the index finger is the magnetic field direction, and the middle finger is the direction of the induced current. Each finger describes one of the three dimensions and is perpendicular to each other (see Figure 1). Therefore, the context of the environment is very important, and perhaps more so than the precision of the measurements. The distance of the source of the field from the meter and the vector of the field in relation to the meter results in the magnitude measurement (Tipler, 1987).

To summarize, improper use of equipment and data collection with EMF meters, as well as a lack of baseline and control data collected over time to provide an appropriate testable sample, leads to difficulties in drawing any conclusions about the relationship between anomalous phenomena and EMF data collected in haunted locations. In essence, without appropriate baseline measurements, how does one know that a specific EMF reading is abnormal? Further, and without comparison samples, why would EMF readings in a haunted location be considered anomalous?

The current study addressed some of the above questions by collecting multi-hour multiple-day baseline EMF data within a non-haunted location. From this process, we explore the EMF profile of said baseline location in order to both compare and examine the extent to which EMF magnitude and variability are actually different within a non-haunted control site.

METHODS

Data Collection

EMF data was collected in a non-haunted location in Round Lake, Illinois on January 2nd, 2020 from approximately 6 am to 10 am and 8 pm to 12 am and January 3rd, 2020 from approximately 6 am to 10 am and 8 pm to 10:30 pm. The house is in a subdivision and is approximately 20 years old. It is a two-story home with an unfinished basement, central air, natural gas heat, and Wi-Fi. The owners also have multiple cell phones, tablet computers, and TVs connected to cellular networks and/or the Wi-Fi network. Data was collected by the first author.

Apparatus

EMF Meter. Electromagnetic Field data was collected using a 3-axis Taishi EMF Meter model TES-1393 with the following specifications: sample time of 0.5 seconds; bandwidth 30-2000 Hz; range 20/200/2000 mG; resolution 0.01/0.1/1 mG; accuracy +/- (3%+3d) at 50/60 Hz, +/- (5%+3d) at 40-200 Hz, -3dB at 30-2000 Hz. The meter was positioned with the X-axis in the W-E position, Y-axis in the N-S position, and Z-axis in the UP-DOWN position. Data were collected at a rate of one sample per second with the supplied software with a Dell Inspiron Mini 10 running Windows XP Home Edition.

Procedure

EMF data was graphed, and descriptive statistics were calculated using Microsoft Office 365 Excel. $MAGNITUDE_{EMF}$ was calculated using the formula $MAGNITUDE_{EMF} = \sqrt{(X^2 + Y^2 + Z^2)}$. An Analysis of Variance (ANOVA) was conducted to determine if the difference between the means of $MAGNITUDE_{EMFs}$ for the different days and AM/PM runs were statistically significant (alpha = 0.01). The overall effect size was calculated with Eta-squared, $\eta 2 = SS_{Effect}/SS_{Total}$. Cohen's d for unequal sample size was calculated for mean differences. Further, variance analysis was done by determining the percentage of readings that were **+/-** 2 SD during each hour of the four different data collection periods. Levene's test was used for testing inequality of variance for the overall data collected during each time period.

EMF frequency was determined using a 3-axis Fluxgate Magnetometer Model 539 with APS software with the following specifications: range -650 mG to +650 mG; accuracy +/-1% full scale. The meter was positioned with the X-axis in the N-S position, Y-axis in the W-E position, and Z-axis in the UP-DOWN position. It was set to collect approximately 250 samples per second. Data was analyzed by FFT analysis using SigView software.

RESULTS

Firstly, an FFT analysis of the Fluxgate Magnetometer EMF data was conducted. Results show that the only frequency present in the data was 60 Hz, which was expected since this is the mains electrical current power frequency commonly used in the United States. As such, inferences about geo-magnetic field magnitude and variation should not be inferred from the current research. Table 1 shows the summary statistics for the four data collection periods of EMF at the baseline location. All data runs showed leptokurtic distributions with various levels of positive skewness. When this data was compared in clusters (approximately 4 hours per session) with an Analysis of Variance, results of ANOVA indicated the difference between these grouped time periods aggregate means was statistically significant, $F(3,54465) = 1282.67$, $p < 0.01$, with an effect size (Cohen's d) of 0.066, considered a medium effect size (Cohen, 1988; Miles & Shevlin, 2001). However, we caution the reader in terms of overestimating significance, as the large sample size for the ANOVA allowed for significant results despite the small actual

Table 1. Summary Statistics for Four Periods of Temporal Data Collection at a Baseline Location.

	N	Mean	SD	Median	Min	Max	Skew	Kurtosis
Jan 2, 2020 am	15093	2.23	0.66	2.13	0.93	19.5	4.05	58.78
Jan 2, 2020 pm	15125	2.43	0.85	2.27	0.99	12.71	1.81	8.35
Jan 3, 2020 am	15139	2.2	0.73	2.05	0.94	14.17	2.15	15.01
Jan 3, 2020 pm	9112	2.74	0.69	2.68	1.38	14.58	4.79	59.87

changes in the mean magnitude of no more than 0.5mG at the different data collection time intervals (see Table 1).

The mean $MAGNITUDE_{EMF}$ percent change for each time interval and corresponding Cohen's d were 10.66% (Cohen's d = 0.76) Jan. 2 am vs. Jan. 2 pm; -1.35% (Cohen's d = 0.69) Jan. 2 am vs. Jan. 3 am; 22.81% (Cohen's d = 0.67) Jan. 2 am vs. Jan. 3 pm; -10.86% (Cohen's d = 0.79) Jan. 2 pm vs. Jan. 3 am; 10.95% (Cohen's d = 0.79) Jan. 2 pm vs. Jan. 3 pm; and 24.49% (Cohen's d = 0.71), Jan. 3 am vs Jan. 3 pm. Cohen's d indicated effect sizes were between medium and large. However, we again emphasize that the practical significance between magnitude and time period are factually small.

The sample variance for each $MAGNITUDE_{EMF}$ time interval was 0.44 for Jan. 2 am, 0.73 for Jan. 2 pm, 0.54 for Jan. 3 am, and 0.47 for Jan. 3 pm. The percent difference between each time period variance, defined as $(T_{2\ Sample\ Var} - T_{1\ Sample\ Var})/ T_{1Sample\ Var}$, were: 66.10% Jan. 2 am vs. Jan. 2 pm; 22.93% Jan. 2 am vs. Jan. 3 am; 8.01% Jan. 2 am vs. Jan. 3 pm; -26.02% Jan. 2 pm vs. Jan. 3 am; -35.01% Jan. 2 pm vs. Jan. 3 pm; and -12.15% Jan. 3 am vs. Jan. pm. This showed that even though the numerical variance difference for each time period was small, there was a large (-35.01% to 66.10%) percent difference between them. Levene's test for inequality of variances was significant ($p < .01$) for the $MAGNITUDE_{EMF}$ readings, which indicated statistically significant unequal variances across the four different time periods data was collected.

The data was analyzed to better understand the temporal variation and how it would compare to a normal standard distribution by examining the percentage of the overall $MAGNITUDE_{EMF}$ readings and the percentage of readings in one-hour intervals that were **+/-** 2 SD. The percent of $MAGNITUDE_{EMF}$ readings for all time intervals that were **+/-** 2 SD were 2.49% for Jan. 2 am, 3.39% for Jan. 2 pm, 6.21% for Jan. 3 am, and 3.94% for Jan. 3 pm. Hour-by-hour comparisons in the percentage of readings that were **+/-** 2 SD was also analyzed to better understand the temporal variability in the $MAGNITDUE_{EMF}$.

Table 2 shows the percentage of readings that were **+/-** 2 SD by the hour and the total time for each data run. The percentages ranged from 0.39% to 14.69%. Notably, the Jan. 2 pm hour 1, Jan. 3 am hours 1 and 3, and Jan. 3 pm remaining time periods of a baseline reading show large degrees of variability beyond a normal distribution of EMF readings, which without interference, would approximate 5%. As the current dataset shows, these percentages are exceeded in several instances, suggesting that baseline readings may not differ from purportedly haunted environments in terms of extreme variability.

Figure 2 shows the $MAGNITUDE_{EMF}$ readings per second for each data run. There was a high level of variability in

Table 2. Percent of Readings +/- Two Standard Deviations By Hour For Total Time

	Jan. 2, 2020 am	Jan. 2, 2020 pm	Jan. 3, 2020 am	Jan. 3, 2020 pm
Hour 1	1.89%	11.69%	14.69%	1.64%
Hour 2	2.75%	0.69%	0.72%	0.61%
Hour 3	1.56%	0.39%	10.00%	na
Hour 4	0.75%	1.25%	0.56%	na
Remaining	1.83%	1.10%	0.68%	14.54%
Total Time	2.49%	3.39%	6.21%	3.94%

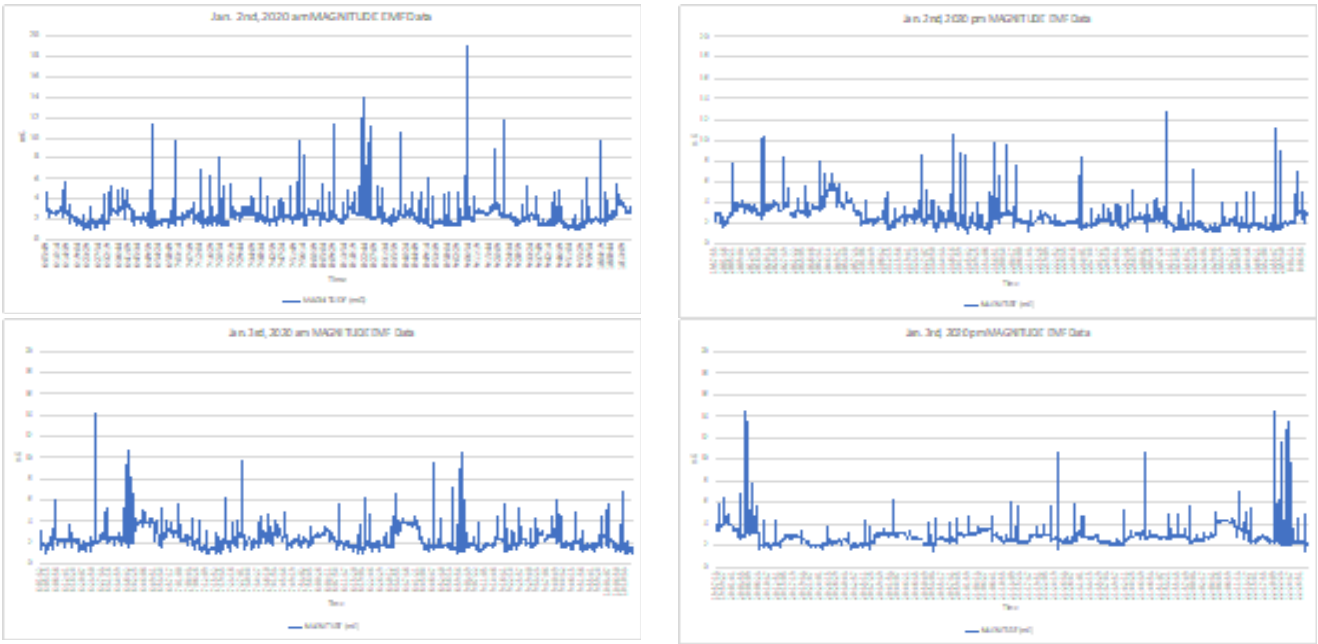

Figure 2. MAGNITUDE$_{EMF}$ data plotted vs. time. Note that the data from left to right ranges from January 2nd to January 3rd, 2020 in approximate 12 hour blocks.

the readings, as seen with the numerous spikes in all data collection periods.

There was considerable variation in the EMF levels in the X and Z axes, which would have been oriented in the W-E and UP-DOWN positions, respectively. There were relatively low readings in the Y-axis readings (N-S) during all data runs. Post-experiment testing confirmed that the Y-axis on the EMF meter was working properly.

Figure 3 shows the difference in what the reading would have been using a single-axis vs. a three-axis sensor meter when placed in the X, Y, and Z-axis orientation. The single-axis meter would have given different readings based on how the meter was oriented in space, while the three-axis meter provided the MAGNITUDE$_{EMF}$ reading no

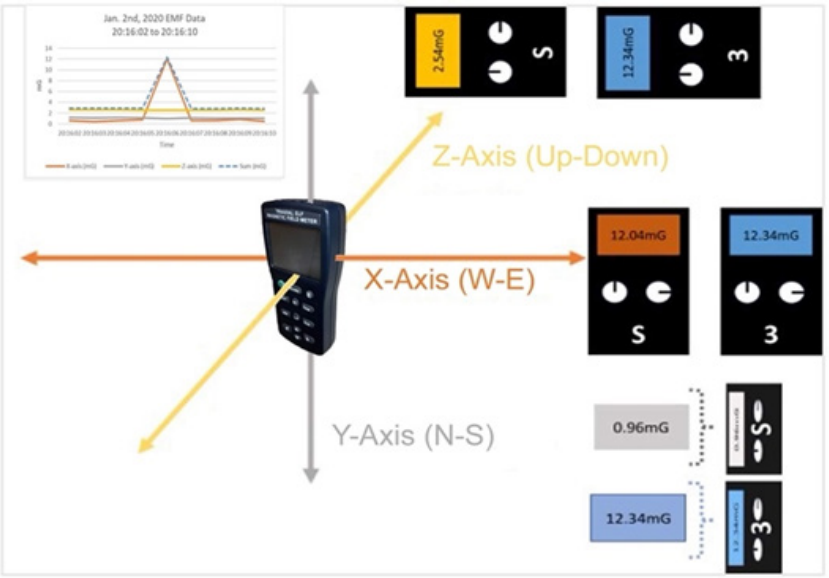

Figure 3. Single axis (S) vs. three axis (3) EMF meter readings on individual axis for an EMF "spike" on Jan. 2nd, 2020 at 20:08:16. The screen color on the single-axis meter matches the three different orientations of the meter and the different axes readings on the graph in the upper left corner. I.e. If the single-axis meter is oriented in the UP-DOWN position, then the reading is 2.54mG, seen on meter screen and the graph. The three-axis meter gives a reading of 12.34mG as all three axes are taking readings and it is calculating the MAGNITUDE.

matter what orientation it was in due to the three different orientations of the three sensors in the meter.

DISCUSSION

The current study shows that a non-haunted control site had complex time-varying magnetic fields during long-term data collection periods at various days and times while the EMF meter was in a fixed position. The differences between the data collection periods were significantly different in both means and, in some cases, extreme in EMF variance. The EMF profile showed that the $MAGNITUDE_{EMF}$ levels were like that expected in homes with numerous electronic devices (Gauger, 1985; Silva, 1988). One study of 24 houses by Mader et al. (1990) reported that the measured magnetic field ranged from 0.27 mG to 30.83 mG. Detailed data collection in one house over a week showed that the EMF varied between 0.8 mG to 7.0 mG. The hourly averages were 4.4 mG with a standard deviation of 0.12. The authors also noted that the short-term monitoring had spikes in the EMF that were 400% higher than expected (Mader et al., 1990). The current study showed a $MAGNITUDE_{EMF}$ range of 0.93 mG to 19.05 mG with a standard deviation between 0.66 to 0.85 and a higher-than-expected percentage of readings that were **+/-** 2 SD when compared to a normal standard distribution for both individual readings and hour by hour comparison.

In fact, the temporal variation of the EMF data was also similar to that found for EMFs recorded over long periods of time in a reportedly haunted location (Persinger & Koren, 2001). In 1996 Persinger and Koren investigated a house with a variety of haunt-type phenomena reported – nightmares, someone touching the wife and husband's feet, anomalous sounds of breathing and children playing, flashes of light, shadows, sensed presence, waves of fear, and apparitions. The aforementioned house had numerous electronic devices. Persinger and Koren said, "Living in the house was analogous to living in a complex electromagnetic coil with very aberrant application geometries" (p. 185). They measured the magnitude of the main's power (60 Hz) over a 24-hour period. The mean magnitude varied between 2 mG to 40 mG in the basement and the area next to the bed. The EMF mean magnitude recorded over 24 hours on June 19, 1996, showed a variety of spikes and dips, which indicated the field was amplitude modulated.
As stated before, differences in mean and variance have been found between areas where anomalous activity has been reported and within site control areas at reportedly haunted locations (Braithwaite, 2004; Braithwaite et al., 2004; Nichols & Roll, 1998; Wiseman et al., 2002; Wiseman et al., 2003). Differences in mean and/or variance have also been noted between haunted locations and control sites outside haunted study locations (Laythe & Owen, 2013; Terhune et al., 2007).

From above, and when examining our dataset from a non-haunted location, the variance showed stronger absolute differences (8.01% to 66.10%) compared to absolute mean changes (1.35% to 24.49%). The percent readings **+/-** 2 SD overall was 2.49% to 6.21%. The hourly percentages were between 0.39% to 14.69%. This is not much different from the 0% to 11% reported by Laythe et al. (2017) but does not entirely conform to the approximate 2.5% "spikes" in both tails of a normal distribution.

The above changes in a baseline sample could be from meter placement and related appliances, notably if they were placed within one or two feet from such an object, but the inverse square law of EMF decay makes this unlikely. Further, any field placement of EMF will, by its nature, be complex and prone to error due to numerous potential sources. However, one prominent point of this study is that, at least from this baseline sample, non-haunted locations seem more similar than different from EMF data collected in purportedly haunted locations.

Interpretation of potential correlations between magnetic fields and anomalous experiences at reportedly haunted locations and the identification of an individual EMF reading as being anomalous, even if within the site and external site controls are used, would seem to be further complicated if control sites (both non-haunted and within site haunted) show temporal variations and differences in overall mean and variance as this study has demonstrated. How, then, can it be determined what is anomalous vs. baselines and controls? Will any stretch of time be sufficient for baselines and controls? We humbly submit that general magnitude and variability comparisons over time may not gain citizen scientists nor research scientists relevant findings, particularly if the goal is further investigation of the EMF-phenomena hypothesis.
However, the distributional approach to EMF analysis was recently developed and applied to haunt research involving EMF and physical variables and objective and subjective phenomena. Binomial probability analysis methodology was effectively applied to analyzing magnetic field data in locations where contamination could not be controlled (Laythe et al., 2017; Laythe & Houran, 2019; Laythe & Owen, 2013). Most importantly, the above research represents the analysis of EMF magnitude and variability in temporal association with documented and observed anomalous phenomena. As such, and from the similar variabilities and magnitudes collected with the current study as baseline data, the current evidence supports that time-synced readings of EMF in conjunction with documented phenomena may well be more fruitful for replicating the

above research. Notably, broad, long-term readings of EMF are unlikely to note any real association with ostensible anomalous phenomena. If one accounts for the overall measurement error of field laboratories, it is likely always the case that various degrees of electronic devices, bad wiring, or related confounds will create variability in any field-measured EMF environment.

In sum, overall temporally extended data sets of haunted environments and the related mean and variance analysis which follows them should be moved away from as imprecision is always going to be present. Therefore, specific spikes in temporal association with subjective or objective phenomena should be analyzed. However, we do note that the current study indicates that EMF variability and spiking occur both in haunted and non-haunted locations but not with the same level of variability present in hour-to-hour comparisons reported by Laythe & Owen (2013). This suggests that abnormal degrees of spikes are likely standard in all EMF environments.

Applied practically, the current findings suggest that while handheld mapping of EMF environments is still useful for gauging potential contamination in a site, citizen scientists interested specifically in the EMF-phenomena hypothesis will need to invest in long-term data logging EMF equipment, preferably 3-axis *and* have the technological capacity for objectively capturing (and time stamping) objective and subjective haunt phenomena in the environment.

Suggested Future Improvements on EMF Survey of Non-Haunted and Reportedly Haunted Sites

There were a few limitations of the current study. First, data was collected in only one location and only in one area of this single location. As such, future validation of baseline data would be greatly bolstered by recruiting additional interested citizen scientists to collect several datasets of baselines to confirm our above conclusions. Secondly, a formal and standardized method of collecting anomalous experiences should be used across these interested parties, such as the "Survey of Strange Events," even in non-haunted control locations (Houran et al., 2019). Third, future studies may benefit from collecting data when the main power to the house was turned off to see to what extent the magnitude and variation of an EMF baseline profile looks like. However, we would be remiss to note that Laythe and Owen (2013) demonstrated large degrees of variability, with no direct power available to the location. Indeed, future studies with standardized procedures could apply and examine several conditions, including haunted or not haunted, inside versus outside, sacred space versus non-sacred space, and in perfect world locations with similar and different architecture. In fact, we heartily encourage amateur enthusiasts interested in such a project to contact us.

Implications and Applications

Long-term EMF data collection and data logging with stationary three-axis meters, as those used in this study, is imperative in collecting quality data when trying to understand the potential correlations between EMF and anomalous activity at reportedly haunted locations. The methods and equipment used in this study are superior to the handheld meters that are used by many ARIGS. Collecting data in control locations with no reported anomalous activity will provide important baseline control data that will assist in determining what might be anomalous readings at a reportedly haunted location. The methods and findings in this paper will benefit and hopefully motivate amateur investigators to collect quality data in order to become citizen scientists and contribute to the big data collection and analyses that are needed to understand the possible correlations between EMF and anomalous activity at reportedly haunted locations.

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AUTHOR CONTRIBUTIONS

Dave Schumacher: Conceptualization, Methodology, Formal Analysis, Investigation, Resources, Data Curation, Writing – Original Draft, Visualization. **Kenny Biddle:** Conceptualization, Writing – Original Draft, Writing – Review & Editing. **Tim Vickers:** Conceptualization, Writing – Original Draft, Writing – Review & Editing.

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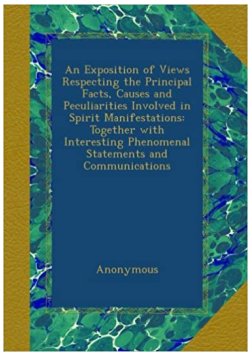
Journal of Scientific Exploration
Anomalistics and Frontier Science

BOOK REVIEW

An Exposition of Views Respecting the Principal Facts, Causes, and Peculiarities Involved in Spirit Manifestations

Michael Tymn
metgat@aol.com



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More than thirty years before the Society for Psychical Research (SPR) was founded, some serious psychical research was going on, as evidenced by this 1852 book. Author Adin Ballou (1803-1890), a Unitarian minister, was considering subconscious influences and other distortions in the messages coming through mediums when Frederic W. H. Myers and William James, two of the SPR pioneers, were still in grade school. "I believe that departed spirits cause *many* of these phenomena, but not all of them," he stated after summarizing a myriad of both physical and mental mediumistic phenomena witnessed by him and many others in the years immediately following the advent of what came to be called 'Spiritualism'. "I believe that spirits in the flesh, i.e., the mind of the Medium, or the minds of the persons surrounding the Medium, *sometimes* thwart, warp, peculiarize, or modify the manifestations and communications made. I also believe that *low* and very *imperfec*t departed spirits sometimes manifest themselves (pp. 14-15).

Ballou also observed that mediums, in their "crude, incipient state, gave forth communications in accordance with their own *prejudices, wishes*, or *wills*, and very contrary ones to those generally received, but that they may outgrow their defects and become reliable" (p. 65).

Remembered primarily as an influential pacifist and abolitionist, Ballou emerges as possibly the first dedicated psychical researcher, even before Judge John Edmonds, whose book *Spiritualism*, co-authored with George T. Dexter, M.D., was published in 1853. Edmonds states that he began his investigation in January 1851, but Ballou's reports, while not giving dates, suggest he started a little earlier than Edmonds.

Ordained as a Universalist minister in December 1824, Ballou first served in Milford, Massachusetts, and New York City. As a result of disagreements in the hierarchy of the Universalist Church, Ballou, and several other ministers formed a new denomination, the Massachusetts Association of Universal Restorations (MAUR), but conflicting ideals within that group prompted Ballou, in 1831, to accept a call to serve as a Unitarian minister, a position in which he focused most of his energies on social reform.

Ballou recorded that he witnessed a myriad of both physical and mental phenomena, including levitations, materializations, apports, and communication with unseen intelligences, the latter from light taps to heavy pounding and even by direct writing with a plumbago pencil, i.e., no visible hand holding the pencil. He further reported that he sat and conversed with the "authors" of the sounds and motions for hours, asking questions and receiving answers, usually by the alphabet being spelled out with a knock at the proper letter, "... all by a slow process, indeed, but with every possible demonstration of intelligence, though not without incidental misapprehensions and mistakes. I have witnessed the asking of mental questions by inquirers, who received prompt and correct answers as when the questions were asked audibly to the cognition of the Me-

dium" (p. 49).

Long before Professor Charles Richet gave the name "ectoplasm" to the strange substance emitted by mediums, Ballou called it *spiricity*. "It is partly of the same substance with individual soul-spirits, constitutes their congenial atmosphere, and serves as the principal element of intercommunication," he explained. "They can inhale and absorb it, exhale and radiate it, impregnate, it with their peculiarities of *thought, affection*, and *will*, and thus transmit influences to inconceivable distances, nay, transport their preceptive consciousness so as to be virtually present anywhere within their permitted range of existence." (pp. 17-18) However, he also observed a wide range in the quality of the phenomena and the degree of strength of the mediums. "I have found that some Media were so imperfect, or had been so sophisticated by the management of overruling minds, that scarcely any reliance could be placed on what purported to come through their mediumship. Others, especially *tipping* and *hand-moved* Media, are frequently so nervous, doubtfully balanced, and peculiarly affected that one knows not what to depend on. But it remains true that there are clear, passive, independent Media, worthy of all the reliances that ought ever to be placed in persons sustaining such a relation to the spirit world" (p. 63).

Ballou went on to say that he had seen a medium "gently magnetized and thrown into a trance in one minute by the imperceptible influence of the spirits." The spirits then used her organs of speech and answered numerous questions instead of responding with the usual raps. "That these trances were not superinduced by mortal agency, and were not *feigned* but *real*, I am as certain as I can be of anything not absolutely beyond the possibility of mistake," he wrote (p. 52). He theorized that not one in 50 mediums has developed spiricity to be a clear intellectual medium.

"The Medium is a sort of amanuensis, translator, or interpreter of the spirit's leading ideas," he continued. "In this character, Media will exhibit, in various degrees, the defects of their own respective rhetoric. Unless their perspicuity, force, and command of language be equal to that of the mind communicating through them, the same result will follow, as when an accomplished mind in the flesh is obliged to write or speak through a clumsy amanuensis, translator, or interpreter" (pp. 113-114).

Ballou wondered why messages coming through mediums sometimes reflected their own ideas. "In such cases, the mediums are of recent development and very imperfect, or else, for the time being, are in an impassive, feverish state, greatly influenced by positive minds near them," he opined. "These exercise a strong physical influence, and either suspend or warp and deflect the action of the spirit attempting to respond" (p. 112).

Even though names had not been given to the theories later called Secondary Personality and Super-Psi, or Living-Agent Psi, Ballou seems to have mostly considered them as "unconscious clairvoyance." He asks, "How can an unconscious, unorganized element understand specific questions? How transmit itself to the particular place, ascertain important facts, return and express them by rappings? How or why pretend to be a particular person – a departed spirit – with a particular name? Is this natural, rational, consistent, or at all probable?" (p. 26). He concluded that departed spirits were a much more rational explanation than such far-fetched theories relating to the subconscious.

Nevertheless, there were discrepancies and contradictions in the information coming from the spirits. "Sometimes it has been found that if the Medium was strongly prejudiced, or was overawed by associates of that character, the teachings of the first few weeks were biased considerably by those influences," he explained, "whereas afterwards, when the communications seemed to be made more freely and independently of the Medium's mind, these peculiarities ceased, and the doctrines attested became accordant with the general current" (p. 54).

Some of the experiences, he reported, were clearly beyond trickery. "I have requested what purported to be the spirit of a friend many years deceased, to go to a particular place, several miles distant from that of the sitting, and to bring me back intelligence respecting the then health and doings of a certain relative well-known to the parties. In three minutes of time, the intelligence was obtained, numerous particulars given, some of them rather improbable, but every one exactly confirmed the next day, by personal inquiries made for that purpose" (p. 50).

Ballou noted that a number of mediums had been discredited because the words supposedly coming from great minds in the spirit world were not consistent with their modes of expression when in the earth life. He concluded that these great minds in the spirit world, realizing how difficult it is to find a medium with the necessary intellectual capacity to convey their message, concerned themselves more with communicating fundamental principles and ideas than with the verbiage. "I read communications purporting to come from these illustrious sources with a good deal of distrust," he offered. "Yet, I cannot doubt that some of them are substantially authentic and reliable. These, however, are not all invulnerable to the objection. A part of them exhibit the defects complained of. How is this to be accounted for? By making due allowances for the imperfection of the Media" (p. 113).

Ballou also claimed that communications sometimes

came from purported spirits of the dead, but it turned out that the person represented was still alive in the flesh. "What passes through such Media must be greatly liable to the influences of *un*departed spirits," he wrote. "Their own prejudices, will, imagination, low ideas, perverse sentiments, and peculiar absurdities of interior conception, must bias and characterize the communication, which any spirits should attempt to make through them. Mesmeric and psychological influences, from controlling minds near them, would be likely to have the same effect. Hence the communications, even of a decent and well-meaning *departed* spirit, might come out in an awkward translation – something quite unlike what was intended" (p. 69).

He recalled a situation in which a spirit came and communicated, purporting to be a well-known friend living in a distant country and still in the flesh. The information communicated was clearly unknown to the Medium, thus ruling out fraud as well as the theory that the mind of the Medium created it. He further concluded that mischievous spirits sometimes impersonated living people. Moreover, he concluded that some *un*departed spirits had the ability to move objects by *will*-power, but that departed spirits had a "hand" in most phenomena of this nature. "As a believer in the exertion of will-power by departed spirits, there is no necessity for my utterly denying the existence of such power in *un*departed ones," he explained his position (p. 121).

Among the consistent "teachings" of the spirits recorded by Ballou were:

> * There are seven spirit spheres, or circles, inferior to the heavenly or celestial spheres, and each sphere or circle has several degrees. Man progresses through these spheres, drawing nearer and nearer to God, or nearer to the divine standard of perfection.
>
> * Death does not change man's real character, nor his proper spirit sphere, nor his capability to make progress, nor the laws of progress.
>
> * Many spirits remain very long in the lower spheres, but while they are "spirits in prison," there is no such place or state as a hell of unmitigated, hopeless mercy.
>
> * God, angels, and all the higher spirits are forever seeking the elevation of the inferior spirits by all just, wise, and appropriate means.
>
> * Spirits in the higher spheres are employed in three general exercises: 1) in striving after a more perfect knowledge of and communication with God, whom they cannot see there any more than here, as a personal being, but only in spirit by faith and intuition; 2) in study, self-examination, contemplations of truth, and acquainting themselves with all useful knowledge attainable to them; 3) in ministering to struggling spirits on earth and in the lower spheres – endeavoring to elevate and bless them.
>
> * Spirits in any circle can descend into all the circles below their own, but cannot, except by special permission, ascend into a higher sphere until qualified by spiritual progress. (pp. 55-59)

There was a time, Ballou remembered, when he was of a very skeptical mindset regarding all the phenomena he had heard about. "But I have seen too much that my native ignorance deemed impossible, not to have been rendered modest in my skepticism. Truth is truth, in spite of all ignorance and unbelief. And there is a vast ocean of truths, which man will have to learn sooner or later" (p. 213).

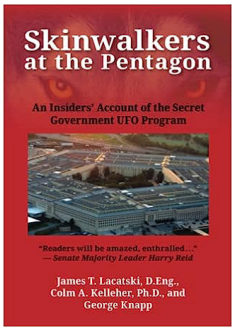
If Myers, James, Hodgson, Lodge, Hyslop, and other early leaders of the SPR were aware of Ballou's research, it is difficult to find it in their reports. Those reading the SPR records might assume that the ideas set forth by Ballou originated with the SPR research forty or fifty years later.

Journal of Scientific Exploration
Anomalistics and Frontier Science

BOOK REVIEW

Skinwalkers at the Pentagon

Barry Greenwood
uhrhistory@verizon.net
National UFO Historical Records Center



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In 2017, the public was introduced to the fact that internal investigations into so-called "anomalous aerospace threats" had been quietly conducted under a $22 million government contract that mainly went to billionaire Robert Bigelow's Bigelow Aerospace firm in Nevada. This happened due to the influence of Harry Reid, the then-majority leader in the U.S. Senate, who had a strong interest in UFOs. That research was conducted between 2007 and 2012, when the funding ended. The Defense Department decided to turn its attention to higher priority issues that merited funding. Apparently, inadequate results were coming from the effort, said to have been called the AATIP, or Advanced Aerospace Threat Identification Program. Nevertheless, investigations by persons associated with AATIP, affirmed in a letter from former Senator Harry Reid to NBC to have been led by DoD counterintelligence officer Luis Elizondo, continued in spite of the lack of funding through whatever means they could muster. One of the more seemingly concrete revelations about UFOs, or now UAPs (unidentified aerial phenomena), was that the government held physical artifacts that were being studied as well as having filmed evidence of UAPs from Navy pilots.

So, with this as a backdrop, it was of interest to see the release of "Skinwalkers at the Pentagon" by authors directly involved with the eventual creation of the government's new UAP program. Dr. James Lacatski and Dr. Colm Kelleher are described as the overseers of the operation of AAWSAP for their day-to-day activities. However, when the government's involvement was announced in 2017, it was said to have been called AATIP. I was puzzled. The introduction to the book said that AAWSAP was not AATIP, that AATIP was a made-up substitute name for AAWSAP via a letter from Harry Reid to the then Deputy Secretary of Defense in 2009. This switch was due to the fact that the AAWSAP program was classified, and the nickname was used and given to the New York Times for public release. This is reminiscent of how former head of the Air Force's Project Blue Book, Captain Edward Ruppelt, had referred to the UFO study effort by Battelle Memorial Institute publicly in the early 1950s as "Project Bear," or the public use of "Project Saucer" as a nickname for an earlier rendition of Blue Book, "Project Grudge."

From the point of view of security overseers, the use of pseudonyms to hide real information is a long-standing practice that achieves particular goals. However, in time the revelation of deceiving information being used to mislead has the effect of seeding mistrust among those to whom the information is being given. Given that AATIP was asserted to be the government's UAP program, lots of people filed lots of FOIA requests in an effort to peel away the secrecy about this now-openly discussed effort. Except that all that effort was for naught since AATIP did not exist as an official program, and the government could legitimately claim that no records could be located.

The book goes on to clarify in early pages just what influenced the government's seeming new-found interest in UAPs: Skinwalker Ranch! This place had been in the news cycle off and on for over twenty years as a focal point of paranormal activity. "Paranormal" meant disembodied voices, fantastical creatures both on the ground and flying,

mysterious vortices appearing from nowhere, aerial objects of varying kinds, and a variety of other phenomena. At the same time, there is a certain degree of the raising of eyebrows in consideration of all this. Exactly what existed to verify that all this was real? Was Skinwalker Ranch a "Paranormal Disneyland" as some have described it?

The one thing that the original government effort did not have that this latest one does is that Projects Sign, Grudge, and Blue Book did not spring from the paranormal then. "Well, what about UFOs?", one might ask. Allegations of unknown flying objects witnessed by military and civilian figures that occasionally were photographed and detected by radar was a legitimate security response for the government if only for the reason that these incidents could have been foreign intrusions, meaning Earth-borne flying objects, and not paranormal events.

The purpose of this book is partly to describe the origins of recent government attention to UAPs and partly to legitimize a variety of paranormal phenomena that are said to take place at, or due to, Skinwalker Ranch, which led to that government attention. It is a bit worrisome that the potential for a less-than-diligent-attitude toward paranormal reporting could be the underpinning of what outwardly seems to be a renewed government approach to UFO/UAP incidents.

There are a lot of alphabet-soup acronyms in the descriptions of government investigations into UAPs. This is inevitable since this reviewer encountered much the same decades ago when researching Freedom of Information Act releases after Project Blue Book closed in 1970. The authors unravel this as well as can be expected. Secrecy of behind-the-scenes UAP investigation continues as it was in the past for legitimate reasons (national security over methods and personnel) as well as not-so legitimate reasons (mistakes, mishandling, bending of regulations).

What might be said to be a positive effect of new investigations is the years-long surfacing of reports of strange aerial phenomena by U.S. Navy personnel, leading to a more concerted effort to monitor and analyze these events as at least foreign technological intrusions into U.S. national security, or at most previously unknown technological developments. An assortment of military reports gathered by AAWSAP in conjunction with Bigelow Aerospace (the biggest corporate beneficiary of the original $22 million government contract) is discussed in chapter 13, including mention of the 1975 overflights roughly forty years earlier. The original scope of the federal inquiries was to have been limited to the early 2000s, but more recently, guidelines were extended further back in time to the 1940s.

Flying triangles and colored orbs are given separate discussions by the authors as part of the phenomenology they try to establish, though as with any other kind of UAP investigation, the conclusion is subject to the diligence of the investigator or investigating body in often assessing fragmentary information. One "Georgia" triangle incident was said to have conformed to a "NIDS Low Flying Triangle" database group of entries, except that "radiation" caused a "plethora" of medical injuries. The event is described in some detail, which included a "men-in-black" sort of encounter with the Department of Homeland Security, but HIPAA laws forbade the BAASS investigators from revealing any details, including the identity of the witness. In other words, little of importance could be independently checked. Did the triangle really cause the medical problem, or was there an alternate explanation for the condition? Well, the book says yes, but specifics are off-limits.

Mixed in between these discussions is reporting of the more vaporous paranormal phenomena that constitute the Skinwalker Ranch saga which makes up a large part of the book. The ranch became an object of interest for Robert Bigelow, a Las Vegas billionaire who had a strong penchant for UFOs and the paranormal. Bigelow had purchased Skinwalker Ranch to explore alleged paranormal activity there. In 1995, he created an investigative organization called NIDS, National Institute for Discovery Science, primarily to collect evidence of the paranormal periodically reported by witnesses at or near the ranch. Thus, it became a modern legend.

A bewildering array of strange phenomena has poured out of the ranch since. UFOs, weird electromagnetic effects, cattle mutilations, portals or vortices appeared out of thin air, an assortment of creatures both flying and ground-based, ghosts and poltergeists, destructive energy, and radiation from undefined sources were all part of the mix. Once, a golden Moebius strip was said to appear to witnesses. Odd animals were said to have been shot but were seemingly invulnerable to bullets. A ranch employee told this reviewer of seeing a frog with the mouth of an alligator that bounded away. Though he had a camera, no photographs were taken, and the frog eluded pursuit. This same witness told of seeing a man standing on a cliff suddenly bending over as if standing on hands and feet. The "man" turned into a werewolf who then, not surprisingly, ran off and vanished. This time photos were taken, though only of prints in the ground and only of wolf prints. No transition prints from a man to a wolf were evident, and no word about analysis.

While these personal recollections to this reviewer were not in the book, they were representative of the kinds of sightings than came from Skinwalker Ranch. In other words, they were not well-documented and strained credibility. Another instance that IS in the book

was reported by NIDS investigator Colm Kelleher and DIA analyst Juliett Witt of seeing what looked like a 150-pound pig that had a beaver-like tail and was covered in spines resembling a dinosaur. It was described as having "glided" past them with no noise and apparently not disturbing the ground or leaving footprints. This has mockingly become known as a "dinobeaver" in paranormal circles (page 56). Once again, no photographs by investigators carrying cameras. Witt was involved in later paranormal activity at her home in Virginia when a roommate was frightened by a body standing over his bed. The body vanished when the lights were turned on. She also told of a giant owl that attacked her car a week later that left visible marks on the car. Anticipating details of an analysis on the owl marks as I read on, nothing further was said about it, only that she continued to experience paranormal events (page 57).

Skinwalker Ranch is a blizzard of this type of information: sensational, lurid, and chilling but always hitting a brick wall when it came down to being able to prove that these incidents were genuine manifestations of truly strange phenomena. It was an endless source of frustration reading this as one would like to think that all of it is real and an indicator of new realms of reality waiting to be plumbed for life-changing discoveries. Instead, it felt like Skinwalker Ranch, like other paranormal topics, is always in the business of selling belief and hope. A story promises amazing revelations, and when a final piece of the puzzle is awaited to drop, the placement of that piece is kicked down the road into a future promising that the piece will fall into formulating a solution and almost never seeming to do so. I say "almost" because at least one example of previous phenomenology, transient lunar phenomena, has been established as genuine. As for the remainder, it reminds me of the doomsday predictions, which are seen with excitement by many as future drama, yet to date, have been one hundred percent wrong!

Chapter Nine (page 80), "Bringing Something Home – The Infectious Agent Model," injects another dimension into the selling of hope and belief by paranormal advocates of the Skinwalker narrative. The reader is told that anomalies occurring there can be transmitted by witnesses to those events elsewhere, bringing the anomalous effects with them to other locations as if spreading an infectious disease. So, the peculiarities of Skinwalker Ranch were no longer confined to Utah anymore but could conceivably be disseminated over the entire planet. One group of DIA personnel was sent to the ranch to look into odd incidents early on in the AAWSAP inquiries. According to the authors, all in the group had "brought something home" when they left, and they weren't just souvenirs. The leader of this group, given the name "Axelrod," said his family had experienced visions of colored orbs and "dogmen" in their backyard, along with poltergeist effects and "black shadow people."

What is one to think of this? Is it provably real? We can't tell because the witnesses are anonymous. And no physical evidence seems to exist for the sightings. All that could be said is the witnesses believed what they saw was real (unless, of course, if there was an overt attempt to deceive). With sympathies to witnesses who genuinely believe they saw an anomalous event, such witnesses much understand and expect that telling this information to those of the rest of us who never saw such anomalies will result in hard questions that probably can not be answered very well.

However, in the case of Axelrod, there is an assurance that medical evidence does exist for a direct relation between the anomalies and a so-called "Hitchhiker Effect" on the bodies and minds of these individuals. One investigator claimed that the effect happened at a higher rate in Skinwalker visitors who "do not treat the phenomenon with respect." Indeed, are the proponents of this effect inferring that it possesses intelligence that decides the mental state of viewers and inflicts punishment if they do not think the right way? It would be helpful for independent investigators to be able to interview witnesses further about medical evidence. Unfortunately, the Skinwalker investigators have invoked HIPAA (Health Insurance Portability and Accountability Act, 1996) laws in not allowing their interviewees to be questioned on these issues. Anonymous witnesses are unable to be questioned, which is not helpful in arguing for the Hitchhiker Effect.

The description of events, the anonymity, and the lack of hard evidence smacks of investigators who are not making decisions fully based upon information as much as they are based on their own personal beliefs and the beliefs of others. The investigators seem to accept the assertions of anomalies as 'unquestioned fact' instead of potential belief-fueled impressions of night terrors induced by dreams and liberal doses of imagination. Combining the above with amorphous assumptions about connections between the perceived events and physical objects on the ranch to individual medical afflictions, a perfect storm of paranormal hysteria can be created.

Example of a Danger

Dr. Travis Taylor, an engineer and lead investigator for the TV show "The Secret of Skinwalker Ranch" on the History Channel, claimed in 2020 that he was hit with a dangerous burst of radiation after looking into a hole on the ranch property. He also claims to be a victim of the Hitchhiker Effect (see Mystery Wire, 6-24-22). If dangerous radiation was present at the time, affecting at least Taylor

and perhaps other occupants with medical problems, why hasn't Skinwalker Ranch been declared a biologically restricted area by federal authorities? Was Skinwalker Ranch even reported as a biologically and radioactively dangerous place? Federal employees were said to have come and gone from the area and carried physiological and psychological aliments with them to where they lived in other parts of the U.S. But, they, and ranch owners, have continued to exploit the property for value gained by advertising it as a "Paranormal Disneyland," oblivious to the threats presented by week in and week out. Notably, they continue to cite those threats and return for more investigations without taking precautions. Neither has there been serious research circulated through the medical profession in peer-reviewed papers documenting such dangerous conditions at this location.

Taylor added this to the lead of chapter nine (page 80): "We don't like to talk about the hitchhiker too much because everybody's afraid it's going to trigger it or something." It seems it had been decided by personnel at Skinwalker that the Hitchhiker Effect was accepted as fact without ever having presented a bit of confirmatory evidence for it to science. Taylor added that instruments were placed at a house and the ranch, and both simultaneously measured "events" apparently confirming the Hitchhiker Effect a thousand miles apart. Again, as I read on expecting the details of this remarkable claim, there was no further elaboration. I hope the intent of this was not to expect the reader to accept these comments at face value.

Perhaps related to the lack of what should be an obvious concern to hazardous conditions is the revelation in November 2022 that a consulting firm created by cast members of the TV show was under contract with three Utah county governments at the rate of over $58,000 for each county to provide economic consulting services and to strengthen business ties (see expandingfrontiersresearch.org, 11-15-22). Nothing could be more damaging to the idea of a "Paranormal Disneyland" engaged in active attempts to create business than to have state governments label the ranch as a biologically and radioactively hazardous site.

Continuing support for a 'Hitchhiker Effect' was a citation from a 1973 investigation at the Lawrence Livermore National Laboratory into psychic Uri Geller's mental and physical abilities, which famously included spoon-bending (page 87). Geller's "abilities" have since been debunked via several lawsuits and demonstrations that magicians could reproduce all of Geller's claimed paranormal powers. Investigators of Geller reported "visions" of flying saucers, a hallucination-inducing teasing spirit, and discarnate raven-like birds appearing to them indoors outside of the locations of Geller's testing. So, the book's authors felt the visions by the Geller investigators were related to the Hitchhiker Effect, though this would presume that they think, in spite of previous problems with Geller's claims, there was validity to the Livermore results, and therefore Geller's psychic powers. In other words, if there was no anomaly with Geller, then how did the Livermore investigators have a Hitchhiker Effect?

It is of interest that the discussion of Geller also cites Dr. Hal Puthoff. Puthoff was involved in the original Geller investigation, as well as in promoting the MJ-12 hoax and the Project SERPO hoax, and as a consultant with AAWSAP and Robert Bigelow's BAASS firm more recently and deeply involved with Skinwalker. Puthoff, at one time, said one of his employees was Richard Doty, a known document forger and a source of questionable UFO claims for four decades (see blueblurrylines.com, 6-22-22), and regarded Doty as a friend. Puthoff has had his hands in many dubious pies, and I'm not sure citing him as a central player in these problem endeavors is a good thing for them.

When the UAPTF issued its report in June 2021, this reviewer noted how it reflected a complete 180-degree turnabout in the government's attitude toward unexplained aerial phenomena, and this is cited in the book. Given this, I must amend that opinion with a concern about the information presented by the authors. It was said that 143 out of 144 reports received from government sources were not able to be identified, or 99.3%. This was a percentage far higher than what had come about in previous government investigations. Was the quality of the reports studied by the task force of such mysterious detail any conventional explanation escaped them? The report was remarkable in this respect for seeming to endorse UAPs as real and unconventional. Or was it?

In June 2022, it was revealed that the chief scientist for the task force results in 2021 was Dr. Travis Taylor, who is also the lead scientist at Skinwalker Ranch and for the History Channel series "The Secret at Skinwalker Ranch." To say that there is a conflict of interest in this fact is an understatement. The lead researcher for presenting the ranch as the location of an unexplained series of bizarre phenomena on TV (the show would not be on TV if they were explainable in his eyes) had also made assessment decisions for UAP events released in 2021. It could be perceived that Taylor and company inflated the number of unknown reports to preserve the mystery of UAPs. An easy way to check this would be to reexamine the investigated UAPTF reports. However, since the reports were gathered partly under the intent to determine if there was a national security threat to the nation, and they were all military reports, none could be made avail-

able publicly for independent study.

So, the reasons for such a high percentage of unknowns that Taylor had concluded existed in the body of observations were shrouded from any scrutiny. Unless those reports can be studied by sources unconnected to Skinwalker Ranch (since a staple of science lies in multiple, independent confirmations of conclusions offered in any study), the 2021 UAPTF announcement must be considered tainted due to possible bias in favor of elevating the mystery of UAPs artificially. After reading Skinwalker Ranch narratives, as the book documents, this introduction to the paranormal appeared to be the driving force by federal employees to support federal funding in the millions of dollars for new investigations, including into UAPs. That is not to say mysteries cannot exist, but those mysteries must be determined through honest, scientific means.

Brandon Fugal, the current owner of Skinwalker Ranch, in a video interview from 2022 (youtube.com/watch?v=Q9Kwv_p2Cww), may have encapsulated the philosophy surrounding the property:
"Acquiring Skinwalker Ranch was part of a religious journey, or at least my spiritual journey." While hard evidence may still be found someday for some paranormal events, it might come in spite of "Skinwalkers at the Pentagon" rather than because of it.

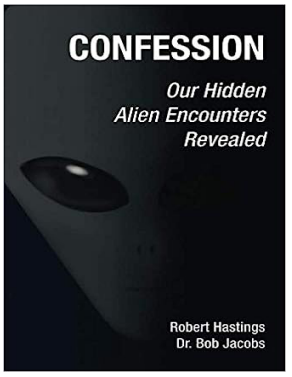
Journal of Scientific Exploration
Anomalistics and Frontier Science

BOOK REVIEW

Confession: Our Hidden Alien Encounters Revealed

Don C. Donderi
dcdonderi@sympatico.ca

McGill University Department of Psychology (retired)



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Two perspectives: objective and subjective, describe all human experience. And as is true for all human experience, objective and subjective perspectives complement and enrich each other. Confession, by Robert Hastings and Dr. Bob Jacobs, is a book containing mostly subjective accounts by each author about the involuntary and continuous interactions with extraterrestrials (ETs) that they have endured following their direct encounters with, and their objective written reports about, extraterrestrial vehicles (ETVs.) During the course of their lives, they reported these encounters either to the public (Hastings) or to the U.S. Government (Jacobs). What they are now reporting to all of us in Confession are their continuing interactions with people who apparently work for the U.S. government – and their continuing interactions with ETs.

Hasting and Jacobs tell us stories about their own lives and about the social and political environment that surrounded and educated them as they grew from youth to maturity. The stories include events that suggest a generational continuity of ET contact within families and also include narratives of continuous and unwelcome intrusion into the authors' daily lives – often at night – which have prevented both authors from experiencing what most of us would call a "normal life." A normal life may include obstacles, difficulties, and pain – we all experience those. But Hastings' and Jacobs' lives have been and still are unpredictably interrupted by events over which they have no control, and that manipulate them in ways that human technology cannot explain. They sometimes remember these events with difficulty, but they also sometimes awaken in the middle of the night with partial memories of ET intrusions during sleep.

The events described in Confession take place mostly during the Cold War between the West and the Soviet Union, during which nuclear weapons, first used against Japan at the end of World War 2, were tested and deployed across the United States. Robert Hastings' UFOs and Nukes: Extraordinary Encounters at Nuclear Weapons Sites (Authorhouse, 2008) is an objective and detailed account of ET interference with the function of American intercontinental ballistic missiles (ICBMs) that are stored, ready for use, in underground missile silos located across the United States. Dr. Bob Jacobs was working as a film technician for the U.S. government in 1964 when he saw and recorded an ETV shoot down a dummy nuclear warhead that had been launched over the Pacific Ocean from Vandenberg Air Force Base in California. Jacobs reports the objective details of this event as well as the government's efforts to suppress it. Both authors fill Confession with narratives of their own subjective encounters with ETs.

Confession's narrative also recognizes the rapidly changing public attitudes about "UFOs" that began most noticeably on December 16, 2017, when the New York Times front-page story: Glowing Auras and 'Black Money': The Pentagon's Mysterious UFO Program (by Helene Cooper, Ralph Blumenthal and Leslie Kean) signaled the moment

when "respectable" journalism caught up with the reality of events that scores of other people had been reporting – and, like Hastings and Jacobs, subjectively experiencing – for decades.

I am a retired university professor whose research specialty (that I practice as an ergonomics consultant) is the study of human visual perception and memory. In the mid-1960s, the increasing number of visual and radar reports of "UFOs" led me to take a professional interest in the observed and remembered "UFO evidence" as well as in the scornful and fearful rejection of this evidence by the scientific community. I have written two books that describe and discuss the objective reality of the ET presence, the intrusive interaction of ETs with humans, and the social, political, and scientific reaction to the ET evidence. Something that I cannot do, based on my own experience, is to describe the subjective and personal effect of continuous, involuntary interference with human lives by extraterrestrials.

This is exactly what Hastings and Jacobs have done. Confession presents the subjective and personal experiences of Robert Hastings and Bob Jacobs in narratives that every reader will find emotionally disturbing. Years of reported objective evidence tell us that their subjective narratives are true. Their personal experiences describe a subjective and objective reality that too few of us are ready to acknowledge, to accept, and to confront.

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MULTIMEDIA REVIEW

Recent Evidence for a Pre-Portuguese Human Presence on the Azores Islands

Stephen C. Jett
scjett@hotmail.com

University of California, Davis

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Conventional history has it that the volcanic mid-North Atlantic Azores islands, some 800 miles to the West of mainland Europe, lay undiscovered until encountered by Portuguese sailors during the A.D. 1400s. Still, fourteenth-century maps do show islands in the region, and other indicators of even-earlier human presences are mentioned in the older literature, including for Carthaginians. The present note reviews literature that reports some surprising recently recognized genetic and archaeological evidence. These varied data have inspired fresh claims to the effect that there had been human occupance in the archipelago long prior to the purported fifteenth-century first discovery on the part of Portuguese mariners, the discovery that was followed by permanent settlement from Portugal. The focus here is on the work of António Félix Rodrigues of the Department of Agricultural and Environmental Sciences and of Science Resources, University of the Azores, Portugal, and his colleagues and their quite unexpected but plausible findings (Pimenta et al., 2013; Rodrigues, 2015a, 2015b; Rodruiges et al., 2015, 2018).

One indirect clue to earlier human presence is the occurrence on Santa Maria and Terceira islands of a variety of non-native house mouse that displays genetic kinship with Norwegian, Icelandic, and northern- and western-British Isles ones (Gabriel et al. 2013), suggesting medieval Norse visits (similar mice are found in the Madeira Islands; Gündüz et al., 2001; cf. a mouse skeleton there was carbon-dated to about A.D. 1036: Rando, Pieper, and Alcover, 2014. Note, too, that introduced least weasels in the Azores are genetically closest to those of Malta, Sardinia, and the Balearic Islands, not to those of Portugal. Those on at least the Mediterranean islands mentioned may reflect ancient Phoenician introduction (M. Rodrigues et al., 2016).

A puzzling finding is that of Spanish geneticists, who—on the basis of human-leukocyte-antigen (HLA) haplotype frequencies—reported, "We unexpectedly found Oriental genes (but Chinese[, not Siberian,]) in the present day Azorean populations, and postulated that the arrival of the genes was before the Portuguese. . . . [Some individuals were] closer to Orientals (continental Asians, like Mongolians and Chinese) than to Europeans and Mediterraneans" (Bruges-Armas et al., 1999. pages 349 and 354). No such Asians are known to have settled on the island post-Portuguese-settlement, which began in 1439. I am not aware of any more recent follow-up of this research. No comparison to Amerind HLAs was reported.

New archaeological evidence of possible early arrivals comes from the Central Azores island of Terceira, especially from around a site known as Grota do Medo (Posto Santo) and was first announced in 2013 by António Rodrigues. A team consisting of A.

Rodrigues, Nuno O. Martins of the University's Department of Economics and Business Management and the Research Center in Management and Economics at Oporto's Portuguese Catholic University, plus Nuno Ribero and Anabela Joaquinito, both with the Portuguese Association of Archaeological Research, published a paper on the topic in 2015. Human activity is signaled by smallish rock-cut basins (also known from Europe) with seeming feeder channels, large-stone arrangements reminiscent of ancient megaliths, and petroglyphs. A crust of amorphous silica containing organic material that coats one of the basalt-rock basins was radiocarbon-dated, using accelerator mass spectrometry, providing an ante-quem eleventh-century-A.D. time level (950 ± 30 B.P.), but the features themselves imply much older human activity. There are some seemingly simple petroglyphs near the basin, as well.

Also in 2015, A. Rodrigues published what he designated as megalithic manifestations on Terceira, which he feels hint at kinship with megalithic monuments of the European Neolithic (before ca. 3000 B.C., in the West), Chalcolithic (to about 2000 B.C.), and Bronze Age (to some 1000 B.C.). Structures present include two that resemble widely dispersed European passage graves, involving a roofed stone corridor leading to a chamber, as well as a feature looking like an Irish wedge tomb (see Rodrigues, 2015b). Four large-rock erections on Terceira are compared to Irish portal tombs. Too, there are crude petroglyphs, including myriad cup marks like European megalithic ones. So far, no relevant artifacts have been discovered or dates obtained, but Rodrigues tentatively looks to the mainland early Calcolithic, of about 3000 B.C.

A team including some of the same authors had earlier looked at stepped stone pyramids (*maroiços*)—some with interior chambers—on Pico and (smaller ones) Faial islands (Matos, 2013). Tradition attributes these to nineteenth-century fieldstone clearance, but the authors found puzzling alignments with the summer solstice sunset, as many ancient European megalithic structures also display. Chipped stone tools were recovered, as well as net weights. "Coal" (presumably, charcoal) found in interior chambers was radiocarbon-dated to the sixteenth and seventeenth centuries; this gives only a minimum time depth for the structures but at least one well pre-nineteenth-century. There are comparable erections in the Canary Islands (Pimenta et al., 2013).

A. Rodrigues et al. (2018) also looked at "cart ruts" on Terceira. A pyroclastic flow covered part of one cart track, but no relevant eruption had occurred later than one millennium ago. Carbon-14 dating of a placic horizon within one rut came out in the eleventh-century-A.D. level (1025–1190 cal A.D), again providing a minimum antiquity.

The group also investigated three of five rock-cut caves on Terceira that display equinoctial alignments. A comparison of Cave-3 stalactites with ones from a seventeenth-century structure caused the team to conclude for a cave age of from 2000 to 400 years ago, but this method seems dubious to me. However, the possibility of an ancient European-megalithic manifestation in the Azores does not seem outlandish. The geographic distribution of megalithic monuments around Europe strongly implies a primarily maritime orientation (see Cunliffe, 2001), so the means of discovery—capable watercraft—were there.

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Journal of Scientific Exploration
Anomalistics and Frontier Science

MULTIMEDIA REVIEW

Earlier Than They Thought Possible: Very Recent Findings on the Impressive Antiquity of Humans in the New World

Stephen C. Jett
scjett@hotmail.com

University of California, Davis

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PLATINUM OPEN ACCESS

This multimedia review provides a background, and highlights, a number of articles and a few books published during the 2020s, about the much-debated topic of the antiquity of humans in the Americas and their routes of entry. The evidence discussed is essentially all from North America; much material is present in South America as well, but I have failed to find much in terms of reports of very recent vintage.

Not all that long ago, among archaeologists it was gospel that big-game-hunting humans had first entered the New World from Northeast Asia's Chukotka ("Siberia") toward the end of the last glaciation around 14,000 years ago, across late Ice Age Bering Strait, which was still dry at the time owing to lowered sea levels consequent upon much former ocean water's remaining locked up in terrestrial ice sheets. Once arriving in America, so the scenario went, these debutants' descendants moved southward via a recently opened "ice-free corridor" between the Cordilleran (Rocky Mountain) and Laurentide (Canadian Shield) ice sheets. Meantime, these hunters had developed—about 13,050 years ago—what is called Clovis culture, which, during the circa 300 years of its existence, spread extremely widely in North America (Neely, 2020a; Waters et al., 2020). Clovis involved specialized hunting of Pleistocene megafauna such as mastodons, and the concomitant development of long, fluted spearpoints. Clovis emerged during a period of environmental change, and its end coincided with that of the last of the megafauna (Dycus, 2022b). Clovis was contemporary with other hunters' western-stemmed-point tradition of North America and the fishtail-point tradition of South America's Southern Cone (Walters, Stafford, and Carlson, 2020).

Still, no finds of Clovis points have ever been made in Alaska, or older plausible antecedent lithic industries there. The northernmost Clovis-point find in Canada is from the Lily Lake site in the Fort St. John area of northeastern British Columbia, associated with obsidian that had come from some 500 kilometers (310 mi.) to the southwest; carriers of a Clovis toolkit appeared to have been working their way *northward* as the developing ice-free corridor was beginning to open up (Britten, 2016). Too, as far back as the 1950s, a few bold observers had begun forwarding the thought that people may have been present in the hemisphere well before the Clovis manifestation—although in the unusually contentious arena of "early-man" studies, for decades such deviant thinkers were roundly reviled.

However, beginning in South America with southern Chile's Monte Verde site (dated in 1982) and including Meadowcroft Rockshelter in southwestern Pennsylvania, the Cactus Hill site in southeastern Virginia, the Debra L. Friedkin site in central Texas, Paisley Caves in south-central Oregon, and the Coopers Ferry site in western Idaho, it came to pass that multiple New World occurrences were being found that demonstrated seemingly unequivocal evidence of at least modest pre-Clovis age. Most of these sites have since been almost universally accepted as such, although there remain a few blanket dissenters: in 2022, the archaeologists Ted Surovell et al. questioned the integrity of relevant stratigraphic dates in North America, proposing that artifacts found buried

in seemingly pre-11,000 B.C. contexts had gradually migrated downward following initial surface deposition that had occurred millennia later. Other Paleo-Americanist archaeologists begged to differ, however (Malakoff, 2022).

If Clovis does *not* reflect the first human entry into the hemisphere, then the interior of northern North America would still have been glaciated, leaving no ice-free inland route to the south from Alaska. Accordingly, a new migrational mode came to be accepted, involving Pacific-coastal travel with the aid of watercraft along the so-called kelp highway (see Erlandson et al., 2007); much of the then-shoreline, such as Haida Gwai and Vancouver Island, BC, is now known to have remained largely free of ice and to have been vegetated and habitable. Genetics has come to play a major role in the evolving view of the subject, and a "Beringian standstill" hypothesis has come to dominate thinking (although Paleoamerican human morphology has caused me to be skeptical concerning there having been but a single migration, with all American Indians being descendants from its participants; Jett, 2007). "Beringia" was low-sea-level Chukotka plus Alaska and included vast areas now beneath the Bering Sea. Here is the abstract of a relevant recent article:

> During the Last Glacial Maximum [LGM, some 26,000–19,500 years ago], a small band of Siberians entered the Beringian corridor, where they persisted, isolated from gene flow, for several thousand years before expansion into the Americas. The ecological features of the Beringian environment, coupled with an extended period of isolation at a small population size, would have provided an evolutionary opportunity for novel genetic variation to arise as both rare standing variants and new mutations were driven to high frequency through both neutral and directed processes. Here we perform a full genome investigation of Native American populations in the Thousand Genomes Project Phase 3 to identify unique high-frequency alleles that can be dated to an origin in Beringia. Our analyses demonstrate that descendant populations of Native Americans harbor 20,424 such variants, which is on a scale comparable only to Africa and the Out of Africa bottleneck. This is consistent with simulations of a serial founder effects model. Tests for selection reveal that some of these Beringian variants were likely driven to high frequency by adaptive processes, and bioinformatic analyses suggest possible phenotypic pathways that were under selection during the Beringian Isolation period. Specifically, pathways related to cardiac processes and melanocyte function appear to be enriched for selected Beringian variants. (Miedbalski & Long, 2022, p. 1)

The University of Kansas anthropological geneticist Jennifer Raff has published *Origin: A Genetic History of the Americas* (2022), a synthetical multidisciplinary endeavor. After describing the history, she cogently consigns the Clovis-first hypothesis to the dustbin, noting the plethora of pre-Clovis sites accepted today. Raff observes that genetics does not support Dennis Stanford and Bruce Bradley's (2012) Solutrean hypothesis of transatlantic migrants from Biscayan Europe. She adopts the now-standard concepts of the Beringian standstill and the kelp-highway migrational corridor. She also offers observations on the ethics of data collection and rejects racist views that Native America was incapable of major accomplishments and that, therefore, they must have been preceded by earlier arrivals (for a review, see DeSilva 2022).

The Cree/Métis archaeologist Paulette F. C. Steeves at Ontario's Algoma University has published *The Indigenous Paleolithic of the Western Hemisphere* (2021), in which she argues for a much earlier human occupation of the hemisphere than is usually credited. She also offers a severe critique of "colonialist" New World archaeology. Artifacts and genetics are not the only pieces of evidence of a pre-Clovis presence. Several score fossil footprints of a young woman—"Zoe," carrying an infant—have been discovered in White Sands National Park, NM. Initially, their age was determined to surpass 12,000 years (Bennet et al., 2020; for summaries see Bennett et al., 2021; Dycus, 2022a; Neely 2020b; Smith 2020; Wade 2021). Further work has determined the date to lie between 23,000 and 21,000 years ago—during the LGM. *Archaeology Magazine* 75(1) named these tracks as one of the "Top 10 Discoveries of 2021" (also summarized 2021/2022 in *Current World Archaeology, 10*(2), pp. 10–11). Eighty-eight human tracks of comparable age have also been identified on the Air Force's Utah Testing and Training Range to the west of Salt Lake City, UT (Neely, 2022).

New Mexico has also recently yielded the remains of two butchered and burned mammoths, at the Hartley site, in the north. Meticulous dating has tagged the occurrence as having an age of about 37,000 years and, therefore, as being one of the oldest dated places of human presence in North America (Rowe et al., 2022). Mexico has been returning some pre-Clovis dates as well, the currently most-discussed being from Chiquihuiti Cave in central-northern Mexico's Zacatecas state. Anciently, the shelter housed a previously unknown but millennia-long-lasting stone tool industry. The materials date to

between 25,000 and 30,000 years ago, overlapping with the LGM and beginning perhaps as early as 33,000 years ago, *pre*-LGM. Some specialists question whether the Chiquihuiti lithics are human productions, but they look to me to be obvious artifacts. No cut marks were found on associated animal bones. The question has also been raised that if the objects are artifacts, why have no others with these forms been discovered anywhere else (Curry, 2020, p. 355)? No human remains, including DNA, were found in the cave. Nevertheless, lead author Ardelean is quoted as saying:

> We don't know who they were, where they came from, or where they went. They are a complete enigma. We falsely assume that the indigenous populations in the Americas today are direct descendants of the earliest Americans, but now we do not think that is the case. By the time the famous Clovis population entered America, the very early Americans had disappeared thousands of years before. There could have been many failed colonizations that were lost in time and did not leave genetic traces in the population today. (News Staff/Source, 2020)

This position is radical among archaeologists, but I tentatively subscribe to it.

A single site within the greater continent has yielded comparable dates, Bluefish Cave in the Yukon Territory, which is considered to be some 24,000 years old. Only a few of its myriad broken animal bones show cut marks, and stone tools there are scarce.

There also exist a few allegedly *very* old—and very controversial (professional careers have cratered) sites, such as Calico in California's Mojave Desert and Hueyatlaco in Mexico's Puebla state, implying pre *sapiens* human entry into the hemisphere, but I know of no recent work that has been reported.

There are now other reliably Late Pleistocene–Early Holocene dates for culturally diverse human presences in Northwest Mexico, the Chiapas highlands, and Central Mexico, and on the country's Caribbean coast, but the population was apparently long very sparse. Beginning 14,000–15,000 years ago, populations increased substantially (Arderlean et al., 2020).

Becerra-Valdivia and Higham (2020) synthesized the earliest accepted archaeological dates from 42 North American and Beringian sites and concluded that:

> The data obtained show that humans were probably present before, during, and immediately after the Last Glacial Maximum (about 26.5–19 thousand years ago) but that more widespread occupation began during a period of abrupt warming, Greenland Interstadial (about 14.7–12.9 thousand years before A.D. 2000). We also identify the near-synchronous commencement of Beringian, Clovis, and Western Stemmed cultural traditions, and an overlap of each with the last dates for the appearance of 18 now-extinct faunal genera. Our analysis suggests that the widespread expansion of humans through North America was a key factor in the extinction of large terrestrial mammals (p. 93).

Highly respectable though some of the above dates are, they pale in comparison to San Diego County, CA's, Cerutti Mastodon site, which comes in at some 130,700 years old (Holen et al., 2017)! Human involvement in site-formation there was questioned, but later technical examination of the site's cobbles—apparently used to crack open mastodon bones for their marrow—supported that function and, therefore, the genuineness of the site as of human origin.

My graduate-school mentor George F. Carter (1912–2004), a San Diego native, was the much-criticized, even caricatured pioneer in forwarding evidence of long-pre-Clovis humans in the Americas, publishing his *Pleistocene Man at San Diego* in 1957 (see also, Carter, 1980). I am certain that he would be smiling knowingly were he still with us.

ACKNOWLEDGMENTS

The material on Mexico comes from Jett 2018–2021. The present article, except for the aforementioned material, will also appear in the 2022-2023 issue of *Pre-Columbiana: A Journal of Long-Distance Contacts*. *8*(2–3).

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Journal of Scientific Exploration
Anomalistics and Frontier Science

Spring 2023 Announcements

KUDOS TO *JSE*'S 'OPEN ACCESS CHAMPIONS'

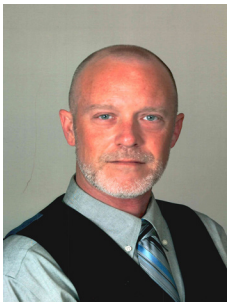
The Editorial Team warmly recognizes the individuals listed below for their generous donations to the 2022 Open Access Champion campaign. Their investment enables *JSE* to remain a unique and 'platinum open access' periodical (requiring no article processing fees) for all topics relevant to frontier science. *Nostram reverentiam et gratiam* —Marsha Adams, Robert Bobrow, Kathleen Erickson, John Norman Hansen, James Houran, Garret Moddel, Margaret Moga, Loránd-Levente Pálfi, Daqing Piao, Slawek Smyl, John Streiff, and Gene Thomas.

There is always time to join in this important cause by making your tax-deductible donation of any amount at: https://www.scientificexploration.org/become-an-open-access-champion

CELEBRATING KATHLEEN ERICKSON'S *JSE* TENURE

This 2023 Spring issue marks a bittersweet milestone for the Editorial Team. Kathleen Erickson — our long-time and valued Managing Editor — has retired from the role effective this past January after a brilliant 17-year tenure. The editorial team can confidently speak for everyone at the Society for Scientific Exploration (SSE) in expressing the deepest appreciation for her many years of tireless and excellent service that produced a whopping 50 issues of the *Journal*. Luckily, she intends to stay an active member and supporter of the SSE and *JSE*. Godspeed, Kathleen!

INTRODUCING *JSE*'S NEW MANAGING EDITOR



Looking ahead, please welcome and support Brian Laythe, Ph.D. as the new and enthusiastic Managing Editor. Dr. Laythe is a prolific researcher, author, and full member of both the SSE and the Parapsychological Association, as well as a prior *JSE* Associate Editor. Most critically, he has 20 years of experience designing and implementing varied media content for research, business, advertising, academic, and personal-related projects. Dr. Laythe is also known for his strong interest in both emerging technologies and the use of citizen science approaches to study anomalous phenomena in real-world settings. We acknowledge and greatly appreciate his crucial participation in the production of the Winter 2022 issue, which was unavoidably delayed in the administrative transition period.

CALL FOR SCHOLARLY 'BOOK AND MULTIMEDIA REVIEWS'

Book Review Editor P. D. (David) Moncrief is expanding the *JSE* book reviews subsection to include important multimedia reviews as well. Our readership appreciates the value of assorted assets for education or research, including certain films, documentaries, recorded presentations or symposia, video series, and reports, websites that are comprehensive resources, software for scholars, and even 'articles of interest' in other peer-reviewed journals that are pertinent to frontier science. Submissions are now being accepted, and authors should note that these multimedia reviews should have four components: (a) introduction, (b) summary of the media content, (c) description of the value of the media to the Journal's readership, and (d) fair critique of the media. These components need not constitute major sections, but each matter should be clearly addressed in the submission. For more details, please consult the updated 'Guidelines for Authors.'

CALL FOR 'STUDENT AND CITIZEN SCIENCE' PAPERS

This issue proudly launches a new *JSE* subsection for Student and Citizen Science papers, which we developed with input from online attendees of a 'Psi Agora' discussion group this past February (thanks to Sally Feather, Darby Orcutt, Doug Richards, and Annalisa Ventola). Though the general public mistakenly assumes only professors, independent

researchers, or graduate students plan or conduct research, the reality is that other academically-minded people often play an important role. The *JSE*, therefore, currently defines the content featured in this subsection as "an inquiry or investigation conducted by an undergraduate-or-below student or citizen scientist ('lay person') that makes an original intellectual or creative contribution to frontier science." Although some journals specifically cater to student or citizen science research and writing (see, e.g., *Journal of Emerging Investigators, Butler Journal of Undergraduate Research, or Citizen Science: Theory and Practice*), these periodicals do not necessarily tolerate or publish highly controversial material. Such journals can thus overlook important preliminary studies, fresh ideas or connections, measurement innovations, or unique data from real-world conditions.

To clarify, undergraduate and citizen science is a way for people who are neither professional scientists, seasoned scholars, nor those with graduate training to contribute to scientific research. This can be done by collecting information, analyzing data, or helping to design various types of studies. By working together, students, citizens, and trained scientists can learn more about the world around us and make new discoveries. Examples of traditional citizen science projects include tracking bird migrations, monitoring air and water quality, and counting or monitoring stars in the sky. On the other hand, citizen (frontier) science efforts over recent decades have variously involved cryptozoology, ufology, and aspects of parapsychology. But too often, such contributions, like some undergraduate research, are not properly recognized, vetted, or shared. We aim to change that, as the many benefits of student and citizen science involve:

1. **Increased public engagement and education:** To help to educate the public about scientific research and the natural world and can also increase public engagement with science.
2. **Increased data collection:** To collect large amounts of data that would be difficult or impossible for professional scientists to gather on their own.
3. **Increased scientific understanding:** To generate new scientific knowledge and can also help to validate or disprove existing hypotheses or theories.
4. **Increased collaboration between scientists and the public:** To build bridges between scientists and the public and can also help to increase trust and understanding between the two groups.
5. **A cost-effective way of research:** Provides an economical approach to testing protocols or conducting research, as it enables scientists to use the resources of volunteers.
6. **Discover new talents and interests:** To uncover or reinforce the talents and interests of the next generation of researchers.

Accordingly, *JSE* actively encourages conceptual or empirical submissions by high school through undergraduate students and citizen scientists. The use of a distinct subsection is intended to properly contextualize these contributions by spotlighting the value of amateur-led research while simultaneously acknowledging their constraints. It is certainly fair to note that student and citizen science, by its nature, does not automatically match the sophistication or technical quality of professional research. For this reason, we are also piloting a mentorship program in which seasoned academics serve as hands-on mentors to support budding researchers and authors in the preparation or revision of selected papers. Ideally, the mentors will be consulted at the research planning stage.

We reiterate that this is not an invitation for poor quality science but rather a call for contributions in which the authors do not have all the resources of trained scientists. Those who think they have a research idea that could result in a paper should contact *JSE* as soon as possible for advice and guidance. Volunteers are greatly appreciated and formally acknowledged in each paper that they help bring to publication. Moreover, there are no minimum time or task demands — mentors can help as often as they want, given their interest and availability. To learn more or register as a 'student or citizen science mentor' on future submissions, please contact Managing Editor Brian Laythe at: journal@scientificexploration.org

PUBLISHER CORRECTION NOTICE

Equation 1 of the printed journal version of Lee (2022, p. 486) is missing its key term "ΔG_L" and should read as:

$$\Delta G_L = -2.3\, RT\, \log_{10}\left(1 + [H_L^+]/[H_{pB}^+]\right)$$

However, the equation is correctly reported in the online version of record:

Lee, J. W. (2022). Type-B energetic processes and their associated scientific implications. *Journal of Scientific Exploration, 36,* 484-492. https://doi.org/10.31275/20222517

Journal of Scientific Exploration
Anomalistics and Frontier Science

2023 CALL FOR PAPERS

41st Annual Conference of the Society for Scientific Exploration

Bloomington, Indiana | July 23-26, 2023

Online Conference Encore | October 20-22, 2023

The 41st annual SSE Conference will take place **in-person July 23 - 26, 2023**, at the Indiana Memorial Union on the Indiana University-Bloomington main campus in Bloomington, Indiana. An Online Conference Encore will take place as a live Airmeet event from October 20-22, 2023.

In this dual hybrid event, we will meet in-person in Bloomington, Indiana, in July and virtually at the Online Conference Encore in October. The Online Conference Encore will consist of talks video-recorded from the in-person event with live Q&A, as well as additional presentations. This call for papers pertains to both events.

Conference Theme: Maverick Science

In a recent paper, Durakiewicz (2022) notes that 'maverick science' involves dissent, collaborative effort, and transformative progress, as well as incremental work and paradigm breaking. Here at the SSE, we support and encourage the hallmarks of maverick science: exploratory research, original thinking, and research into unexplained phenomena. In this Call for Papers, we welcome submissions addressing a range of topics of interest to maverick scientists. This includes, **but is not limited to**, topics such as:

- Anomalies and unexplained phenomena
- The nature of consciousness
- New physics, cosmology, and galactic cycles
- Alternative energy, future technology
- Energy healing, healing research, and Bio-energetics
- Psi, mind-matter interactions, Remote Viewing
- NDE, reincarnation, the persistence of consciousness beyond death
- UAPs, UFOs, and other extraterrestrial phenomena
- Divination, astrology, dowsing
- Cryptozoology
- Sociology and philosophy of science

In addition to describing the results of your research, we encourage you to address the theoretical implications of your research in the larger field of anomalies research. How might they advance other scientific frontiers?

We will have three presentation formats:

- Long talks
- Short talks
- Poster presentations

Presentation format will be assigned by the Program Committee based on the evaluation of abstracts for:

- Scientific merit
- Alignment with the goals of the SSE
- Originality of the research
- Impact and relevance of the research to the broader field of maverick science

Abstract Submissions: Deadline: April 30, 2023

Who can Submit an Abstract.

- Full or Emeritus members of SSE
- Associate or Student members of SSE. Sponsorship by a Full or Emeritus member is encouraged, but not required, for acceptance.

How to Submit and Abstract.

If you are not a member of SSE, you may join on the SSE Website, and then submit an abstract. First, download the 2023 SSE Abstract Submission Template.docx Word template and complete it with your abstract and speaker biography. Please note that abstracts should be less than 500 words, and speaker biographys should be no more than 100 words. Second, complete the online SSE 2023 Conference Abstract Submission form and use it to upload your completed 2023 SSE Abstract Submission Template.docx Word template. **You must be logged into a Google/Gmail account to submit your abstract.**

You will receive notification of your proposal status by May 15, 2023.
Registration and hotel reservation information will be posted soon on the SSE website.

Questions can be directed to the Program Committee Chair:

Mark Urban-Lurain, Ph.D.
Secretary
Society for Scientific Exploration
secretary@scientificexploration.org

65th Annual Convention of the Parapsychological Association

Oslo, Norway | AUGUST 3-6, 2023

Online Convention Encore | NOVEMBER 10-13, 2023

The 65th Annual Convention of the Parapsychological Association (PA) will be held from Thursday, August 3, 2023 through Sunday, August 6, 2023, in the Fanehallen at the center of Oslo, Norway. An online encore of the convention will take place as a live Airmeet event from November 10-13, 2023.

Online Encore Convention

In the interest of having a "hybrid" convention with both live and online elements, this event will encompass two sets of dates. It is anticipated that those responding to this call will participate in both events, in some fashion.

August Oslo Convention - Floor time will be given to in-person presentations only, which will be video recorded. A web catalog of talks from online-only presenters will also be available in August for attendees of both events to view at their leisure.

November Convention Encore - Will include 1) A live replay of selected presentations recorded in Oslo with new Q&A, 2) A live replay of presentations from the web catalog with Q&A, and 3) an online space for further interaction between attendees and speakers.

Visit the Convention website to learn more about accommodations, registration, and other updates as they become available:

https://www.parapsych.org/section/69/2023_pa_convention.aspx

Bial AWARD IN BIOMEDICINE 2023

Jury

President Ralph Adolphs

Members

Sarah Bray • Nektarios Tavernarakis - *European Research Council*
Maria do Carmo Fonseca • Fátima Carneiro - *Council of Rectors of Portuguese Universities*
Vincenzo Costigliola • Olga Golubnitschaja - *European Medical Association*
Hugo Critchley • Menno Witter - *Scientific Board of the BIAL Foundation*
Daniel Pipeleers • Peter St. George-Hyslop - *Previous winners of the BIAL Award*
Kamran Abbasi (BMJ) • Eric Rubin (NEJM) - *Scientific Journals*

Who can nominate

- Voting members of the Jury;
- Members of the Scientific Board of the BIAL Foundation;
- Previous BIAL Award winners;
- Scientific Societies in the biomedical field;
- Boards or Deans of Medical Faculties;
- Heads of leading research institutes in the biomedical field;
- Boards or Heads of prestigious Academies;
- In addition, highly qualified researchers may nominate candidate works, but self-nominations are not accepted.

"Nominations may be submitted by an organized group of scientists, such as a university, society, academy, or research institute. The nominating group should not include individuals who contributed to the nominated work. Nominations are welcomed for works authored by scientists at any stage of their career, and from any country around the world."

Ralph Adolphs
President of the Jury

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The BIAL Foundation was established in 1994 by BIAL and the Council of Rectors of Portuguese Universities. BIAL Foundation's mission is to foster the scientific study of the human being from both the physical and spiritual perspectives. It is managed by representatives from both institutions.

Among its activities, the Foundation manages awards promoting the research in health sciences and supports scientific research projects in the area of neurosciences.

For more information visit **www.fundacaobial.com**.

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There are no strict word limits, but guidelines for different types of submissions are given below. In all cases, authors should be as clear, direct, and concise as possible in their presentations. The Editor-in-Chief reserves the right to mandate revisions to the lengths of accepted papers in the interest of readability, accessibility, and space.

Contributions can be empirical research, critical or integrative reviews of the literature, position papers, policy perspectives, or comments and criticisms. Studies can adopt diverse methods, including qualitative, ethnographic, historical, survey, philosophical, case study, quantitative, experimental, quasi-experimental, data mining, and data analytics approaches.

A. REGULAR ARTICLES (11K WORDS MAX)

Primary research or interesting and important theoretical papers that foster the diversity and debate inherent to the scientific process. This entails novel or innovative ideas that have some 'fragmentary' experimental or empirical support but which can be evaluated with logic and open-mindedness to present academia with provocative hypotheses that would otherwise be rejected by most conventional journals. Additional requirements are as follows:

1. All empirical results that have not been replicated should be called 'preliminary' with the findings treated as such. Peer-review and publication priority will be given to studies that are (a) pre-registered or (b) replications. Note that 'replication' can involve repeating the research procedure in a (nearly) identical separate study to be reported within the same paper (e.g., 'Study 2: Replication'). Or, large datasets can be divided randomly into 'Training' and 'Test (or Validation)' sets, i.e., the research findings presented are those results that replicated in the Test set.

2. To promote stricter transparency and context for readers, all analyses where appropriate should provide effect size statistics in the form of direct percentages of either *association* (correlative analysis) or *mean percentage differences* (ANOVA, *t*-tests, etc.). In the case of correlative analysis, reported results shall report R^2 to provide a covariance percentage estimate. Mean tests shall provide a 'percentage change' indicating the actual percentage change between groups (e.g., M = 3.44 Group 1 versus M = 4.02, in Group 2, on a five-point scale is calculated by the following: ABS [M_1 – $M_{2/5}$(scale range)] = 11.6% shift or change in means). Standard effect statistics also are allowed, so long as the above percentage techniques are likewise reported. These statistics should be reported in results as 'percentage effect' and follow immediately after standard statistical analysis notation. For correlation, (r = .43, p < .01, percentage effect = 18%), for means tests (M_1 = 3.44 versus M_2 = 4.02, t = 3.443, p < .01, percentage effect = 11.6%).

B. SYSTEMATIC, NARRATIVE, AND SCOPING REVIEWS (12 K WORDS MAX)

All meta-analyses and systematic reviews should include a PRISMA flow diagram to clarify for readers how the exclusion/inclusion criteria were applied to create the literature set under consideration: See http://www.prisma-statement.org/

C. BRIEF REPORTS AND RAPID PUBLICATIONS (2K WORDS MAX)

These are usually pilot studies, direct or conceptual replication attempts of previous work, case studies, brief evaluations, reviews, or 'citizen scientist' efforts that are unique, first-time reports, with no more than two tables and/or figures and 10 references. This rapid publication option is especially appropriate for graduate-level student studies, pilot or preliminary research, or descriptions of important new methods or instrumentation. These reports are subject

to blinded peer review in the same manner as research articles. Authors should follow all requirements for longer manuscripts when submitting Brief Reports, including that they have not been submitted or published elsewhere.

D. BOOK AND MULTIMEDIA REVIEWS (2K WORDS MAX)

Structured for readability and utility in which the content is suitably contextualized and includes links to general model-building or theory-formation in the respective domain(s). Please use the following headers, or otherwise incorporate these themes into the review: (a) Author Disclosures; (b) Content Overview; (c) Pros, Cons, and the Book's Contributions to the Literature; (d) Recommendation; and (e) References (if applicable). For an example, see: https://www.spr.ac.uk/book-review/poltergeist-night-side-physics-keith-linder

Multimedia reviews can cover films, documentaries, recorded presentations or symposia, video series and reports, websites that are comprehensive resources, software for scholars, and even peer-reviewed articles in other journals that are pertinent to frontier science. Submissions are now being accepted, and authors should note that these multimedia reviews should include four components: (a) Introduction; (b) Summary of the Media Content; (c) Description of the Value of the Media to the *Journal*'s Readership; and (d) Critique of the Media. These components need not constitute major sections, but each issue should be clearly addressed in the submission. We strongly encourage prospective authors to discuss their topic for a multimedia review with the Subsection Editor P. D. Moncrief (pdmoncrief@yahoo.com) prior to submission.

E. ESSAYS (8K WORDS MAX)

Important conceptual or philosophical commentaries, observations, or arguments to spark constructive discussion or debate relative to theory, methodology, or practice.

F. LETTERS TO THE EDITOR (1K WORDS MAX)

Must address substantive issues relative to recently published content in the Journal.

SUBMISSIONS (A) TO (C) AND (E) AS APPROPRIATE, MUST ALSO INCLUDE THE FOLLOWING SECTIONS:

1. **Highlights (i.e., lay summary) (50 words max)**. Placed at the beginning of the article before the scientific abstract, this is a short—1 to 3 sentences—bottom-line description of the paper. Avoid technical terms and prepare the comments akin to a published quote to a non-specialist or uninformed journalist or student about the researchers' interpretation of the main results.

2. **Implications and Applications (~150 words max).** Placed immediately after the Discussion section to succinctly summarize or suggest how the study's methods or findings can potentially inform the study of other issues, anomalies, or fields of study, including interdisciplinary and multidisciplinary approaches.

3. **Author Contributions (Contributor Roles Taxonomy)**. Please include this information within or following the Acknowledgments section. Follow standard guidelines such as this one from Elsevier: https://www.elsevier.com/authors/policies-and-guidelines/credit-author-statement. Also, please include ORCID numbers for authors where possible (on the online submission page).

4. **Data-sharing requirements.** Primary (raw) data (redacted for confidential or personally identifying information) must either be (a) uploaded to a freely accessible repository for independent verification or analysis by qualified researchers and the URLs shared in the paper and in a section called Data Availability under the Acknowledgments section (the *Journal* can provide such space), or (b) otherwise provided to qualified researchers on formal request.