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EDITORIAL

Communicating 'Real Versus Reel' Science

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Slogans, sound-bites, and memes...oh my! Promoting 'real' over 'reel' science is more critical than ever in this era of digital connectivity and rapid exchange of information. As the public strives to navigate a media landscape rife with competing narratives, the challenge lies in simultaneously fostering responsible public education in science (especially about anomalistics and frontier topics) and also recognizing the role of science communicators or popularizers who may prioritize entertainment over evidence when informing societal perceptions (for an overview, see Fischer et al., 2024). The constant tension between data-driven scientific inquiry and ideologically-charged media storytelling creates a battleground where understanding and knowledge can easily become casualties of misrepresentation and polarization. Whose obligation is it to remedy this situation - the scientific community, the media, the educators? Some of us or all of us? Sober contemplation seems to be warranted.

Reel science refers here to the portrayal of scientific concepts in news outlets and popular online and offline media, from Instagram 'reels' (short-form video) to books, magazines, podcasts, television shows, documentaries, films, and the internet. Typically, these representations favor entertainment by way of dramatic narratives, hyperbole, or caricatures, as opposed to accuracy and rigor. This often contributes to bias and potentially propagates misleading information whereby scientific findings are oversimplified, exaggerated, distorted, or ignored to fit preconceived narratives. In other words, facts and context are readily sacrificed in the proverbial battle for more clicks to 'like, share, or subscribe.' It's the social media 'dopamine-hit' equivalent of a drive-thru meal: Nourishment for the mind or body is of little concern. There's a balance to be struck in the pursuit of honoring the complexity of the subject matter while presenting it in a comprehensible and compelling way to audiences (for a discussion, see Horst, 2013). That balance seems ever more elusive.

Conversely, *real science* embodies the rigorous methodologies, ethical standards, and critical thinking that underpin a genuine quest for knowledge. It emphasizes the importance of data, evidence, peer review, and transparent debate to validate results or their interpretation or application. Real science is characterized by a commitment to openness, curiosity, skepticism, a willingness to revise hypotheses in light of new evidence, and an understanding of the limitations of our current knowledge (Funtowicz & Ravetz, 1993). *Where reel science is often insistent and unequivocal, real science is ongoing and provisional*. The producers and packagers of scientific programming, therefore, may desire a tidy package of the 'facts,' but the denizens of libraries and labs know that the process of science involves an ever-developing description or understanding of reality. *So, how can everyone help science to supersede sensationalism?* We think several key strategies must be considered, each involving distinct challenges and corresponding actions.

Ponder the Impact of Media on Public Perception

The so-called Fourth Estate wields significant power in shaping the public's understanding of science. Although the media always has been an influencer to general information and discourse, legacy media has been fighting for survival since the internet went mainstream in 2000. Dwindling budgets to hire trained journalists were accompanied by the rise of new influencers, such as paid 'content creators,' who tend to be citizen enthusiasts cleverly producing viral social media. Their content can generate large followings that compete with the traditional press. Anyone today can be a writer, publisher, or broadcaster virtually for free, and the consumer of that content is unaware of that person's bias or (lack of) training. Producing and distributing content on media platforms does not qualify someone automatically as a journalist. Rather, media professionals typically are trained in the art, science, and ethics of investigation, verification, and storytelling.

In the always-on environment of social media and 24-hour news cycles, information spreads hastily, often without all the necessary context or proper scrutiny. Stories that capture attention - whether through dramatic headlines (aka, 'click-bait') or emotionally laden narratives - are more likely to be shared and discussed than the mundane. Unfortunately, this dynamic encourages the proliferation of pseudoscience, conspiracy theories, and misinformation (Lewandowsky et al., 2017). Consider prominent science communicators like Neil deGrasse Tyson or Bill Nye ('The Science Guy'), whose media presence has made them household names. While they have successfully engaged the public with science, their roles as media personalities sometimes overshadow the educational aspects of their work. For example, Tyson's talk-show appearances and social media work often feature entertaining sound bites or ideological commentary over in-depth scientific discourse (Kahlor & Rosenthal, 2009). Similarly, Nye's television appearances often emphasize dramatic demonstrations, which can be alluring, but may nonetheless sacrifice a nuanced understanding of the scientific principles involved (Nye, 2015). Even more concerning is the tendency for some general science communicators or public intellectuals, Tyson and Nye included, to join certain conversations as expert voices.

The editors of *Nature* (2007) spoke to this point when they cautioned, "But scientists need to take care not to overstep their expertise. It is reasonable to expect a Manhattan Project physicist to weigh in on the dangers of nuclear weapons, with which he or she is entirely familiar. It is less clear-cut to, say, support the candidacy of a politician" (p. 354). Thomas Sowell (2012) put it more starkly, "...stepping beyond your competence can be like stepping off a cliff. Too many people with brilliance and talent within some field do not realize how ignorant - or worse yet, misinformed - they are when talking like philosopher-kings about other things" (p. 518). This issue of scientists overstepping their expertise—known as 'expert overreach' or 'disciplinary trespassing', - occurs when experts offer authoritative opinions on matters outside their specialized field. The problem has gained attention in recent years, particularly in the areas of public policy, interdisciplinary research, and communication on complex global issues such as climate change, the COVID-19 pandemic, economics, critical race theory or gender ideology, and artificial intelligence.

When scientists or public intellectuals speak outside their domain, they can *unwittingly* mislead the public or policymakers, risking the erosion of trust in science when inaccuracies are revealed (Collins, 2014). One key factor contributing to this issue is the complexity of modern problems. Issues like climate change or global pandemics require input from multiple disciplines. However, scientists who step into fields adjacent to their expertise may lack the necessary depth of understanding, making their contributions less reliable (Moore, 2022). This creates challenges for interdisciplinary research and public discourse, as it becomes difficult to assess which voices are genuinely and fully informed. The public's perception of authority exacerbates this problem. Many people assume that expertise in one domain translates to competence in others, which can give undue weight to scientists' opinions outside their specializations. Such misrepresentation of expertise can skew public understanding and amplify risks inappropriately, as seen in controversial debates on environmental and health issues (Oreskes & Conway, 2011).

The role of the media further complicates this state-of-affairs. Media outlets often seem to value 'credentials' over relevance, giving platforms to scientists whose expertise may not properly align with the issue at hand (e.g., Biermann & Taddicken, 2025). This can lead to distorted narratives and confusion, particularly during crises when the public seeks clear guidance from level-headed and data-driven authorities. Ethical considerations likewise are critical in this debate. Some argue that scientists have a moral responsibility to stay within their expertise, as venturing beyond it risks promoting inaccurate or biased information (Resnik, 2018). An appropriate boundary is essential to maintaining the integrity of scientific communication and protecting public trust.

When mainstream media face tight deadlines, they reach out to recognized science personalities that they know can fill the role. The ones with media savvy. The

ones with a household name, like Tyson. About 30 million people have clicked 'follow' on his social media channels, and another 4.2 million are subscribed to his "StarTalk" show on YouTube. There may be overlaps, and not every individual (or 'bot') catches every post, but these audience sizes eclipse those of most journalists. *New Scientist*, a mainstream science magazine, counts only 9.5 million followers across its social channels. It's enough to make one wonder whether the *end* (i.e., media exposure) justifies the *means* (i.e., dilution of scientific context at best and misinformation at worst). While generalist science professionals are certainly valuable to the media, the topic of science, and the media and public as well, are bound to be better served by specialist science professionals who can communicate in more media-and-audience-friendly manners.

TAKE PERSONAL RESPONSIBILITY FOR QUALITY SCIENCE COMMUNICATION

Responsible science communication is paramount to curbing the prevalence and impact of 'reel science.' Researchers, educators, and communicators alike must commit to clarity, accuracy, and accessibility in their outreach efforts. This involves translating complex scientific concepts into relatable terms without sacrificing the crucial meaning or nuance. The goal is to foster understanding and engagement rather than alienation or ignorance. One successful approach to responsible science communication is the use of effective storytelling. By weaving narratives that highlight the human elements of scientific discovery—such as the challenges faced by researchers or the real-world implications of their work - communicators can create compelling connections that strongly resonate with audiences (Berkowitz & Nussbaum, 2021). This tactic educates and humanizes science, making it relatable, relevant, and actionable to real life - or what we like to call the 'so what?' of scientific findings. We delve into this latter point in greater detail below.

ACTIVELY ENCOURAGE CRITICAL THINKING

Critical thinking is another essential component to bridge the gap between 'real and reel' science. Educators should equip individuals with the tools to analyze information logically, discern the credibility of sources, and question any and all claims that have little to no empirical support (Baker et al., 2020). Promoting media literacy empowers individuals to navigate the complex information landscape more effectively, fostering an informed citizenry capable of making sound judgments about scientific issues. Moreover, integrating discussions about the scientific method into education can demystify the processes of inquiry and hypothesis testing. By understanding how scientists arrive at conclusions and the iterative nature of research, people can better appreciate the rigor behind research findings and recognize the importance of evidence-based decision-making.

Both scientists and journalists are trained to investigate the truth. Both seek evidence to determine fact versus fiction; and both bear the 'burden of proof' to demonstrate their insights. Credibility is vital. For instance, journalism students are instructed to follow the Code of Ethics established by the Society for Professional Journalists (see https://www.spj.org/ethics/) and, in the case of hard news, to verify the facts using multiple sources. A journalist's obligation is to explore the information underlying all 'versions' of the truth, objectively and fairly evaluate that information, and ultimately communicate it in a meaningful context to the audience. Ethics and integrity constitute the credibility needed to earn public trust. That said, it is well-documented that many journalists and news outlets haven't consistently lived up to their own proclaimed standards of transparency, fairness, or truthfulness (e.g., Huang et al., 2024; Leung & Strumpf, 2024; Pan et al., 2023). There's clearly much room for significant improvement and growth in addressing the various forms of media bias.

MAKE RESEARCH MORE RELEVANT AND RELATABLE

One of the biggest hurdles to communicating 'real' science lies in the language and the meaning conveyed. Researchers and scientists use jargon to talk about their fields, but that specialized vocabulary and manner of speaking quickly loses outside audiences. On the other hand, speaking to journalists and the public in more grounded, plain language will help to ensure that messages are understood and appreciated. And it must pack *meaning*. What is relevant and relatable about the scientific evidence? Who or what does it affect, and how? What's the applicable context of this discovery? These kinds of questions should be the narrative backbone to answers that scientists give to media interviewers.

If the answers to these questions are meaningful only for those in the scientist's field, the chances are that there's no substantive story to be told. If it holds significance and application to potentially inform or influence the audience's beliefs or behaviors, then there's a real story. Journalists are looking for the truly newsworthy information: "Does this finding having any material impact?" or "Is it new, different, exclusive or significant – and to whom for what purpose?" If the research can be related to lessening harm or improving the quality of life

in any way whatsoever, chances are you have a good story to pitch to a journalist, as well as information that general audiences want to hear.

The media and science industries are in powerful positions to serve the public good. If those in science can become more approachable to journalists and the public—via language and visibility—the context and evidence of your particular topic will be conveyed and comprehended with meaning. Here are three simple actions that anyone can take to support this goal:

- *For every paper published, think about how you would explain the concept, evidence, and progress to a pre-teen relative*. For instance, *JSE* articles begin with a 'Highlights' summary in lay terms to engage non-specialist readers. How might you likewise draw a line between the findings and their relevance to quality of life? Invoke a common, practical touch to your topic.

- *Unlock the vault of your work, so Google (or other search engines) can find it and decipher its meaning*. Chances are that there's a conversation happening on social media *right now* about your topic. People are searching for information. It may be waiting behind a paywall, disguised in scientific language, or locked in a format unreadable by search function (audio, video, PDF, etc.). It is crucial to make the content accessible, whether that's transcribing the audio, tagging it (via hashtags or website content tagging), or placing a text explanation with keywords and phrases to accompany a PDF.

- *Search the Internet and social media forums (e.g., Reddit, YouTube, LinkedIn, or BlueSky) for your topic to understand how people are engaging around it*. Find the media coverage and make note of the journalist. Then Google that person and follow him or her on social media. Interact with their content and, in time, make contact to offer yourself as a source when the topic is covered again.

PROMOTE COLLABORATIVE EFFORTS

Cooperation between scientists and media professionals further helps to alleviate the conflict between 'real and reel' science. Specifically, engaging journalists in conversations about scientific methodologies and the importance of particular insights or evidence often leads to more accurate representations in the media (Shapiro, 2017). Similarly, scientists can benefit from media training that equips them with the skills necessary to convey their findings effectively to diverse audiences, including news reporters and the public alike.

Several organizations have already begun to support this strategy. Initiatives that connect scientists with journalists, provide resources for accurate science reporting, and emphasize ethical standards in media coverage are crucial steps toward fostering a more informed public (National Academies of Sciences, Engineering, and Medicine, 2017). Moreover, public forums and community discussions often provide spaces for dialogue where experts and laypeople can engage in meaningful exchanges about scientific issues.

Journalists and scientists also can collaborate to address community challenges. "Solutions journalism is news reporting focused on emerging responses to societal problems," according to The Center for Media Engagement at University of Texas at Austin's Moody School of Communication (Curry et al., 2016, para. 1). This reporting style involves journalists working with stakeholders - such as organizations, charities, advocates, or activists - to discover what can effectively unravel problems like poverty, climate risk, education drop-out rates, or public health threats. The news stories track efforts to improve the target issue. It also makes for positive news by leaving the public feeling inspired and empowered (Curry et al., 2016).

RECOGNIZE AND SUPPORT GROWTH OPPORTUNITIES ON BOTH SIDES

The UK-based Science Media Centre unapologetically states on its website that "The media will do science better when scientists do the media better" (see https://www.sciencemediacentre.org/about-us/). This group serves as an independent press office for any science and engineering topics thrust onto the front page of the newspaper or the top spot of nightly news programs. The Centre, which is piloting a new service in Ireland, acts as a resource for mainstream journalists who find themselves needing to understand complex topics in order to cover them, such as public health. In fact, the Centre blossomed as the pandemic broke. It is an ideal resource for both the media and the scientific community, but the Centre's scope is limited to mainstream science stories. This leaves a major gap - what about frontier topics involving anomalous phenomena and controversial topics, which are often looked askance by many of these researchers' colleagues? Well, there's some good news on this point that we will address below.

But more fundamentally, the Center for Media Engagement and the Frontier Journalists' Network (FJN) independently conducted surveys that revealed the press believes scientists can be more proactive with communication (Dudo et al., 2024). The Center specifically partnered with SciLine—based at the American Association

for the Advancement of Science (AAAS) - whose mission is about "enhancing the amount and quality of scientific evidence in news stories." They notably offer a free service that matches journalists with scientists for their coverage in the U.S. The Center/SciLine report indicated that "...journalists think scientists should focus more on broadening participation in science communication" (Dudo et al., 2024, para. 3), among other interesting findings. The FJN is similarly devoted to making it easier for the press to cover science, although its focus concerns more the niche areas of human phenomena like spirituality and the nature of consciousness.

These types of esoteric topics are generally marginalized, if not derided and denied (even called 'spooky' or 'woo woo'), by mainstream media, despite the public's enthusiasm for them (e.g., Hill et al., 2018; McClenon, 1984; Webster & Saucier, 2023). When the FJN asked editorial professionals what barriers exist to covering these sorts of frontier science topics (see https://frontiernet.org/2022/10/consciousness-is-top-interest-for-journalists/), the survey respondents acknowledged challenges to finding newsworthy story ideas, securing credible sources, and better comprehending topics. But, these barriers reveal important opportunities for those in the scientific community, namely, to raise the online visibility of their work and themselves so that their topics and expertise can be found through Google search and understood by the public. Interestingly, the FJN also found that both journalists and scientists often must surmount internal friction at their own institutions on frontier topics.

Journalists must sell the story to an editor or producer who may be biased on the topic – and scientists usually operate in clandestine ways to study esoteric topics, making active outreach a tougher proposition. Until such topics are fully normalized in culture - and wholly accepted academically - they are subject to the bias and shackles of decision-makers who suppress them. This includes editors, producers, university department heads, and press offices. Journalists and scientists can meet in the middle through common language, curiosity, openness, and mutual outreach. The FJN has actioned its survey findings by creating content specifically for journalists: *Story Ideas* to seed coverage ideas (i.e., published studies on meditation curbing activity by cancer cells), and *Topic Briefs* that explain subjects and provide sources (i.e., Consciousness, Near-Death Experiences, the Placebo Effect). FJN also provides media training for scientists, scholars, and practitioners, so they can learn how to engage positively with the press. An online directory of vetted journalists and scientists is likewise being developed to encourage communication between the two camps. Readers can learn more about these and other initiatives at FJN's website: https://frontiernet.org.

CONFRONT IDEOLOGIES AND CONTROVERSIES WITH EMPATHY

The interplay between science and ideology presents unique challenges in our increasingly polarized world. Some media outlets clearly promote certain perspectives that are not rooted in scientific evidence, which can lead to the entrenchment of misinformation about real-life issues like government policy, health care, or environmental challenges. Of course, we also know that sometimes scientific voices are actively censored by academic journals or the press (e.g., Walach & Klement, 2024). In either scenario, responsible science communication becomes even more crucial. Scientists and communicators must proactively address misconceptions and provide accurate information that counters ideologically-based narratives (Goertzel, 1994). Addressing the emotional components of scientific issues also can facilitate the public's understanding. By acknowledging the values, fears, and concerns that underpin public attitudes (pro or con) toward science, communicators can advance more empathetic dialogues. This approach should help to ease tensions and promote constructive discussions about scientific issues that truly matter in people's daily lives.

CLOSING THOUGHTS

The divide between 'real and reel' science poses significant challenges to the public's understanding of scientific issues and its trust in scientists. And make no mistake, the public's trust in science and scientists is currently tenuous (e.g., Agley, 2020; Cologna et al., 2024; Pew Research Center, 2023). According to a 2024 Gallup survey (cf. Brenan, 2024), more people (36%) said they had "no trust" in the mass media to report the news "fully, accurately and fairly" than those who have a "great deal" or even a "fair amount" of confidence (31%) in media. Those under 50 years old are the least trustful of the media. Internationally, trust in scientists varies across countries. One large-scale study encompassing 68 countries highlighted that public trust in scientists is influenced by factors such as cultural values, economic development, and exposure to scientific information (Cologna et al., 2024). Nevertheless, these trends have resulted, to some extent, from self-inflicted wounds (e.g., Grimes et al., 2018; Serra-Garcia & Gneezy, 2021; Zillich et al., 2024). Cultivating trusted relationships between scientists and journalists is, therefore, a good bedrock for both to restore the public's trust.

As the media and cultural landscapes evolve, the responsibility for effective science education arguably falls

to scientists, educators, communicators, and the public. Avoiding hype in scientific communication can prevent disillusionment and maintain trust (Master & Resnik, 2011). This means prioritizing clarity, accuracy, and critical thinking to negotiate the complexities of the information age and foster a more informed citizenry capable of engaging with the scientific issues that shape our world. Ultimately, resolving the rift between 'real and reel' science requires a collective effort; one that values evidence, embraces curiosity, and champions the pursuit of knowledge rather than headlines.

Doing so, we should be able to create an environment where science thrives, informed by the richness of data and evidence rather than the whims of people or organizations that support anti-science views, government or media propaganda, scientism (i.e., excessive belief in the power of scientific knowledge and techniques), or other ideologies. By forging a balance between entertainment and education, we can ensure that the public remains engaged with the scientific enterprise while also acknowledging - and perhaps even appreciating - its nuances and complexities. As in life, relationships are at the core of improving the quality of science media coverage. Journalists and scientists are both seekers and messengers of truth in their own ways. This means that both parties must be open to learning the *needs* and *language* of the other to join forces to bring meaningful research to the public; especially when the findings very well may alter our understanding of the nature of reality...and humanity's place in it.

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Journal of Scientific Exploration
Anomalistics and Frontier Science

RESEARCH ARTICLE

The Naming Problem in the Recognition of Psi-Encoded Visual Information: Analysis and Implications

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HIGHLIGHTS

Research suggests that the difficulty in naming objects in psychic-type experiences occurs because psi-received visual information is processed at a low level, lacking the higher-level cognitive organization needed for object recognition.

ABSTRACT

A consistent finding in experiments involving telepathic and clairvoyance phenomena is the difficulty of a receiver of visual psi information to name objects and symbols in what they receive. This deficit has been called "the naming problem" by Russell Targ. To gain insight into this issue, the perceptual and cognitive process used by receivers of telepathic and clairvoyant information is examined. Introspective and behavioral data are included in the examination. Factors are identified which contribute to the naming problem. The perception process of a receiver of psi-encoded visual information can be viewed as a form of perception like that in visual imagery but without effective high-level cortical involvement. Psi-encoded information in visual telepathy and clairvoyance is hypothesized to contain information that is decoded into low-level visual features, while higher-level information that organizes sensory information into specific object names and meanings – information known by the sender, or "agent" in telepathy – is absent. The fact that the same naming problem and similar introspective reports about received visual impressions are found in both telepathy and clairvoyance suggests that the data structure of the psi-encoded information in both forms of psi phenomena is identical.

KEYWORDS

Clairvoyance, integrative agnosia, introspection, mental imagery, object recognition, consciousness, psi data structure, telepathy, visual perception.

INTRODUCTION

A consistent finding in visual telepathy and clairvoyance experiments is the inability of the percipient to name specific objects in the received information. Russell Targ referred to this as the *naming problem*: "An important fact – known by Rene Warcollier in the 1940s and by Buddhists twelve hundred years earlier ... is that *it is much harder to identify a symbol you already know by name than it is to describe something you have never seen*" (emphasis in original; Targ, 2012, p. 34). Noted American psychic Ingo Swann suggested, referring to the visual perception of psi-encoded data: "a great deal of distortion and misrepresentation can and does take place while the mind seeks to translate the basic images into words" (Swann, 1991/2017, p. 73). Recognizing this tendency, Swann developed a technique of drawing psychically received shapes and forms as an alternative to trying to verbal-

ly identify or name the received impressions, leading to improved performance. Swann called this difficulty in grouping local elements into recognized objects a *lack of fusion*: "All parts are correctly perceived, but will not connect to form a whole" (Swann, 1991/2017, p. 229). In training remote viewing, a form of psi perception without a telepathic sender, Lori Williams emphasizes "the biggest mistake psychics and remote viewers make is naming things with nouns." "Our biggest mantra is, *describe don't identify"* (Williams, 2020). Figure 1 illustrates the naming problem and lack of fusion.

In this paper, I discuss the naming problem observed in psi-encoded information processing in the context of telepathic and clairvoyant phenomena. Telepathy involves information sharing between a sender (or "agent") and a receiver (or "percipient"). Clairvoyance phenomena, in which the same naming problem occurs, does not involve a sender. Together, these are the major and readily testable forms of psi phenomena in which remote psi-encoded visual information can be acquired and perceived. Hypotheses will be proposed and evaluated regarding the information that is conveyed and its perception in telepathic and clairvoyance phenomena. The content of psi-encoded information and the perceptual process, which decodes that content, form a general framework in which to view psi phenomena.

For simplification, this paper will use the term "clairvoyance" in its broadest sense, referring to a psi phenomenon where no sender is involved, and the perceived mental impressions can apply to any sense, not just the visual sense. This broad definition, encompassing all sensory modalities, has a precedent in its use in the modern definition of remote viewing, which can be described as a practice of multi-sensory clairvoyance which follows a specific protocol (see Tressoldi & Katz, 2023).

In psychometry, a "link object" is used as a starting point for clairvoyantly acquiring psi information related to the object. Otto Reimann, a recognized Czech psychometrist, mentioned that his

> " ... information about the target did not come to him, he said, as one piece altogether, like a photograph. Instead, as metaphors of the process he preferred those of slowly building a mosaic from tiny pieces of stone or painting a portrait by repeated applications of pigment to a canvas" (Schmidt, 1930, as cited in Barrington et al., 2005, p. 157).

Warcollier (1948/2001, p. 3) mentioned, "A telepathic image resembles somewhat a chemical molecule. The original molecule, the target, decomposes into elements. Some of these elements are received and are recombined into a new molecular structure." It should be noted that although the "naming problem" typically occurs in the visual reception of psi information, it is not universal. With highly gifted psychics, and reported in spontaneous as opposed to experimental cases, recognition can be detailed, and correct naming of objects can occur. For example, in many documented cases regarding Gerard Croiset, a highly acclaimed Dutch psychic (1909–1980), objects are regularly named with accuracy. In a tape-recorded conversation typical of Croiset's style:

> "I see a factory along a canal. Opposite the factory, there is a semidetached house. Near this house, there must be something like a plank bridge. It also has steps leading down to the water. I also see a blue sign. It is about fifty meters from the plank bridge. Opposite that blue sign, I see a small tower. This is close to the canal. If you stand with your back toward the semidetached house, and face the plank bridge across the water, the child must lie there about ten meters from the bank."
>
> The following afternoon, the body of the missing child was found by two frogmen at the exact spot indicated by Croiset (Pollack, 1964, p. 131).

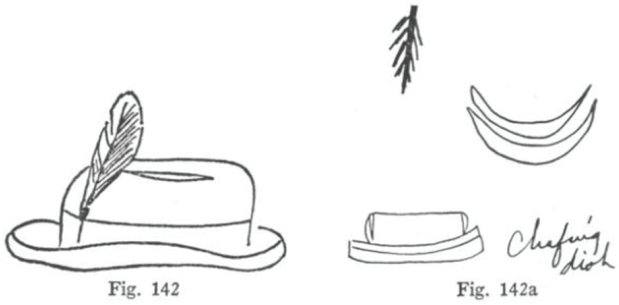

Figure 1. Illustrating the "Naming Problem" and "Lack of Fusion" in Telepathically Received Impressions of Visual Information. The impression drawn by a percipient on the right illustrates how some isolated parts of the drawing on the left were received telepathically, but they were not correctly organized into a specific object. Such "lack of fusion" is typical in visual telepathic and clairvoyant psi phenomena. A number of approximately correct "bits and pieces" are perceived, but they are not correctly integrated or named (Figure reproduced from Sinclair, 1930/2020, p.108).

In this paper, I will not discuss the evidence for the existence of the psi phenomena of telepathy and perception of distant scenes, referred to variously as clairvoyance, remote viewing, and psychometry, as relevant studies that do this are widely available. For meta-analyses, see Bem et al. (2016), Cardeña (2018), Mossbridge et al. (2012), Storm (2006a,b), Storm and Tressoldi (2023), and Utts (2018), all of which find significant experimental results. For credible accounts of cases of telepathic and clairvoyance phenomena, see Barrington et al. (2005), Mayer (2007), Pollack, (1964), Radin (2006), Talbot (1992), Targ (2012), and Wilkins & Sherman (1951/2004).

Why is it that receivers of psi-encoded information typically find it difficult to accurately name objects in the visual information they acquire? To better understand the naming problem, it will be instructive to examine other phenomena in which naming is problematic.

Integrative Agnosia

Lack of ability to identify visually perceived objects is found in patients with a neurological impairment called *integrative agnosia*:

> The patients ... are unable to recognize even familiar common objects presented to them in the visual modality. This object recognition deficit cannot be attributed to a problem in labeling the stimulus per se nor to a loss of semantics; presented with the same object in a different modality, either haptically or auditorily, they have no problem in naming it or providing detailed and rich descriptions of it. Visual agnosia refers to a specific failure to access the meaning of objects from the visual modality ... The 2 patients we studied are clearly able to extract some visual information from the display but apparently are unable to integrate all aspects into a meaningful whole (Behrmann & Kimichi, 2003, p. 21).

Integrative agnosia refers to a deficit in integrating visual information into known objects or percepts. This deficit is typically observed in patients with damage in the occipitotemporal cortex, a region of the brain involved in the integration of low-level visual features. Visual integrative agnosia may also result from a stroke or traumatic brain injury that affects higher-order pathways in the brain involved in visual integration. Neurologically intact perceivers unify and identify a multipart stimulus quickly. Figure 2 shows attempts to name line drawings of objects by R.N., an integrative agnosia patient. These responses could just as well have been made by a telepathic or remote viewer of these drawings.

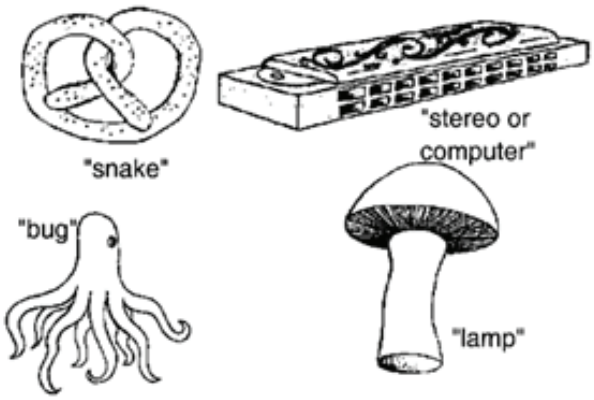

Figure 2. Examples of line drawings and responses of subject R.N. The subject who named the objects in the drawings above had visual integrative agnosia. Although such patients can discriminate low-level visual features, their challenge is to integrate the features they identify into a whole. In the drawings above, the target objects were incorrectly named. Patients with visual integrative agnosia can easily name objects that are put into their hands or described verbally, but not when they look at them. (Figure reproduced from Behrmann & Kimichi, 2003, p. 22; line drawings from the Boston Naming Test, 2nd ed.).

Perception is a Constructive Process

Visual perception and recognition of objects is understood to be an interactive process between higher and lower levels of neurological processing within a hierarchically structured visual and cognitive system. Visual perception acquires information from the pattern of photons which enter the eye. The photons can vary in wavelength and flux density, which are perceived as different colors and brightnesses. The earliest stages of visual processing extract low-level visual features from the raw sensory data impinging on the array of rod and cone cells of the retina. This process involves detecting and organizing the raw data into (1) oriented edges resulting from adjacent differences in brightness and color, which help delineate the shape of objects; (2) colors; (3) contrast which enhances edge detection and object differentiation; (4) movement; (5) binocular depth information; and (6) the identification of continuous surface areas with uniform textures. *Perceptual organization* is the process by which these low-level visual features in the early processing stages are organized into progressively more complex units, a process in which high-level information that comes from memories of previous experiences is

involved. This is the constructive, interactive process of "making sense," i.e., "deriving meaning" out of the available low-level visual sensory information (for further discussion regarding the mechanics of this process, see Clark, 2013; Graboi & Lisman, 2003; McClelland & Rumelhart, 1981).

The sensory-cognitive system normally assembles basic visual features into more complex units using a rapid series of neurologically based computational steps which involve both "bottom-up" and "top-down" processing. In visual integrative agnosia, there is an apparent disconnect in the process that normally and rapidly occurs between low-level "bottom-up" visual information and learned higher-level "top-down" information, resulting in performance that appears to duplicate the naming problem observed in the perception of received psi-encoded visual information.

Low-Level vs. High-Level Information

Shannon's information theory (Shannon & Weaver, 1949/1964) focuses on *quantifying information content* and intentionally avoids addressing its *meaning*. In this paper, the term *information* is concerned with meaning, not quantity. Specifically, meaning is separated into two major categories, "low-level meaning" and "high-level meaning." These categories are inspired by the structure of the human visual system. As discussed above, the lower hierarchical levels of the visual system (which include the primary visual cortex (V1) and other areas in the occipital lobe (V2, V3, V4, V5/MT), collectively referred to as the *visual cortex*) perform early visual processing. These regions process basic visual features such as edges, colors, motion, binocular disparity, and simple shapes, which are assigned to the "low-level meaning" category of visual information. Measurable physical characteristics of the information comprise "low-level meaning", but their stand-alone intrinsic meaning in the cognitive schema of the percipient in most contexts is insignificant.

High-level visual processing is performed in visual association areas of the brain. These include areas in the temporal and parietal lobes, such as the inferotemporal cortex (IT) and posterior parietal cortex (PPC). These regions are involved in associating visual information from lower levels of processing with memory and integrating the discovered high-level information with other sensory inputs. It is in these higher processing levels where the names and "high-level meaning" of integrated visual information are expressed in the consciousness of the percipient. When a visual image on the retina is perceived, neural processing activity occurs at all hierarchical levels, and the percipient can focus attention and become conscious of the information content on any desired level of integration. For example, you can focus attention on the lower loop of the 'g' in the word "integration" if you desire – a low-level unit of visual information – but while reading, the focus and consciousness remain at the high-level meaning of the integrated stream of characters made up of low-level visual features on the page.

While the low-level visual information contained in oriented edges, simple shapes, motion, and disparity is unambiguous and can be appreciated universally by all beings with visual perception, the high-level meaning of the visual information depends largely on the learned experience of an individual and is therefore different for different species and in many cases different for different individuals within a species. However, there are also high-level information constructs which are archetypal and transcend individuals and even species. For example, a large object moving rapidly and directly towards a perceiver has a universal high-level meaning of 'danger.'

Since telepathically received visual shape information can be drawn with some accuracy by percipients (Figure 1, right), telepathically communicated visual psi-encoded information must contain, at a minimum, a representation of low-level visual information. But can telepathically and clairvoyantly communicated psi-encoded information to humans also include high-level information related to what the information means, including its symbolic name? While low-level, raw visual information is unambiguous and without intrinsic meaning, the high-level meaning extracted from the integration of low-level information in some cases signifies different things for different percipients in different contexts, and in other cases signifies archetypal and universal meanings. These can be regarded as two subcategories of "high-level meaning."

The question of whether high-level meaning is present in the psi-encoded information received clairvoyantly, in which an active sending agent is not involved, does not have an obvious answer. When a clairvoyant remotely views, for example, a bush or shrub in a distant environment, it seems logical to assume that the name of the shrub would not be included as part of the raw psi-encoded information received by the clairvoyant. However, it can't be ruled out that information available in a collective unconscious repository is also accessed during that clairvoyant perception. In that case, the name of the shrub, as well as its ability to alleviate certain health conditions, might be part of the information content received by the clairvoyant. The same possibility applies to telepathic information access.

HYPOTHESES

Given our current state of knowledge, hypotheses can be proposed to account for the naming problem and lack of fusion observed in telepathic and clairvoyant perception experiments. Evidence from related perception research, case evidence, and introspective evidence can then be considered, leading to an assessment of the validity of the hypotheses.

Hypothesis 1

The fact that telepathic and clairvoyant percipients typically act like patients with integrative agnosia is consistent with the notion that *Hypothesis 1: Received psi information that enters the visuo-cognitive system of the brain does not include high-level information, including information about the integration of basic visual features into specific objects, symbols, and their names. The visual and cognitive system used to perceive psi-encoded information is responsible for organizing and assigning high-level organization and meaning to raw sensory features communicated by psi-encoded information.*

In telepathic experiments, high-level information – information about how low-level visual features are organized into specific named objects and their meanings – is certainly known by the sender, but it does not appear to be present in the information communicated to the percipient. The percipient appears to be dealing only with raw visual information and must organize that information into meaningful units using his or her visio-cognitive system which brings in their learned experience.

In normal vision, feature information is available from the lower levels of the visual system, and high-level semantic information is available from learned experience. But, it appears that while perceiving psi-encoded information, perceptual processing does not operate nearly as effectively as it does in normal visual perception. Perceived visual feature information often defies proper organization into integrated shapes that comprise known objects and symbols. For example, receivers of psi-encoded information are often unable to organize even the simple lines and curves of totally familiar letters, words, and numbers into recognized symbols. Many examples of drawings of telepathically received information may be found in Swann (1991/2017, Chap. 12) and Sinclair (1930/2020). By looking at them, it is clear in almost every case that *some visual information was telepathically received*, but "direct hits" with correct naming assigned to the received visual information are rare.

Even though the organization of simple visual features into recognized objects with names is well-defined information in the consciousness of a telepathic sender (e.g., Figure 1, left), the receiver's performance shows no awareness of this high-level information (e.g., a "hat"). Since some cases of psi perception include auditory or olfactory information, in general, it appears that *raw physical feature information* is what becomes telepathically as well as clairvoyantly available to a receiver of psi-encoded information – at least in experimental non-spontaneous contexts. Such information does not appear to have semantic content; it is assumed to be up to the percipient to process the received physical feature information into a meaningful high-level percept.

Hypothesis 2

The fact that telepathic receivers and remote viewers typically act like patients with integrative agnosia is consistent with the notion that, *Hypothesis 2: During the perception of psi-encoded visual information, the receptive apparatus in the brain that detects low-level visual features of psi-encoded information is to some extent functionally disconnected from the higher-order "top-down" processing that normally participates in the integration and recognition of these features*.

This hypothesis extends the first by positing that the perception process itself does not operate effectively the way it normally processes visual information. Specifically, the involvement of high-level cortex brought to bear in feature integration is impacted. Implicit in this hypothesis is the assumption that the same visual system that operates in normal vision also operates in a modified way during the perception of visual psi-encoded information.

Swann believed that the "ESP mind" operates separately from the conscious mind. "The ESP mind was not part of the conscious mind, and hence had never been truly touched through conscious intellectualizing and labels" (Swann, 1991/2017, p. 38). "We must also have a second consciousness that integrates with the second reality *and* with the physical as well" (Swann, 1991/2017, p. 51, emphasis in original). Swann called this second consciousness the "ESP core." "To our eyes, all objects are more or less familiar and easy to recognize. But the ESP core processes bits and pieces of information…" (Swann, 1991/2017, p. 123). If there is a separate psi information detection and processing system in the brain which is receptive to low-level psi-encoded information and which is not well-connected with the higher-level analytic processing of the brain used in normal vision, this could account for the behavior observed in connection with the naming problem. Hypothesis 2 discounts the notion of a separate processing system and considers failure to name as a functional deficit in the normal visual processing system used to process visually coded information.

Hypothesis 3

Since introspective reports and the behavioral evidence of the "naming problem" are essentially identical in both telepathic and clairvoyant psi perception, we have *Hypothesis 3: All visual psi-encoded information, whether sourced by visualization in a sender's mind or directly viewed by a sender, or whether its source is a passive environment with no active sender, whether the information source is in real-time or in the past or in the future, has the same general data structure.*

The idea that all psi-encoded information has the same general structure has been expressed by Marwaha and May (2016) and others, including Rhine (1945) (see Radin, 2019). This third hypothesis is based on the fact that whether there is an active agent involved in sourcing the psi-encoded information, which may be termed "telepathic encoding," or whether no active agent is involved in sourcing the information, which may be termed "clairvoyant encoding," the same perceptual issue of the naming problem is observed. This suggests that the information encoding in telepathic and clairvoyant communication is the same. At first glance, in the context of modern-day signal communication theory, this notion seems illogical. Although it is easy to conceive of a radio analogy where a signal is encoded at a remote transmitter and then decoded at a receiver (telepathy), where and how is any signal at all encoded in clairvoyance where there is no transmitter at the remote source of the information?

BACKGROUND RESEARCH AND CONTEXT

To gain deeper insight into the perceptual processes and psi-encoded data involved in telepathy and clairvoyance, these phenomena must be examined using as wide a net as possible. This section extends the body of research findings to include findings from tachistoscopic perception, case studies of high-clarity psi visual perception, instances of apparent high-level information transfer in psi phenomena, and introspective evidence.

Tachistoscopic Perception

Another mode of visual perception occurs when images are presented tachistoscopically (for very brief exposures) to subjects. In this experimental paradigm, the result is poor object recognition, which resembles that found in integrative agnosia and visual telepathic and clairvoyant perception and recognition. Donald Hebb summarized the performance of subjects who view tachistoscopically presented images:

> The subject's reports are such as "a triangle with the top cut off" or "a square with a crooked bottom" It is thus clear that the subject is not only responding to the diagram as a whole, he perceives its parts as separate entities ...
>
> A drawing or a report of what is seen tachistoscopically is not unlike a paleontologist's reconstruction of early man from a tooth and a rib. There is a clear effect of earlier experience, filling in gaps in the actual perception so that the end result is either something familiar or a combination of familiar things, a reconstruction on the basis of experience (Hebb, 1949, p. 47; see Neisser, 1967, p. 94 for reference to Hebb's paleontologist analogy).

In the case of perception, when brief tachistoscopic glimpses of images are presented to subjects, some low-level information is extracted, a few low-level features of one or more objects, but the extracted visual information is often insufficient to allow accurate object recognition and correct naming of objects or symbols fails. In tachistoscopic perception, this results from a very brief effective viewing time, leading to unattended (unexamined, unprocessed) low-level visual information. The tachistoscopic exposures use a "backward masking" stimulus to block any further extraction of sensory information after the exposure time due to visual sensory after-effects. For example, a checkerboard pattern is presented immediately after a brief presentation of the target.

Tachistoscopic perception experiments have shown that, up to a point, a speed-accuracy tradeoff (SAT) exists: the more time available to perceive a stimulus, the more accurate will be the resulting recognition (Wickelgren, 1977). Since visual perception is very rapid, this effect typically applies during the first several hundred milliseconds following exposure to the stimulus. The consensus is that the perceiver makes choices based on a sequential analysis of sensory evidence. "Faster responses entail less accumulated evidence, and hence less informed decisions" (Heitz, 2014, p. 7). In contrast to tachistoscopic experiments, the amount of time available for psi perception is typically on the order of a half-second to a few seconds (see Hubbard & Langford, 1986 for early data), and the perceived sensory information is typically "wispy," of very poor quality – percipients typically feel that there is not nearly enough time to confirm enough evidence for proper recognition. In a sense, then, perception of psi-encoded information can be considered a drawn-out form of tachistoscopic perception during which evidence accumulates slowly, and not enough evidence accumulates for accurate recognition.

Many have noted the reduced quality of perceptible

information integrated by a perceiver of psi information. Swann (1991/2017, p. 33) mentioned, "... what I was perceiving were bits of shapes, forms, and colors which in themselves were not clear." Hubbard and Langford (1986, pp. 6-7) mention, "Accomplished viewers appear to agree that correct RV [remote viewing] data is perceived as impressionistic and generally vague. ... correct visual impressions are largely indistinct in outline." "By subjective report, the "data access window" is approximately 0.5 to 1 second in duration" (Hubbard & Langford, 1986, p. 5).

Swann noted that psi visual data is "soft" (1991/2017, p. 134). "Soft" can be interpreted to mean "low resolution coupled with low contrast and low intensity." The fact that received psi-encoded visual data are of low resolution, low contrast, and low intensity suggests that perception and recognition are additionally impeded by these factors. In the language of signal communications, the data available for perception do not have high spatial frequency content and act as if they have been subjected to a low-pass filtering operation (see Piao & Katz, 2023).

Telepathic and clairvoyant perception and recognition are unlike perception and recognition in visual integrative agnosia since the percipients do not have lesions or other deficits in, for example, in the occipitotemporal cortex which is connected bidirectionally with higher-level cortical areas. Since percipients in psi experiments who do not have damage to the occipitotemporal cortex nevertheless experience the naming problem, the lesson to learn from visual agnosia is that if, for any reason, there is an effective impediment in the bidirectional information processing channel from high-level cortex to low-level visual sensory processing areas, a "naming problem" is likely to occur.

An Introspective Study

Out of the blue, my son asked me, "What am I thinking?" He had never asked me this before (and has not done so in the 3+ years since), and I immediately realized he could be thinking about anything. I immediately stopped paying attention to what I had been looking at and looked down, and, with my eyes remaining open, checked my "mind's eye" to see what might be there. To understand what is meant by checking your "mind's eye" with your eyes open, visualize the Eiffel Tower or an Egyptian pyramid (or anything else you care to visualize). You are doing this in your "mind's eye" (otherwise called your "visual imagination"). Eyes do not have to be closed. I saw in my imagination a wispy grayish-white-on-black rounded flat (2D) symbol of some kind, with something unclear in the middle of it and something unclear hanging down from its bottom. I knew this wispy visual shape was not coming from me, possibly in part because it was surprising and had nothing to do with what I was previously thinking about. I couldn't view the whole object as a single integrated object – I could only see parts of it at a time, which appeared to pop in and out of view. I could move my attention from one location in the image to another. You can do this by focusing attention at the top or at the bottom of your Eiffel Tower or pyramid. I was most reminded of the symbol for 'female' (Figure 3). I knew I was seeing a closed circular shape with something hanging out of the bottom of it, but I also knew there was something in the middle that I couldn't make out clearly. I knew it wasn't actually the symbol for 'female,' and that it was more complicated. But I could not see the whole wispy symbol at one time and could not get a clear view of all of its spatially organized details. When focusing my attention on a new location in the image, it was hard to remember what I had

Fig 3. Symbol for 'female'.

A B C D

Figure 4. Flavor of the successive observations of received telepathic visual information. When inspecting what I was receiving telepathically, I had the feeling of voluntarily moving the focus of my attention from one part of my visual field to another. This sequence of successive views on the "screen of visual imagination" (i.e., the "mind's eye") gives a flavor for my perception of the "bits and pieces" of the telepathically sent image. Parts of the entire image could be perceived in successive glimpses, but the entire figure as a whole never "came together" or "fused." The visual information had low contrast, resolution, and intensity, and it wasn't clear how the fragments in the successive voluntary changes of views of it fit together. Visual features in successive glimpses were not aligned with each other so as to show their spatial relationships. I felt that I didn't know what to expect when voluntarily moving my attention to the next location. Upon moving to the next location, I tended to forget what was at the previous location since what I had previously perceived did not have a recognizable shape that could easily be remembered (except for the "circle").

Figure 5. (A) Symbol for 'Toyota.' (B) symbol for 'female. The symbol for Toyota on the left (A) was what my son was visualizing. It is possible to appreciate the "bits and pieces" in this figure by looking first at the inner oval at the top, then the area below the inner top oval and above the outer oval. Then, focus on the area in the center where the lines cross, etc. This turns out to be a rather complex symbol when perceived in terms of disconnected "bits and pieces." It cannot be trivially recognized when it is appreciated as separate incomplete views. All the parts must be in plain view simultaneously to allow for their organization into an integrated single object or symbol. In typical telepathy experiments, this does not happen, and even a single capital letter often cannot typically be perceived as a whole telepathically. Gifted psychics do better at reading letters and naming objects. But even Ingo Swann, a highly gifted psychic, said, "[Alphabet letters are] targets that are (my experience can vouch for it) very, very difficult..." (Swann, 1991/2017, p.109).

seen in the previous location(s) since they were more or less arbitrary hard-to-remember shapes, except for what I thought was a "circle." I did not recognize what my son was visualizing, even though later it was obvious that under normal circumstances, I would have easily recognized it. I responded, "The symbol for female but that isn't what it is." My son was amazed that I knew he was thinking of a symbol. I was attempting to analyze its parts separately instead of taking in the image as a whole, which was not possible. Figure 4 gives a flavor for the step-by-step visual feature extraction process I had experienced during a period of approximately 3 seconds, after which the image faded.

If the reader had to construct what the whole image is from first considering Figure 4A, then Figure 4B, etc., one after the other, it would not be possible to recognize and name it. This was the feeling I had when trying to recognize the object from the separate disconnected glimpses of different locations in the received visual information which did not "fuse" together. It turned out that my son was visualizing the symbol for Toyota, whom he had been employed for over 3 years at the time – Figure 5A.

With hindsight, I may have had a problem making out what was in the middle of the Toyota symbol because, in my attempt to put a name to what I was perceiving (which experts warn not to try to do), believing it most like the symbol for 'female,' it should not have anything in the middle. Due to this bias, my cognitive system may have been "top-down" regarding the features in the middle as irrelevant and therefore inhibiting my ability to integrate them into the percept under construction. However, I would not say that the visual features I perceived at that time were "pure coincidence" – there was no doubt in my mind that *some telepathy* had occurred.

In normal visual perception, as currently understood in cognitive neuroscience, "the spotlight of visual attention" can be voluntarily moved covertly (the eye does not move) from one location in an internal representation of an image to another (Carrasco, 2011; Hopfinger et al., 2000, Kinchla, 1992).

For example, in reading, at each eye fixation, covert attention helps in processing and extracting information from the area surrounding the fixation point. Covert attention shifts to different visual features or words within the peripheral vision. Distinct visual features are paid attention to and integrated into the percept under construction. Once paid attention, even when the covert attention moves to another location, the previously discovered features do not disappear from the external view or from the internal representation under construction. Their spatial alignment is preserved. Before moving the eyes to a new fixation point, covert attention is used to plan the eye movement (saccade) to the most informative part of the text for the next fixation point (Engbert et al., 2005).

But in telepathic and clairvoyant perception, as covert visual attention is moved from one location in the internal sensory representation of the target to another, the memory trace of the visual information discovered in the previous covert attention fixation may fade – possibly being wiped out by examination of the next fragment of visual information. Mary Potter (1976) found that a memory trace produced by a briefly presented (113 ms) picture is vulnerable and can be wiped out if the subject must attend to another visio-cognitive task (e.g., comparing a new picture to a target). Potter called this effect "conceptual masking." But when enough time is allowed after a brief presentation of a picture or scene (~300 ms), the memory trace is not wiped out, and the subject remembers it.

Analogous to Potter's "conceptual masking," in the perception and recognition of visual psi-encoded information, a "visual information masking" effect may occur, in which the memory of previously examined visual information disappears from the internal sensory representation (i.e., visual memory), thereby preventing its integration ("fusion") into a properly growing perceptu-

al construct with spatially aligned features. This would result in a partial and unstable internal representation of visually received psi-encoded information. Instead of *persistent* specific visual features in their relative spatial locations in the internal sensory representation, in the perception of psi-encoded information, the same visual information may need to be re-acquired every time its relative location is paid attention. When attending to different low-contrast, low-resolution visual features at different locations in the internal representation of the field of view, one or a few distinct visual features might be perceived together, but they may fade from memory and view when not attended.

In normal vision with eyes open, and in mental imagery projected to the mind's eye, a representation of all the features tends to persist at some level of resolution, remaining "fused" into a complete sensory-cognitive percept which includes accurate higher-level information. This does not appear to happen in visual psi perception, where the starting point is low-level visual features of poor quality and spatial alignment.

Using cognitive effort in an attempt to put a name to fragmentary and unstable, poorly remembered fragments of visual evidence discovered tends to bring the receiver's biases and experience to bear. This interferes with the perception of the features actually present. By assuming the presence of features that aren't there and inhibiting attention to features actually present which do not make sense with current high-level cognitive assumptions about the target, the perception becomes colored by the receiver's experience. The effort of identification interferes with perceiving what is actually being received. Swann mentioned, "[When you can achieve] a detached poise, a sort of disinterest ... the core ESP processes will work their best (Swann, 1991/2017, p.124)."

Cases of High Clarity Image Reception

In reported spontaneous cases of telepathy and in cases involving high-functioning psychics, as opposed to what is observed in typical experiments involving intentional telepathy and remote viewing, reasonable image clarity and detail can be present. For example, Ossowiecki located a bracelet with "traditional work" in the bushes – an apparent sufficiently clear view of a small object (Barrington et al., 2005, pp. 104-106). Croiset saw the blade of an ice skate worn by a dead girl protruding up through the dirt at the bottom of the ocean (van Luijtelaar & Kramer, 2020). McCoy could perceive a fracture on a bone (McCoy, 2011, p. 72).

The factors that modulate the effectiveness of psychic ability, hence the effective *strength* or *quality* of telepathic or clairvoyant information communication, have been summarized by Radin (2024) as (1) belief, (2) motivation, (3) imagination, (4) intention, and (5) a state of gnosis, described by Radin as a special state of awareness, a direct intuitive knowledge of reality, called "samadhi" in yogic lore. Many have pointed to *emotion* and *strong intention* in the sender as factors that increase the strength of shared telepathic information (e.g., McCoy, 2011).

The fact that accurate naming can occur when there is clear visual psi perception of details such as found in cases of spontaneous telepathy and with gifted psychics contradicts the assertion in Hypothesis 2, that the neurological top-down visual pathway is largely disconnected in psi perception. When the reception is strong, an effective disconnection may weaken or disappear.

In spontaneous cases with relatively clear perception (Ossowiecki used the term "lucid state"), the visual information available in the mind's eye can be assumed to have higher contrast, intensity, and resolution, which would improve the overall accuracy of the process of high-level feature integration. Even with gifted psychics, what is perceived is often "clouded" and requires considerable concentration to discern details. Ossowiecki noted,

> Whether I read a concealed target, or find a lost article, or do psychometry, my sensations are almost the same...The vision is clouded and demands great concentration. Great effort is needed to see some of the circumstances and details displayed. Sometimes, this lucid state is evoked in a few moments, and at other times, one has to wait for hours. It depends to a large extent on the ambiance; incredulity, skepticism, or even attention concentrated too closely on my person can block a quick and successful result or cripple the perceptions (Barrington et al., 2005, p. 44).

Psychic Gerard Croiset would typically report details which often included clear information about future events. He participated in many "chair test" experiments in which he would give information about a person who freely chose or was randomly assigned to sit in a particular row and chair position at a meeting which in some cases took place months after he gave the information. One "chair test" was scheduled to take place in the boardroom of the Museum of Natural History in Verona, Italy. The day before, German parapsychologist Professor Anton Neuhausler picked a chair and asked Croiset, "Who will sit tomorrow at Verona on the fourth chair to the left in the third row?" Croiset immediately gave his impressions which were written down by Neuhausler and placed

in a sealed envelope. The chair test took place on the next day:

> The Verona chair test was supervised by Dr. de Boni and Professor Zorzi who opened the envelope at the beginning of the experiment. Until then, the contents were absolutely unknown to them.
>
> Croiset's day-earlier impressions in Munich began: "A girl will come and sit on the chair. She has dark hair, wears a dark dress and a light-colored blouse. ..."In the immediate surroundings of her house is a ladies' hair-dresser's salon. ... "She lives on the fourth floor. ... "She has beautiful handwriting. ..."She loves animals and has a picture of a squirrel. I do not know if she made this drawing herself or recently looked at a drawing like it which made a deep impression on her. ..."When she walks home she sees at the end of her street a small square. On that square stands a round building with arches. ..."Has she at home a Russian samovar or Turkish pipes with loops twisted into one another? ..."She wears black pumps. The upper leather is lightly damaged. There is a crack in it. ..."Did she yesterday experience some emotion because of a cigarette box? Did it fall to the floor? ..."Who is the old gentleman with the mustache? Has she a portrait of him in her room? ..."Did it recently happen to her that a dead animal, from a butcher's shop, fell in front of her feet?" (Pollack, 1964, pp. 251-252)

The ellipses in the above quotation indicate where comments about the correctness of Croiset's impressions were inserted. In this experiment, as in the many others documented in Pollack's (1964) book, the information provided by Croiset was substantially accurate, although inaccuracies did occur (see Luijtelaar & Kramer, 2020). Note how the information he supplied is largely visually descriptive. Croiset's information often contains references to visually described situations involving heightened emotion in the subjects.

High-level Knowledge from Psi-Encoded Information

Experiments have been conducted which indicate that some people know with a probability significantly greater than chance who is calling them on the phone (Schmidt et al., 2009; Sheldrake & Smart, 2003). This "knowing" of who is calling, or in other instances, "knowing" of who is sending spontaneously received telepathic information, appears to be an example of successful communication of high-level information, which includes naming. The thought of the name of the calling individual (as opposed to a visual impression of the way they look) would suddenly pop into the receiver's mind – a "knowing" – just before or when the phone rings. When a caller acts to connect by phone with someone, this thinking amounts to "broadcasting" psi-encoded information about who the caller is and the caller's intention to communicate with a specific person. It appears that the identifying information, in this case, is encoded in non-sensory ways as a form of high-level information. Ossowiecki mentioned how he could become aware of the "world" of an individual ("I easily transported myself into *his world* and told him, '... you will meet a woman, a Russian, with whom you will fall in love and whom you will marry shortly after. Her name will be Lydia')" (Barrington et al., 2005, p. 120; emphasis added). When becoming aware of a person calling on the phone, it is possible that what one becomes aware of is the "world" of the calling individual – which appears to refer to abstract, high-level information as opposed to low-level physical sensory-encoded information. Similarly, in cases of remote healing, the healer can direct "intentions of well-being" at the patient (Achterberg et al., 2005). This also appears to involve communication of high-level abstract information, or it may involve communication of visual information generated by using mental imagery to visualize area(s) of the patient's body having a healed appearance. Another example of the communication of abstract psi-encoded information was mentioned in connection with Croiset. When he was 26,

> his mother suddenly died of cancer. During the last stage of her illness, she ate many peaches. On her deathbed, a half-peeled peach was lying on her bedside table. [Whenever] Croiset sees the image of a half-peeled peach, it symbolizes a cancer patient to him" (Pollack, 1964, p. 56).

One explanation for this is that high-level information about a person's "world," including their health, is contained in the data structure of psi information accessible to a gifted psychic. In the above case, the presence of cancer in the data structure of the psi-encoded information received by Croiset would have been decoded by his visio-cognitive system to be visualized as a half-peeled peach. The above example, and there are many cases of psychic knowledge of health conditions (see, e.g., Cayce & Cayce, 2004; McCoy, 2011), suggest that under certain conditions, information such as the identity of hidden medical conditions is accurately communicated. It remains possible that the actual psi-encoded representa-

tion of the communicated information was not high-level, but a representation in terms of low-level visual features of structures inside the body. For example, healers Cayce and McCoy were known to have substantial knowledge of anatomy, even though they never studied it, and McCoy and other psychics have reported cases of seeing visual structural details inside their patients' bodies.

The rarely mentioned psychic ability called "claircognizance" refers to becoming aware of a deep, gut-level knowledge about a currently relevant situation in one's life. "Claircognizance does not receive images, sounds, smells or tastes, instead it is an undeniable and unshakable inner truth" (Martinez, 2022). For example, you immediately know that a person has had a traumatic experience when she was 11 years old (H. Wahbeh, personal communication, August 24, 2024). "It is just *knowing things* without any real backing" (Wille, 2024, "What is Claircognizance?", emphasis in original).

Since claircognizant information is not perceived via a sensory representation such as images, sounds, smells or tastes, this type of information is not decoded within a sensory processing channel. Rather, it is expressed in the brain via a non-sensory pathway, and the information it represents can be decoded directly into high-level cognitive knowledge. This does not involve the processing of sensory cues but is rather a more direct conversion of psi-encoded information into semantic information.

DATABASE OF PSI-ENCODED INFORMATION

Clairvoyant perception can be precognitive, as illustrated by Croiset's "chair test" example mentioned above (no sender was present at the time Croiset received the information), or it can address events that occurred in the past (retrocognition), as well as in real time, as illustrated by a case in which Ossowiecki was asked to discover what happened to a lost bracelet and, if possible, to get it back.

> Mr. Ossowiecki was given a small box in which the lost bracelet used to be kept. ... He said, 'I see the bracelet; it is a thick gold chain, traditional work. It is hanging on the lilac bush in front of the bedroom window. It slipped out of a pocket and fell out unnoticed when the servant was shaking things out. Search carefully there and you will find the bracelet' ... The bracelet was found among the thick leaves of the lilac bush growing outside the bedroom window" (Barrington et al., 2005 pp. 104-106).

From the examples above, and from many other examples in Barrington et al. (2005) and Pollack 1964), it is *as if a recording exists of everything that happens in the world, down to a fine level of detail*, and a gifted psychic *can tune into any desired segment of the recording,* by using a *link object* as a cue (psychometry), or simply using knowledge of the desired attributes of what to tune into. The recording appears to be associatively organized, making it possible to move attention associatively from one event to another in time and space based on specific attributes. Difficult to understand, future events also appear to be part of the record, as evidenced by precognitive clairvoyant perception. This record has been called by various terms, for example, the "skein of time and space" at times by Edgar Cayce (Cayce & Cayce, 2004) and the "Akashic record" by Cayce and others (e.g., Barrington et al., 2005; Graboi, 2024; Laszlo, 2004; Leadbeater, 1903/2009). After reading the many documented reports by Ossowiecki (Barrington et al., 2005) and Croiset (Pollack, 1964), the existence of some such kind of information record "out there" is difficult to deny. If such a record does exist, it must have a data structure; it would presumably be recorded in *some format* (the term "Akashic format" comes to mind). Is this the same format of all psi-encoded information?

Hypotheses In Retrospect

Three hypotheses were proposed early in this discourse. The first addresses the data structure of psi-encoded information, suggesting that it lacks a high-level information component. The second pertains to the visual perception of psi-encoded information, asserting that during psi perception, the visual system typically operates as if effective access to high-level visual cortical information is attenuated, leading to an inability to name objects. The third hypothesis asserted that psi information originating from a telepathic sender and psi information perceived through clairvoyance, without an active sending agent, share the same data structure. Given the evidence from diverse related areas that have been examined after positing the three hypotheses, an initial assessment of their validity can be made.

Hypothesis 1: Absence of High-Level Meaning in Psi-Encoded Visual Information

Hypothesis 1 states that *received psi information that enters the visuo-cognitive system of the brain does not include high-level information, including information about the integration of basic visual features into specific objects, symbols, and their names. The visual and cognitive system used to perceive psi-encoded information is responsible for organizing and assigning high-level organization and meaning to raw sensory features communicated by psi-encoded*

information.

Hypothesis 1 is supported by free response data in visual telepathy experiments, as seen, for example, in Figure 1 and in the work of Warcollier (1948/2001), Sinclair (1930/2020), Swann (1991/2017), and others. "Shape, form, and color are described much more reliably than the target's name, function, or other analytical information" (Warcollier, p. xix). Typical "partially correct" responses contain a number of correct or approximately correct visual features at relatively low levels of organization which are perceived either as free-standing features or organized into partial or incorrect objects. Incorrect object recognition is also seen in the case of visual agnosia and tachistoscopic perception. In these types of perception, some low-level visual features are perceived, but accurate information that defines their higher-level organization into specific objects is absent.

If the visual information in a telepathically sent psi-encoded message does include usable information about higher levels of visual feature organization, including information about more complex organizations of features into specific objects, symbols, and their names (information present in the mind of the sender), receivers of this information would be expected to know and/or draw the correct objects and name them with greater accuracy than has been found experimentally, and the naming problem would not be expected to be such a widespread issue in recognition of psi-encoded visual information.

Hypothesis 1 appears to be provisionally supported *under certain conditions.* It appears to be true in the case of experiments in which visual images constitute the psi-encoded information which is communicated and which is decoded by the visual and cognitive processing system. It appears to be the case, however, that other non-sensory channels are available (for example, in claircognizance) which can decode high-level cognitive information in the data structure of psi-encoded information.

Hypothesis 2. Functional Disconnect of Higher Cortex in Psi Visual Perception

Hypothesis 2 states that d*uring the perception of psi-encoded visual information, the receptive apparatus in the brain that detects low-level visual features of psi-encoded information is, to some extent, functionally disconnected from the higher-order "top-down" processing that normally participates in the integration and recognition of these features*.

In mental imagery, low-level visual features are activated "top-down" starting with activation of the high-level object or scene being visualized. For example, visualizing the Eiffel Tower would activate a similar set of neurons in the visual system hierarchy (but not the retina) which would be activated as if the Eiffel Tower itself or a picture of it were viewed with open eyes. Functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) studies have shown that regions such as the primary visual cortex (V1), as well as higher visual areas from V2 up to the temporal lobe, can be active during both seeing and imagining visual objects (Bartolomeo, 2002; Kosslyn et al., 1997; Pearson et al., 2015). Above the visual cortex, both visual perception and mental imagery engage parts of the parietal lobes and frontal cortex. These areas are associated with higher-level cognitive functions, including attention, memory retrieval, sensory integration and spatial manipulation, which are important in constructing mental images. The areas activated in visual perception and mental imagery overlap, but the intensity and extent of activation in visual perception typically result in stronger and more extensive activation, particularly in the primary visual areas, due to direct sensory input. Some non-overlap between the two processes was also noted (see Ganis et al., 2004).

By contrast, when visual information is acquired from a remote psi-encoded source, it does not originate from the activation of high-level information resident in the percipient's cognitive system, but rather, the percipient must acquire, decode and direct the relevant low-level visual feature information associated with a remote source into the visual system hierarchy.

The high cortical level cannot be involved directly in processing psi-encoded information because it is the level at which object naming normally occurs and object naming of psi-encoded visual information typically fails. This suggests that pre-processed remotely acquired psi-encoded visual information is interfaced to and weakly activates a portion of the early to intermediate visual cortex (V2 – V5), and the activation is typically too weak to allow normal object recognition processes to function effectively. As found in mental imagery, activation of the primary visual cortex (V1) would not generally occur except in cases where very detailed image generation is involved (Kosslyn et al., 2001; Kosslyn & Thompson, 2003; Mazard et al., 2004).

It may also be the case that during psi perception, all the psi-encoded information is not present at the visual interface at the same time, and when a location in an image is re-attended, the visual information for that area must be re-acquired – a recurrent "on-demand" process. Psi visual perception is made more difficult because the intensity of the imported visual features is typically very low, making specific visual features harder to perceive, requiring more attentional resources, effort, and time to discriminate them from the background. Further adding

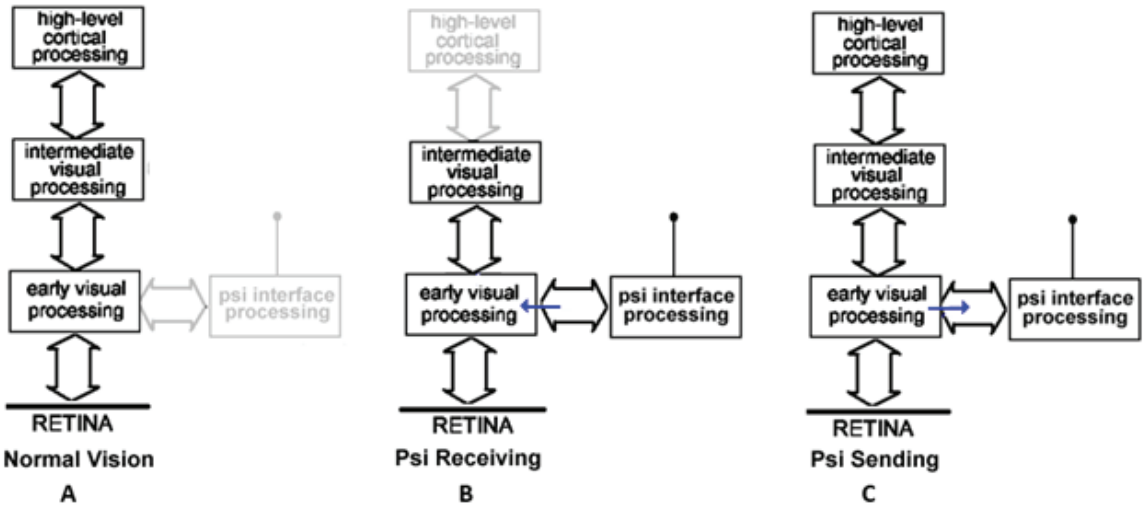

Figure 6. Simplified illustration of normal visual processing and proposed psi visual processing. In the absence of attentional focus to relevant psi information, visual processing occurs normally, as illustrated by the visual information processing diagram in A. The double arrows indicate normal bidirectional top-down and bottom-up processing of neural information. However, when relevant psi information is present and given attention, the "psi interface processing" brain center is assumed to become strongly activated, sending visually decoded low-level feature information to early levels of the visual processing system, indicated by the blue arrow in B. This input adds to and competes with the normal processing flow of visual information. Visual information hypothesized to be devoid of high-level semantic information comes from the psi interface processing area. This area is conceived to be a brain region where psi-encoded information is received from an external source and is decoded into visually coded neural signals which feed into the visual neural hierarchy, resulting in conscious perception of visual shapes, color, motion, etc. Their organization into recognized objects and names is problematic due to the typically poor quality and accessibility of features in the psi neural visual footprint. Panel C illustrates a concept for information flow during telepathic sending of visual imagery generated primarily by top-down signal flow from high-level cortex, activating lower visual system levels and conscious visual experience. There is an absence of high-level information in the outgoing signal. An "antenna" connected to the psi-to-brain interface area symbolizes connectivity with the larger psychic environment.

to the difficulty, the features of a received psi-encoded image do not persist for long. The psi-encoded information available to the receiver usually fades entirely within no more than a few seconds. In a process like this, the best strategy is to simply try to remember any distinct visual feature impressions, such as basic shapes and colors and their relative locations in the field of view. Trying to put a name to what is being seen, given the impoverished visual information available, would take resources away from perceiving what is actually there, further decreasing the useful information available.

In the case of higher-quality received images, visual information would presumably be received with greater intensity and contrast, greater persistence, and greater activation of V1. This would provide finer detail with increased vividness, and the more robust activation of the lower and intermediate visual hierarchy would allow more normal bidirectional processing flow between high cortical levels and lower visual levels, allowing the percipient to use high-level cognitive resources more effectively to organize and name what is seen. Figure 6 illustrates potential neural processing for normal vision, psi-encoded visual information processing, and psi-encoded visual information generation in a telepathic sending situation.

In the figure, an as-yet unidentified brain area is assumed to be an interface center for detecting and decoding ("demodulating") psi-encoded information into neurological signals compatible with sensory and cognitive neural processing. It is tempting to speculate that this psi-to-brain interface region is not located in the higher cortical areas responsible for high-level cognitive processing of abstract symbols and ideas that developed late in evolution but is located in the older brain in evolutionary terms. The actual mechanics of the interface between the brain and the external psi-encoded information are unknown at this time. It is possible that psi information to neural information transfer occurs at the quantum level, as theorized by Hameroff and Penrose, 2014.

Venkatasubramanian et al. (2008) found significant activation of the parahippocampal gyrus in an interesting pilot study using fMRI to detect active brain areas during telepathic reception. This region, which is involved

in memory encoding and retrieval, is part of the limbic system deep in the brain and includes the hippocampus, amygdala, and hypothalamus. The psi information interface brain center is assumed to be responsible for decoding the "native format" of psi information into a sensory format compatible with processing centers in the visual system hierarchy. In Figure 6 B, the psi interface becomes active, which feeds decoded visual psi information into low levels of the visual system, where it is assumed to temporarily rival and add to the activation in these areas to some extent. Normal visual system bottom-up flow to the higher cortical areas would be modified by this additional neural activity. During a brief time period a percipient whose attention is focused at this level would consciously *see* psi-originated visual features.

Figure 6, C illustrates the pathway operating in the reverse direction when a sender is "broadcasting" visual imagery. The imagery originates top-down from higher cortical levels and activates lower levels of the visual system, causing visual details in the imagery to be perceived consciously. Activation from these lower levels acts as a source of activation into the psi interface, where the neural information is converted into psi-encoded information. Again, this might entail a conversion of the neurally encoded information into quantum-level encoding. In this conceptualization, the visual information channeled into the outgoing psi interface does not include high-level cortical "naming" and other high-level symbolic associational information.

In the foregoing formulation, an independent visual and cognitive apparatus, an independent "second consciousness" as Swann suggested, is not present. The fact that clear perception of psi-encoded information is possible when the signal-to-noise ratio is improved due to the strength of belief, intention, etc., of the sender and/or receiver further suggests that *psi-visual perception makes use of the normal visual perception anatomy*. It is assumed that a separate area in the brain is dedicated to the initial transduction of psi-encoded information, which is converted and projected into the visual cortex. Conversion of one form of information (for example, high-level semantic information in the higher-order associative cortex) into another form of information (for example, visual or auditory sensory information in the primary visual or auditory cortices) is something the brain routinely does – for example, the processing that occurs when one it asked to "visualize the Eiffel Tower" demonstrates a conversion from auditory to cognitive to visual information. When a person "hears" a song in their head or engages in inner speech, their brain is converting semantic or conceptual information into auditory sensory information. The auditory cortex is involved in generating these internal sounds.

Hypothesis 2, which asserts that there is a functional disconnect between higher cortical processing and lower-level visual feature processing in the perception of psi-encoded visual information, is supported if for no other reason than the fact that the visual information available from psi-encoded information to lower levels of visual processing is generally of low quality, which in itself makes the connection with correct high-level information problematic.

Hypothesis 3. Uniform Data Structure of Psi-Encoded Information

Hypothesis 3 states that *all visual psi-encoded information, whether sourced by visualization in a sender's mind, or directly viewed by a sender, or whether its source is a passive environment with no active sender, whether the information source is in real-time or in the past or in the future, has the same general data structure.* This hypothesis is based on an implication derived from the similarity of behavioral and introspective evidence in the two modes of psi communication. The hypothesis suggests the possibility that forms of information transfer arising under such apparently different means of production (sender vs. no sender) can have an identical data structure. A radically different worldview than our current paradigm would be needed to allow for such a possibility.

In an alternative worldview, there is no physical movement of information, and all psi-encoded information is *always everywhere.* In this world view physical and mental universe emerges from a foundation of *information* which is effectively distributed like the information in a hologram throughout what our limited sensory-cognitive systems perceive and conceive as extensions in space and time. It will be remembered that each region of a holographic film contains the whole image, suggesting the whole is contained in every part. This basic worldview is found in schools of Buddhist, Hindu, and Taoist philosophies, among others, and is now making inroads into Western thought. The general idea is that a "deeper reality" exists outside the ordinary experience of reality shaped by our sensory perception and cognitive constructs – a "deeper reality" based on *universal consciousness*. In Western science, physicist David Bohm(1980) proposed the concept of the "implicate order" in which the physical universe is conceived as taking instructions from information exported from a kind of hologram where every part contains information about the whole. A branch of physics and philosophy called "Informational Realism" exists in which *information* is viewed as the primary substance of the universe instead of matter. Physicist John

A. Wheeler's (1989) famous catch phrase: "it from bit," succinctly expresses this concept — "it" referring to all the matter-energy that comprises the universe and "bit" meaning *information* (for additional discussion, see, e.g., Bohm & Hiley, 1975; Gober, 2018; Graboi, 2023, 2024; Radin, 2006, 2009; Talbot, 1992; Targ, 2012; Wheeler, 1989). In such a universe, the data structure of its primary substance, information, could reasonably be expected to be the same across all modes of communication, including telepathy, where there is an obvious sending agent, and clairvoyance, where there is not. It is not reasonable to claim any ability to assess the validity of hypothesis 3 at this time. Its value is to suggest a possibility that may deserve consideration in the context of the next paradigm.

CONCLUSION

An implicit assumption about the perception of psi-encoded information is that we are continuously bathed in a "field" of psychic information which exists in a "deeper" and "more subtle" dimension outside the constraints of physical space and time. Swann referred to this as the "second reality." Our information-processing brains have the ability to tune into specific information resident in this "field" where it is expressed as neurally encoded information compatible with our sensory perception and cognitive anatomy. And our working brains also inject information into this "field." The term "field" is quoted because the information in it "does not fall off with distance, nor is it associated with energy in the usual sense. Possibly the notion of field should be widened or, at the quantum level, we should be talking about pre-space structures, or about algebraic relationships that precede the structure of space and time." (Peat, 1995, p. 3).

Examination of the naming problem has brought us closer to understanding perceptual factors in psi-encoded information reception – a unique mode of perception. With regards to the visual sense, it resembles mental imagery in that there is no direct stimulation of the retina with light, yet there is a conscious perception of visual features. Unlike mental imagery and more like normal vision, it is not sourced from the activation of high-level "top-down" cortical information. Rather, it is sourced from psi-encoded visual information, which appears to be available to the visual system in the form of low-level visual features. In many experimental contexts, information regarding the higher-level organization and meaning of these features does not appear to be contained in the received psi-encoded data.

It has been proposed that the visual perception of psi-encoded information is mediated by activation of the existing visual system anatomy at relatively low levels above the retinal level (Figure 6). During the generally brief periods when psi visual perception is active, high cortical levels in the visual processing hierarchy are often unable to perform accurate object recognition. This inability has been termed "the naming problem."

Specific factors that appear to contribute to the naming problem are (1) low resolution of psi-decoded visual data; (2) low intensity and contrast of psi-decoded visual data; (3) psi-decoded visual features are not available to the visual system as an entire image with all features aligned to show their spatial relationships. Successive fixations of covert visual attention are needed to detect one or a few low-level visual features at a time; (4) the perceived psi-decoded visual data do not persist. Received visual information typically requires a number of fixations of the spotlight of covert visual attention totaling a few seconds. These factors limit the number of distinct spatially aligned low-level features that can be extracted in the time available and integrated for object recognition. As found in tachistoscopic recognition experiments, the extracted visual information is often insufficient to allow accurate object recognition and naming.

Using cognitive resources to attempt to identify or name objects or symbols in received psi-encoded information takes attentional resources away from the process of perceiving and remembering the visual features that are detectable during the time they are available. Additional factors which contribute to the naming problem may include: (5) a lack of high-level information in the received psi-encoded data. For example, if the psi data included the notion of "hat" in Figure 1, the drawing made by the receiver would likely have been more accurate; (6) attention to each successive location in the received image may disrupt the memory trace of previously attended visual information in the perception process, a "visual information masking" effect.

Some individuals perceive received imagery in more detail (i.e., with higher resolution) than others. An analogous variation across individuals in perceived image resolution occurs in mental imagery. Good imagers see their images with more detail, and in such cases, fMRI data has shown that more of the visual system is activated top-to-bottom, including V1, the level that receives input directly from the retina and which produces the highest perceptual detail (Kosslyn et al., 2001; Kosslyn & Thompson, 2003; Mazard et al., 2004). A reasonable assumption would be that high-functioning psychics, like good imagers, have the ability to activate more of their visual system, including V1, during the perception of psi-encoded information.

Psi information may be *initially acquired* into the sensory-cognitive apparatus via a "second consciousness

that integrates with the second reality *and* with the physical as well, (Swann, 1991/2017, p. 51; emphasis in original)." After initial acquisition, the psi-encoded information is assumed to be decoded into sensory and cognitive neural information units appropriate to the receiver, followed by the use of normal processing methods found in all sensory pathways. The decoded visual information is assumed to be projected to and processed by largely the same areas of visual processing within the visual cortex which are activated in the process of mental imagery and visual perception. Since fine detail is not typically perceived, the data from visual imagery research suggests that the visual system areas involved would not typically activate V1 strongly, the primary visual cortex. In cases where fine detail is perceived, V1 would be activated more strongly. Thus, the naming problem with its concurrent lack of fusion effect can be explained in terms of mental imagery and normal perception, which are degraded due to the enumerated factors discussed above without the need to postulate a substantially independent visual processing pathway.

Although the naming problem supports the possibility that psi-encoded information lacks high-level information, such as object names and their function, other psi-receptive modes, such as claircognizance, suggest that high-level information can be communicated in psi-encoded data. The question of the conditions in which received psi-encoded information can or cannot contain such information deserves further investigation. Investigation of the characteristics of psi data structure in different contexts can help in the formulation of a new paradigm in which psi phenomena are understood as part of the natural order. Investigation can be pursued experimentally through analyses of behavioral and physiological data, analysis of reported cases, introspective data, and by using brain imaging techniques such as fMRI to understand the interplay of brain areas involved in psi perception. Venkatasubramanian et al. (2008) have demonstrated the feasibility of using fMRI technology to study telepathy in a preliminary study. Introspection as a tool to investigate psi communication and perception should not be discounted. An example of the value of introspective data in understanding the dynamics of psi perception has been presented.

A radio can have poor reception either because the incoming signal at the antenna is too weak and/or noisy, or because the radio that processes the incoming signal in the radio performs poorly (or a combination of both). Since high functioning psychics can have "lucid states (Barrington et al., 2005, p. 44)" this suggests that the incoming signal to every brain is adequate, and the issue of the naming problem is the result of factors in the neural processing system of the percipient. The naming problem, therefore, appears to be due more to perceptual dynamics than to the dynamics of psi-encoded information propagation through spacetime.

In practical terms, in order to maximize performance in visual psi perception phenomena, the typical percipient should avoid using intense guesswork to integrate the few barely perceived and remembered low-level visual features in what is received. Rather, the percipient is well-advised to take Ingo Swann's advice, "[When you can achieve] a detached poise, a sort of disinterest ... the core ESP processes will work their best" (Swann, 1991/2017, p. 124), and Lori Williams' advice, "describe don't identify" (Williams, 2020), and Russell Targ's advice, "Don't try to name it" (Targ, 2012, p. 223).

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RESEARCH ARTICLE

Colored Fields of Light Surrounding Living Organisms: Responses to Magnetic Fields and Mental Attention-A Unique Case Study

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PLATINUM OPEN ACCESS

HIGHLIGHTS

A young boy reported seeing dynamic energy fields around people that changed with magnets and mental focus, and blinded experiments confirmed consistent interactions between these fields and magnetic poles, suggesting a novel and unexplored phenomenon.

ABSTRACT

A 14-year-old boy reported perceiving transparent colored light fields surrounding human and animal bodies. With drawings and verbal descriptions, he explained the phenomenon in detail. The left side of the body was covered with a transparent blue, and the right side was covered with transparent red, reaching 0.5–2 cm outside the skin. The blue field was attracted towards the north pole of a bar magnet and repelled from the south pole in 127/130 randomized, single-, and double-blind trials (30). The red field showed opposite results in a few pilot experiments. An additional outer rainbow-colored field extended 20–50 cm from the body responded to the magnet in the same way as the inner field in 50/50 trials. Notably, these fields seemed responsive to cognitive focus, with thin red and blue spirals emerging at different heights on each side of the body. The boy also identified "thought-forms" as cognitive-dependent extensions of the fields at the ends of these spirals. In an extraordinary example, a right-leg amputee secretly visualized having a healthy leg and foot. The boy reported seeing a healthy limb in red light projecting as an extension of the right-sided red "Inner field". These initial results suggest: (1) the boy's perceptions are not mere illusions, (2) the body possesses polar asymmetry along the left/right axis, and (3) significant influences of cognitive states on these fields exist, even over distances beyond the limits of the body. This case study is remarkable in its level of detail (including original illustrations) and in the experiments performed to assess their validity. We call for interdisciplinary exploration into three key areas: (a) unraveling the nature and sensory basis of this extraordinary perception; (b) uncovering potential physiological or physical processes enabling such experiences; and (c) understanding the mechanisms facilitating the generation of these extended fields, as influenced by cognitive states.

KEYWORDS

Acupuncture, biofield physiology, body asymmetry, magnetic sensing, perception, sensory system, synesthesia, psi-track, thought-form, visual system.

INTRODUCTION

In this experimental case study, we describe the observations of a 14-year-old boy named Pontus (now an adult whose permission was obtained to reveal his name) who purportedly perceived colored fields surrounding living beings. The fields were dynamic, transparent, and most "visible" to him when in proximity (0.3–1 meter) and when sufficient mental focus was committed.

In 1987, one of the authors, G Andersson, became curious about what the dowsing technique could reveal about the human body. He began to explore the task and made two remarkable discoveries: (1) a response about 0.2–0.5 meters outside the skin, resembling a field all around the human body, and (2) when a person focused in a specific way on an object, an extension of the field was detected, reaching toward the object. This extension was called "thought-track" or "thought-field." The discovery opened the door for the elusive to be systematically investigated by two scientists (Jacobson & Tellefsen, 1994). They changed the name of the discovered phenomenon to "psi-track." In the summer of 1989, Andersson encountered Pontus, who lived in the same rural area of central Sweden. The discovery of Pontus' ability was serendipitous. Andersson was with well-reputed local dowsers, investigating if their technique responded to the human body, when Pontus and two other teenagers approached and asked what was happening. While Andersson explained, Pontus inquired: *"Could it be the same thing as I see surrounding bodies? It looks like a rainbow, but it is not".* While there was no reason to doubt the young boy's spontaneous, naïve response, his sincerity could have simply been a by-product of an active imagination. In search of objective verification, Andersson introduced a bar magnet, which he pointed at the periphery of the color phenomenon. To his surprise, Pontus immediately exclaimed in astonishment: "*The field is sucked out towards the magnet!".* When Andersson turned the bar magnet 180°, Pontus claimed instantly: *"Now it is pushed away from the magnet."* The revelation provided an avenue for systematic, objective investigation. All involved participants were non-academics and unfamiliar with any literature relevant to the findings. The original protocols and illustrations, meticulously preserved by Andersson, were thoroughly reviewed by author Marie Ryd, who now safeguards the original data. Between 2015 and 2022, Ryd collaborated with Andersson and extensively interviewed Pontus, Pontus' family, and other contemporary witnesses. Andersson's documentation of these events exists in books and magazines (Andersson, 1994, 2010, 2012; Andersson et al., 2013). This manuscript consolidates all available original data, even previously unpublished details. Recognizing that selective reporting of the information may bring it out of context and risk data misinterpretation, we made a conscientious effort to keep the content as unadulterated as possible.

The study has two aims: (1) to document a young boy's unique perception of extraordinary "light" phenomena, and (2) to test the null hypothesis that the boy's report of perceived changes in light fields (attraction vs. repulsion) in response to varying poles of a magnetic bar (north vs south) was due to chance.

To our knowledge, no documented case in scientific literature couples the detailed reporting of a rare human "gift" (for seeing living fields) with quantifiable, objective assessments through repeated experimentation under different conditions. We hope this detailed documentation will inspire more people with similar capabilities to come forward and possibly contribute to the broader scientific understanding of rare perceptions and underexplored biophysical fields.

METHODS AND RESULTS

The study comprises three sections. Section 1: Pontus' observations, Section 2: Testing the observations with a magnet, and Section 3: Other ways of perception.

Section 1: Pontus' Observations

The young Pontus was surprised by Andersson's interest, as no one, not even his family, was aware of his extraordinary "visual" ability. He had assumed that everyone shared the same experiences. Although he spoke of these visual features being common to all living beings, the descriptions provided herein were limited to those present during the study – the persons physically present, his horse, and the family dog. Pontus was asked to describe his visions in detail using words and drawings. Andersson developed more detailed illustrations based on Pontus' descriptions and thorough corrective feedback. We retained Pontus' original wording (*italicized*) and the now somewhat faded illustrations as much as possible to convey his narratives and experiences accurately and without any external influences.

Pontus' General Perspective of His Perception

Pontus put himself into a mental state of relaxed focus, and within seconds, he described different patterns of transparent colors. He needed to be within one meter to perceive details clearly, or as he stated, "*to see it*". He compared their general appearance with "*the vibrating air above the road on a hot summer day"* (Andersson, 2010, p. 30). The studies were performed in daylight during the Swedish summer when complete darkness is difficult to

achieve. Thus, whether the phenomenon existed in the darkness and Pontus would have been able to see it then is unknown. When blindfolded or with eyes closed, Pontus claimed to see nothing.

Pontus named and described four significant patterns of dynamic transparent colors:

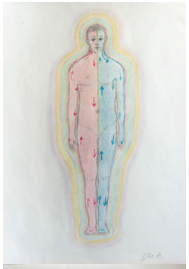
The "Outer Field". A wider rainbow-colored field surrounds the whole body, extending 20–50 cm beyond the skin (Figure 1). Pontus explained: *"It is transparent and has the colors of a rainbow, but it is not a rainbow. It is surrounding the whole body."* He readily described without hesitation the color order as seen in a cross-section: *"Closest to the body is a red ring followed by, in appropriate order, rings of green, blue, red again, yellow, orange and purple."* Pontus added: *"Every living entity has the same sort of colors, but the size of the field surrounding them can vary between different individuals. Regarding humans, some individuals have a rather large transparent colored field, while others have much smaller."*. Pontus noticed on several occasions that the quivering "Outer field" lingered in space like a rainbow-colored imprint or "shadow" of the person after he/she left. *"It is like a transparent copy of you Göte, in rainbow colors, however less bright than the one around you."* When Pontus' younger brother Lucas, eight years old, and Andersson placed themselves facing opposite directions, left-to-left, a couple of decimeters in between, their fields were *"pushed away"* from each other. When they stood side-by-side, their fields were *"sucked towards"* each other. The procedure was repeated with an 8-year-old friend of Lucas, with the same result. During this observation, Pontus suddenly discovered another closer to the body light phenomenon. He called it the "Inner field".

The "Inner Field". A near-body field extending 0.5–2 cm beyond the skin throughout the whole body (Figure 1). Pontus explained: *"If you take a vertical line from the crown of one's head to the crotch, the body is split into two halves—the left side of the body and the right side of the body. The right side is red-orange, and the left side is blue. In between, there is a vertical line that is luminescent green. It is like a spiraling flow from the top of the head to the abdomen."* Andersson was careful not to pose leading questions. However, at this point, he inquired: "Where does the green field come from?" Pontus replied, *"It might be coming into the head from above, but I am not sure."* The transparent red-orange and blue fields cover each half of the body, and he added: ***"... they kind of move in two separate circles in opposite directions".***

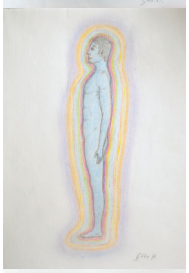
The "Extended Field." When focused intently on an object, a person's Inner and Outer Fields could extend toward the target, ending there (Figure 2). Pontus termed this person the "sender" standing at the "sender place" generating extensions, i.e., an "Extended field." This dynamic required the sender to be in firm, focused attention, with a clear inner visualization of the object attached to a warm emotion, a state easy to achieve for Andersson, who is also an artist. Eyes could be open or closed. The field extension was challenging to establish when the mind was scattered or distracted. However, since this was not investigated systematically, it is possible that other unaccounted factors could have also interfered.

The "Extended field" turned out to be novel to Pontus. He discovered it when Andersson secretly focused on Pontus' horse grazing 20 meters away, but without telling him. After a short while, Andersson asked Pontus to look at Andersson's "Inner" and "Outer" fields. Pontus exclaimed: *"There is a track extending out from your "Outer field" pointing toward my horse! It is like a rainbow-colored cone with its base along your body becoming a narrow tunnel further out from the body!"*. Pontus concluded that the field terminated at the horse. Through repeated procedures, he could map the phenomenon. He described it as seen from the front: *"In the moment you start to focus on something, I see "swirls" in the red-orange and blue light on your front side, five "swirls" on your red-orange side and five "swirls" on your blue side."* They appeared pairwise approximately at the following heights: head, chest, navel, groins, and feet.

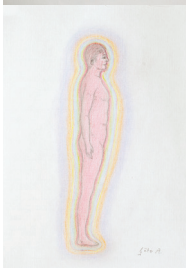
Figure 1. The "Outer Field" surrounding the "Inner Field".



1a
The wider rainbow-colored "Outer field", extending 20–50 cm beyond the skin, is surrounding the red-orange/blue "Inner field" reaching 0.5–2 cm outside the skin. Clockwise movements of colors within the "Inner field", as indicated by the arrows. Between the red-orange and blue, there is a luminous green color extending from the top of the head to the crotch.



1b
Both fields seen from the left blue side.



1c
Both fields seen from the right red-orange side

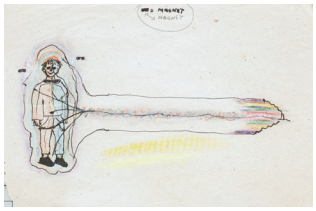
Note. Illustrations by Göte Andersson made from detailed descriptions according to, and confirmed by, Pontus.

A green "swirl" was also formed approximately at the solar plexus emanating from the central vertical green line (Pontus hesitated somewhat on the exact heights of the spiraling phenomena). Altogether, 11 "swirls," five blue, five red-orange, and one luminescent green, were formed. From an angle side view, he observed a thin spiral formed in each "swirl", spiraling outwards. At approximately two meters from the person and 85– 90 cm above ground, at an area below Andersson's navel, all 11 spirals merged and twisted into one thick spiral. The quivering transparent rainbow-colored tunnel-shaped field gradually surrounded the red-orange/green/blue spiral. The tunnel, seen from the front, had a circular shape with an outer diameter of 0.3–1 meter. It was again striking how quickly Pontus reported the sequential order of the seven rainbow-like colors constituting the tunnel. The colors did not follow the order of the rainbow spectrum but matched the order previously described in the "Outer field". When Pontus was standing close to the target, he described: "*The twisted thick spiral comes first, the surrounding colors appear one at a time with a delay.*" The twisted spiral unbraided, with each of the 11 thin spirals meeting with the corresponding "swirls" on the object's bodies (horse and humans). The surrounding multicolored tunnel seemed to merge with the "Outer field" of the object. As Andersson stopped focusing, the spirals disappeared, leaving a hollowed rainbow-colored field, like an "*empty tunnel*" that remained connected to the object while it moved.

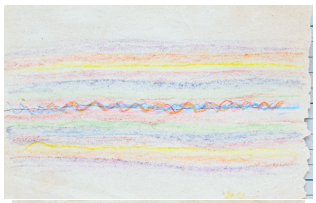
With Pontus blinded, Andersson created "Extended fields" for various objects, some in immediate proximity and some at long distances. Pontus successfully identified them by following the "light" patterns. In several tests, people were asked to hide themselves. In one instance, Pontus' younger brother Lucas, eight years old, went to hide outside. Andersson remained inside and acted as the sender, focusing on Lucas. Pontus remained with Andersson. When Pontus discovered the "Extended field," he immediately went to the wall through which it had penetrated. Pontus then laughed, saying that Lucas seemed to struggle to find a place to hide as the field with the spiraling center moved and changed directions several times. When stabilized, Andersson stopped sending, and they proceeded outside. Pontus followed the now empty tunnel field. It ended in another house where Lucas also hid. Lucas was asked which path he had taken. It matched the earlier movements of the "Extended field" as Pontus had seen on the inside wall.

When Andersson stopped focusing or if his attention wavered, Pontus made some critical observations: (1) The red-orange/green/blue spirals immediately vanished. (2) The quivering tunnel-shaped rainbow-colored field appeared "empty" and lingered for about 0.5–1.5 hours,

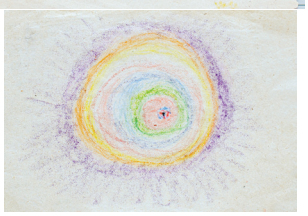
Figure 2. The "Extended Field" and its Dynamics (2a–g).



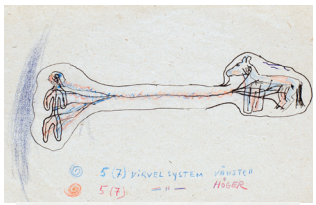
2a. View at an angle. The red/blue "Inner field" and its pair-wise extending spiraling phenomenon at 5 levels illustrated as black lines. The spirals are twisted together at ≈2 meters distance from the body. All surrounded by a rainbow-colored tunnel shaped field, its outer border illustrated with a black line.



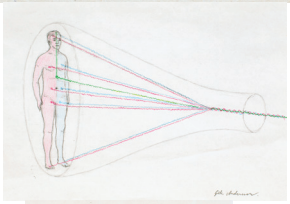
2b. Close-up and side-view of the "Extended field" observed at least 2 meters ahead where the central red-orange, green and blue spirals are twisted together



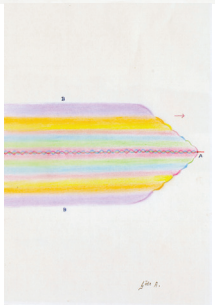
2c. Front-view of the "Extended field" observed at least 2 meters ahead, showing the multicolored circular field, like a tunnel, surrounding the inner spiraling phenomena.



2d. Andersson as the sender, focusing on a horse 20 meters away, depicting the "Inner Fields" of both the sender and the horse. Black lines represent the spirals emanating in pairs from five levels, converging after ≈2 meters, and diverging towards the corresponding positions on the horse. The border of the rainbow-colored tunnel is indicated with a black line.



2e. View at an angle. The 11 red-orange and blue spiraling "threads" extending out from swirls in the "Inner field", and the vertical green luminescent line spiraling out from the solar plexus area. The "Outer field" forming a cone only illustrated with a black line at its border.



2f. Close-up side view of the circular "Extended Field." The now non-polar intertwined spirals form the tip that points toward the target, surrounded by a quivering multicolored field.

2g. Front-view of the "Extended" field observed at least 2 meters ahead, showing the multicolored field, like a tunnel, surrounding the inner spiraling phenomenon.

Note. Illustrations by Pontus (a–d) and Göte Andersson (e–g) made from detailed descriptions according to, and confirmed by, Pontus.

slowly fading away. (3) A "copy" of Andersson's own "Outer field" remained as a rainbow-colored "shadow" at the spot where he had been standing.

Three other individuals were tested for their ability to generate "Extended fields": Pontus' younger brother Lucas and the dowsers KEJ and AA. Secretly selected trees in the forest (Lucas and KEJ) and a hidden wristwatch (AA) were chosen as target objects in the immediate 360° surroundings. Lucas and KEJ were instructed to look intensely at their selected tree for a few minutes. KEJ was also asked to visualize himself hugging the tree. AA visualized his wristwatch. The sender left, and Pontus entered the experimental area. He readily perceived the empty tunnel of the "Extended field" from all three, as demonstrated by finding the specific objects on the first try. Pontus noted that Lucas' tunnel was less bright.

"Thought-forms." A remarkable serendipitous discovery was made at the end of the Extended Field. The spiraling light patterns could manifest into the form of a particular person, an animal, or an object based on focused imagery sourced from the sender. This was termed a "Thought-form". Andersson strongly visualized himself or another desired object in an open area. A "Thought-form" began with the appearance of a formless pattern, which steadily morphed into a form at the chosen spot. The final form was composed of transparent light - one half in red-orange (connected to the red-orange spirals), the other half in blue (connected to the blue spirals), and always with the green in between (connected to the green spiral). Faint rainbow colors developed and surrounded it. Like the spirals, the inner colors were only present during mental focusing, while the rainbow colors lingered, becoming weaker in intensity with time. The work with Thought-forms and how they emerged are exemplified:

- *A copy of Andersson made by Andersson - the Discovery*. Pontus' brother had a predilection for migraine attacks. Andersson created an "Extended field" from a secret location irrelevant to Pontus or his brother, 30 km away. At a scheduled time, at home with his brother, Pontus was asked to report from which direction the "Extended field" was coming and to make marks in the ground. Andersson also visualized holding Lucas' head with his hands. The following day, Andersson checked the direction of the marks and discovered they were pointed towards the sender's position. To both their surprise, Pontus had also seen a transparent "copy" of Andersson's body standing beside his brother with its hands on his head. *"It also has the Inner field in red-orange/blue."* Notably, despite the 30 km distance, there was no attenuation of the field's colors and brightness.
- *A long-distance salute*. Andersson repeated the experiment while visiting Stockholm, 400 km east. Neither Pontus nor his family knew where Andersson was located during this experiment, even unaware that he was traveling afar. Andersson called Pontus from a telephone booth. They agreed that Andersson would visualize himself standing on the staircase outside the front door of Pontus' home. The task for Pontus was to detect the direction of the incoming "Extended field" and the form at its end. Pontus went outside, and Andersson secretly visualized himself standing at the front door of Pontus' house. Pontus checked and returned to the phone call and said:" Your *figure is standing in front of the door at the end of a track."* Andersson asked if the figure performed any movements. Pontus went out to check and returned to the phone:" *It is making a salute!*" This was the movement Andersson had visualized himself to do, a gesture he never had discussed with anyone. Pontus was finally asked if the figure and the associated track were less bright than usual, to which he denied: *"It is no different."* A couple of days later, Andersson returned home and recognized that the markings formed a straight line in the direction of Stockholm. Pontus was finally informed of Andersson's correct location.
- *A walking "Thought-form"*. Andersson agreed with Pontus that he would visualize himself at Pontus' home, standing at the court close to a small storehouse roughly 30 meters from Pontus' main front door. The figure was supposed to start moving, but the direction and final goal were kept secret. Sitting close to the phone at his home 15 km away, Andersson began to visualize himself at the agreed spot. He then slowly visualized walking the 30 meters to Pontus' house, up the stairs, passing the front door, entering a hallway, and turning right into a room where he walked diagonally across the floor to a corner where he knew there was a copper bowl. Andersson visualized himself standing still in front of that copper bowl. Pontus described how he had closely followed a "figure" that appeared at the agreed position outdoors, up the stairs and into the house, turning right, into the correct room where he saw the figure move diagonally across the floor to the corner with the copper bowl, where the figure stopped moving. A detail Pontus found peculiar was that the figure had passed straight through the closed front door, which Pontus had to open to follow. The figure was linked to an "Extended field" in the direction of Andersson's home. Pontus claimed that the figure seemed to float as it moved instead of physically walking across the ground.
- *A sheep*. Andersson visualized a sheep standing a couple of meters away. Immediately, Pontus described the

"Extended field" emanating from Andersson as having a formless mass of light at its end. Slowly, it was taking form. Suddenly, he shouted out: *"A sheep is standing there!"* He showed it was three-dimensional by letting his hand trace its contour.

- *An elephant*. To further confirm the validity of the phenomenon, Andersson invited a third person, MBB. MBB was asked to choose any animal for the next experiment immediately before testing to avoid any information transfer between Andersson and Pontus. She chose an elephant. MBB describes in a written report (saved original) how Pontus intensely observed something. His eyes went up and down, and his hand followed something three-dimensional. After a while, he said with astonishment: *"It is an elephant. It is the same size as a real adult elephant with a trunk, tusks, and big ears."*
- *A sphere*. Andersson repeated the procedure, visualizing a sphere. Pontus did not hesitate, stating that it looked like a football. The ball was also divided into red/blue halves.
- *A lost leg – another kind of "thought-form."* The dowser AA had an amputated right leg 10 cm below the knee joint. Without preparing Pontus, the boy was simply asked to look at the limb and describe what he saw. The right side red-orange "Inner field" continued as an unbroken field covering the amputated limb with the exact width of 0.5 – 2 cm outside the skin. When Pontus unexpectedly left the room for 10 minutes, Andersson, on a whim, asked AA to visualize a healthy full-length leg and foot. Pontus returned and was asked to double-check the limb, implicitly to confirm his previous statement. The transparent red-orange field had expanded. He said: *"I can see the full leg! It is transparent red-orange; the inner field has extended to a full leg."*

Other luminous phenomena. Pontus occasionally described, without being asked, other luminous phenomena (Andersson, 2012):

- Plants and trees possess fields of transparent light, forming a three-dimensional cylinder. The red-orange appeared to Pontus as an inner core of the plant, covered by a green light surrounded by transparent blue and the farthest faint rainbow colors.
- The luminous green light of plants can extend outwards as thin "threads". Pontus spontaneously compared this color with the luminous green between the red-orange and blue "Inner field". The observation was tested by Andersson, who broke twigs from trees or leaves from house plants and hid them approximately 20 meters from the mother plant. Pontus was asked to find them. He always started close to the mother plant to localize a green "thread" emanating outwards, which he simply followed to the items. When Andersson hid a leaf on the floor under a cupboard inside a house, the boy had to crawl on the floor to follow the "thread" to the hidden leaf.
- Other green lines, shorter and longer, were detected in the air nearby. *"They are surrounding us,"* he said. They always had the same direction and appeared to him when close. The length of the lines remains obscure due to Pontus' limited perception. They had a north-south direction.
- Once, he found *"a shimmering stone"* in the forest, which had green-blueish nuances and was the size of a football. *"Let us go there,"* he said, eager to show it. The stone was full of holes/bubbles, indicating it could be a volcanic rock type.
- On several occasions, Pontus spontaneously reported perceiving faint rainbow colors around electrical fences surrounding local meadows.
- Once, Andersson presented a bar magnet (10 x 2.8 cm) to Pontus, who described it as covered by fields of weak transparent light, one half in blue and the other half in red-orange.

Section 2: Testing the Fields with a Magnet

An assay was developed with Pontus blinded to a randomized magnet orientation in each trial. The strength of the bar magnet (size 4.7 x 1.3cm) is unclear; they typically vary between 50 and 1000 milli-Tesla.

General design: A bar magnet was fully concealed in an equally sized box. In every trial, the same end of the box was pointed at 90° toward the fields to be investigated, 3 – 4 cm from their outer borders (Figures 3 and 4). Inside, the magnet's north-south orientation was randomly shifted. Randomization was done by a designated person, RP, who flipped a coin: heads=north pole, tails=south pole pointing toward the field. Pontus was never present during the randomization procedure. The room was kept silent (except for in Series 5).

The observed person, OP, stood before a white/pale colored wall wearing a white cotton t-shirt and thin cotton shorts. Pontus positioned himself face-to-face with OP (Series 1– 4). The box was placed and held in the proper experimental position (Figures 3, 4) by OP or a third assisting person (AP).

Pontus focused on the box-field interface, reporting if the field was attracted to or repelled from the end of the box. He was only given one chance to answer, imme-

diately followed by the removal of the box. The answer was recorded as either attraction (A) or repulsion (R). Finally, the box was opened, revealing the actual direction of the bar magnet – the north (N) or south (S) pole facing the field, which was recorded.

Negative control with an empty box was piloted in ten similar randomized, blinded trials (original notes are lacking). The empty box option was unbeknownst to Pontus. When the box turned out to be empty (in 6/10 trials), it correlated with Pontus' claims of no changes in the field. After ten trials, Pontus questioned, "*What is the meaning of using an empty box when nothing happens?*" The empty box control was not used further.

There were no preconceived hypotheses about whether the north or south pole of the magnet would attract or repel the fields. Pontus was not allowed to change his mind. The general hypothesis was that a high congruency in his answers would indicate a systematic perceptual phenomenon rather than a random guess or fantasy. Five series of 205 stand alone trials were performed – one on the "Outer field", three on the "Inner field," and one on the "Extended track field". Four of the series were led by Andersson, and Series 4 was led by an external physicist from Uppsala University who lived in the neighborhood during the summer season. Each Series was performed for one-afternoon session.

Testing the "Outer field"

Series 1. Andersson, OP, also performed the randomization procedure (RP), a single-blind experiment. Andersson held the magnet box with his left hand at the height of the left hip, 30–60 cm from the skin. However, during the piloting experiments, the box was held outside the left arm, as illustrated in Figure 3. The procedure was repeated in 50 trials.

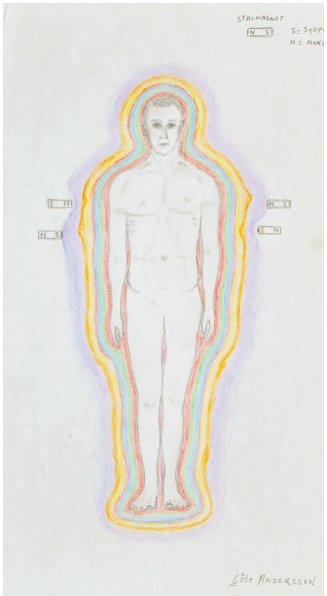
Pontus answered instantly without any hesitations or reasoning in all trials. His observations were 100% con-

Table 1. Results Series 1 Magnet Assay the "Outer Field"

Cumulative Experiments	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pontus's Observation	R	A	R	R	A	R	A	R	A	A
Magnet Direction	S	N	S	S	N	S	N	S	N	N
Cumulative Experiments	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Pontus's Observation	A	R	R	A	R	A	A	R	A	R
Magnet Direction	N	S	S	N	S	N	N	S	N	S
Cumulative Experiments	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Pontus's Observation	R	A	R	A	A	R	R	R	R	A
Magnet Direction	S	N	S	N	N	S	S	S	S	N
Cumulative Experiments	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Pontus's Observation	A	A	R	A	R	A	R	A	R	R
Magnet Direction	N	N	S	N	S	N	S	N	S	S
Cumulative Experiments	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
Pontus's Observation	R	A	R	A	R	R	A	R	A	A
Magnet Direction	S	N	S	N	S	S	N	S	N	N

Note:
A: Attraction towards the bar magnet end
R: Repulsion from the bar magnet end
N: North end of the bar magnet pointing towards the upper left arm of the observed person
S: South end of the bar magnet pointing towards the upper left arm of the observed person

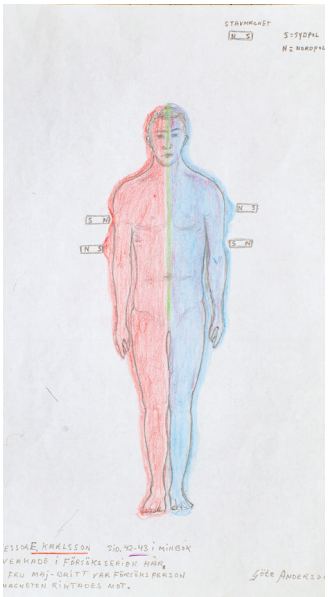
Figure 3. Series 1 Magnet Assay The "Outer Field".



The placement and possible directions (north/south) of the magnet on the experimental left side. On the right side a few piloting trials were performed. The box that holds and conceals the magnet is not illustrated.

Note. Illustration by Göte Andersson made from detailed descriptions according to, and confirmed by, Pontus.

Figure 4. Series 2–4 Magnet assays The "Inner Field".



The placement and possible directions (north/south) of the magnet in Series 2–4 of 130 trials on the left blue field. On the right side a few piloting trials were performed. The box that holds and conceals the magnet is not included.

Note. Illustration by Göte Andersson made from detailed descriptions according to, and confirmed by, Pontus.

Table 2. Results Series 2 Magnet Assay the "Inner Field".

Cumulative Experiments	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pontus's observation	A	A	R	A	A	R	A	A	A	A
Magnet direction	N	N	S	N	N	S	N	N	N	N
Cumulative Experiments	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Pontus's observation	A	R	R	A	A	A	R	R	A	A
Magnet direction	N	S	S	N	N	N	S	S	N	N
Cumulative Experiments	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Pontus's observation	R	A	R	R	A	R	R	R	A	R
Magnet direction	S	N	S	S	N	S	S	S	N	S
Cumulative Experiments	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Pontus's observation	A	A	R	R	R	R	A	R	R	A
Magnet direction	N	N	S	S	S	S	N	S	S	N
Cumulative Experiments	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
Pontus's observation	A	R	A	A	R	R	R	A	A	A
Magnet direction	N	S	N	N	S	S	S	N	N	N

Note:
A: Attraction towards the bar magnet end
R: Repulsion from the bar magnet end
N: North end of the bar magnet pointing towards the upper left arm of the observed person
S: South end of the bar magnet pointing towards the upper left arm of the observed person

gruent: attraction of the rainbow-colored light toward the magnet occurred when the north pole faced the field and repulsion when the south pole faced the field, see Table 1.

Testing The "Inner field"

Three blinded randomized Series (No 2–4), including 130 trials, tested a bar magnet held near the blue inner field around the person's left upper arm (Figure 4).

Series 2. Andersson (OP) also performed the randomization procedure (RP), a single-blind experiment. Andersson held the magnet box with his left hand approximately five centimeters outside the skin of the left upper arm (Figure 4). The procedure was repeated in 50 trials.

In every trial, Pontus answered instantly, without hesitations or reasoning. His observations were also 100% congruent: attraction of the blue light toward the magnet occurred when the north pole faced the field and repulsion when the south pole faced the field, see Table 2.

Series 3. The protocol from Series 2 was followed but in a double-blind manner with an independent third person for randomization (RP) and magnet box placement. The closed magnet box was given to OP (Andersson), wherein RP left the room. The room was kept silent, and extra precautions were taken, such as Pontus wearing a headset and playing music during the whole experiment.

Table 3. Results Series 3 Magnet Assay the "Inner Field".

Cumulative Experiments	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pontus's observation	A	R	R	R	A	R	A	R	R	A
Magnet direction	N	S	S	S	N	S	N	S	S	N
Cumulative experiments	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Pontus's observation	A	R	R	R	A	R	A	R	R	A
Magnet direction	N	S	S	S	N	S	N	S	S	N
Cumulative experiments	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Pontus´s observation	R	A	R	A	R	R	A	R	R	A
Magnet direction	S	N	S	N	S	S	N	S	S	N

Note:
A: Attraction towards the bar magnet end
R: Repulsion from the bar magnet end
N: North end of the bar magnet pointing towards the upper left arm of the observed person
S: South end of the bar magnet pointing towards the upper left arm of the observed person

Again, Pontus answered promptly without hesitation or reasoning for all 30 trials. Also now his observations were 100% congruent as for Series 2, see Table 3.

Series 4. The protocol from Series 2 was followed, and two external persons, RP and OP, were recruited to perform the 50 experiments. RP handled randomization, placing the magnet in the box and holding the box containing the hidden magnet toward OP. Neither were informed about the results from the prior series of trials. Andersson was present and, like Pontus, fully blinded to the magnet orientation.

In 47 of 50 trials, Pontus' observations were congruent in the same way as for Series 2 and 3. He answered instantly, except for the three deviating answers where he hesitated but never changed his mind, see Table 4.

Inner Field Results Summary Series 2–4.

Across 130 total experiments in three series, Pontus' observations were 97.7% congruent (127/130 correct). For Series 4 alone (47/50 correct), the binomial distribution shows the probability of ≥ 47 correct guesses out of 50 trials of random change (50% probability of success) are extremely low ($p < .001$).

Testing the "Extended Field"

The spiraling part of the "Extended Field" was tested with the magnet. The rainbow colors forming the cone surrounding the 11 spirals were only tested in a few non-blinded trials, yielding the same results as the "Outer Field" in Series 1. At this juncture, Pontus was becoming impatient and bored, necessitating the conclusion of the

Table 4. Results Series 4 Magnet Assay the "Inner Field".

Cumulative Experiments	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pontus's observation	A	A	R	A	A	A	R	R	A	R
Magnet direction	N	N	S	N	N	N	S	S	N	S
Cumulative Experiments	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Pontus's observation	A	*R*	R	A	R	R	R	A	R	A
Magnet direction	N	*N*	S	N	S	S	S	N	S	N
Cumulative Experiments	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Pontus's observation	A	R	R	A	A	A	A	R	R	A
Magnet direction	N	S	S	N	N	N	N	S	S	N
Cumulative Experiments	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Pontus's observation	A	R	A	A	R	R	A	R	A	R
Magnet direction	N	S	N	N	S	S	N	S	N	S
Cumulative Experiments	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
Pontus's observation	*A*	A	A	R	*R*	R	R	A	A	A
Magnet direction	*S*	N	N	S	*N*	S	S	N	N	N

Note:
A: Attraction towards the bar magnet end
R: Repulsion from the bar magnet end
N: North end of the bar magnet pointing towards the upper left arm of the observed person
S: South end of the bar magnet pointing towards the upper left arm of the observed person

testing. Andersson acted as both OP and S and was blinded to the direction of the magnet.

Series 5. At the intertwined red-orange/green/blue spirals, starting approximately 2 meters from the body, Pontus detected no response to the bar magnet. This was also the case for the isolated narrow green spiral emanating from the center of the "Inner field" at the height of the solar plexus. However, Pontus noticed magnetic responses for the free-standing blue and the red-orange spirals. A blue spiral was chosen to be tested (Figure 5).

OP/S was sending on a tree 25 meters away. In these single-blind 25 trials, a third person, EH, performed RP. The magnet box was held horizontally 1–3 cm from the blue spiral emanating from the left groin of OP at a position of approximately 1.5 meters ahead. Pontus had to actively guide box placement since the exact position of the blue spiral could not be easily deduced through a proximate anatomical reference (e.g., skin or specific arm muscle). The room could not be kept silent since Pontus gave precise, verbal instructions regarding the placement of the box overlooking the spiral from above. He was perceiving something, carefully inspecting it with his eyes.

In all 25 experiments, Pontus' answers were 100% congruent as for Series 1, 2, and the double-blind Series 3, see Table 5.

Table 5. Results Series 5 Magnet Assay the "Extended Field".

Cumulative Experiments	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pontus's observation	A	A	R	A	A	R	A	A	A	A
Magnet direction	N	N	S	N	N	S	N	N	N	N
Cumulative Experiments	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Pontus's observation	R	R	R	A	A	A	A	R	A	A
Magnet direction	S	S	S	N	N	N	N	S	N	N
Cumulative Experiments	**21**	**22**	**23**	**24**	**25**					
Pontus's observation	R	A	R	R	A					
Magnet direction	S	N	S	S	N					

Note:
A: Attraction towards the bar magnet end
R: Repulsion from the bar magnet end
N: North end of the bar magnet pointing towards the left arm of the observed person
S: South end of the bar magnet pointing towards the left arm of the observed person

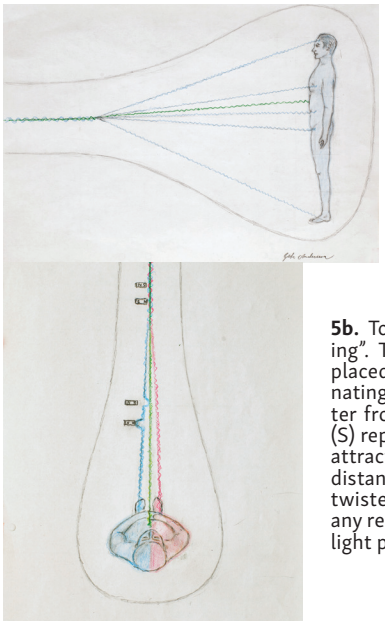
The red-orange spiral emanating from the right side of the groin area reacted in the opposite way to the blue spiral in a couple of pilot trials (no protocols available), like the inner red-orange field at the right upper arm. We cannot draw conclusions about the behavior of the rainbow-colored tunnel surrounding the twisted spirals when near a magnet, as it was not systematically investigated.

Summary Series 1–5. In 107 out of 205 experiments, the direction of the magnet was randomized so that its north pole was directed at the light fields on the right side, which responded with attraction in 105 trials and repulsion in 2 trials. In 98 out of 205 experiments, the magnet's south pole was directed toward the light fields, which responded with repulsion in 97 trials and attraction in 1 trial.

Testing and Mapping the "Thought-form"

Fifty pilot trials were conducted to investigate the magnetic response of the "Thought-form." Conducting these trials posed a challenge due to the limited participation of only Andersson and Pontus, intending to maintain a double-blind methodology. The bar magnet was placed inside a large box, providing sufficient space to move freely. This box was sealed and shaken to ensure randomization of the pole orientation. With eyes closed, Andersson removed the magnet from the box, concealing it within his fist to maintain the orientation unknown to himself and Pontus. Subsequently, he visualized himself standing at the center of the room.

Pontus observed a light figure progressively materialize at the predetermined location, mirroring Andersson's



5a. Left-side view during "sending". Only blue and green spirals illustrated. Only blue and green spirals illustrated. The green non-polar central spiral is extending from the area around solar plexus. The height of the "Extended field", where the 11 spirals twist, is corresponding to an area a couple of centimeters below the navel.

5b. Top-down view during "sending". The box with the magnet is placed close to the blue spiral emanating from the groin area, 1.5 meter from the body. The south pole (S) repelling and the north pole (N) attracting the spiral. At > 2 meters distance, where the 11 spirals were twisted, the magnet didn't evoke any response at all, as for the green light pattern.

Figure 5. Magnet Assay The "Extended Field".

Notes. The outer borders of the rainbow-colored tunnel field and the Outer field are depicted with a black line in both illustrations. Pontus constructed all the images by bringing together his many close-up focus-points and observations of the phenomena. Illustrations by Göte Andersson made from these detailed descriptions.

shape in a three-dimensional construct, split into red-orange and blue colors. After releasing his focus, Andersson approached the lingering form, which was only composed of rainbow-like colors. Pontus guided Andersson to position his fist, which contained the magnet, on the precise spot. As the trial progressed, the form faded, challenging Pontus's ability to perceive it. Andersson had to refocus every tenth trial to reinforce the vibrancy of the form.

The results demonstrated a 90% congruency rate across the 50 trials (45 out of 50). Like the findings from Series 1, which related to the physical body, the left side of his light form was consistently attracted to the magnet's north pole and repelled by the south pole. Five trials may have been unsuccessful, potentially due to the light pattern appearing too faint for Pontus to discern accurately or the incorrect positioning of the magnet within the hand. Unfortunately, the original protocol for this series is not available.

Section 3: Other Ways of Perception

Pontus' exceptional abilities were first recognized within the ambit of dowsing practices and the discovery of the "thought-field," later named "psi-track." Pontus was thus invited to observe a dowser, KEJ, in action investigating the "psi-track." At the very moment, KEJ felt a response, Pontus reported how the "Outer field" around KEJ's hands and arms was "*sucked together*" with what Pontus called the "Extended field." "*It forms a bubble around his hands when the two fields meet*," he explained. Although this intersection of two individuals' fields was not subject to further inquiry, comparative experiments involving Pontus and various perceptual modalities were undertaken.

Comparing Experiment 1– Defining the Height

Pontus and two female dowsers, KE and MBB, were asked to define the height of the center of an extending field generated by Andersson sending to a tree 20 meters away. The experiments were done on three different occasions, and none of the participants were aware of the results of the other. At the time of the dowsers, the hypothesis was that the field extension would emanate from the head. For this reason, both began their search, standing on a chair close to Andersson. However, none of the dowsers got a response at this height. The position for the investigations was thus chosen to be 1) 5 meters from the sender spot and 2) close to the tree.

Pontus' perception of the center was the 11 twisted, spiraling phenomenon, a light phenomenon that seemed non-reactive to the bar magnet. The two dowsers were selected due to their purported ability to perceive the center of the "psi-track," since their dowsing rods deflected upwards when placed at the lower border and downwards when placed at its higher border of the "psi-track," having a neutral state with no deflections when at the center. Additionally, not using any dowsing devices, they perceived subtle vibrations in their bare palms when touching the center.

Both dowsers detected a field 85–90 cm above the ground, corresponding to an area just below Andersson's navel. The height and strength at 5 meters were the same as close to the tree. Also, Pontus reported the height of the center to be around 85–90 cm above the ground at both locations and with the same colors and brightness.

Thus, the three double-blind experiments with no preconceived correct answer show that the independent participants got the same result using different perceptual modalities.

Comparing Experiment 2 – Defining the Direction

Pontus and a dowser, KEJ, were asked to define the direction of an extending field generated by Andersson sending to an unknown, secret person 30 km away. The participants were informed that the target could be an object in any direction 360°, near or afar. The experiments were carried out at the same location in a wild forest on separate occasions, unaware of the others.

The dowser identified the path of the "psi-track" as

approximately 149–154°. Pontus quickly determined the precise direction of the spiraling center to be 144°. Upon verification using a map, the actual direction to the target was confirmed to be precisely 144°.

Comparing Experiment 3– Finding Missing People

Andersson's team applied the "Extended Field" discovery to locate missing people and items, per definition always double-blind trials (Andersson, 1994, 2010; Jacobson & Tellefsen, 1994). The lost item's owner could sometimes be asked to create the field extensions. When it was reported in the local newspaper that two teenage girls from the city of Arvika were missing, Andersson decided to search for them and to compare the independent results from a dowser and Pontus. Both pointed out the direction of an "Extended field" with the bearing 305°. If their independent identical findings were correct, the girls could be located anywhere along a line pointing at 305° from the sender's place. A couple of days later, it was published in the newspaper that the girls had been found in Oslo, Norway, with the correct bearing of 305°.

Perception With the Body

Three female dowsers could perceive the fields with their hands. They directed their open palms towards whatever they were supposed to investigate: *"It tingles in the hands when there is an energy field".* They naturally alternated this technique with the dowsing rods. A similar skill was found in two older male dowsers, KW and TT, both 70+ years old. TT had the nickname "electrical Ture". Both had the unusual ability to detect underground water streams, where their arms would shake in proximity. Their skills were tested in a double-blind trial.

A person was recruited to hide a wristwatch in nature in any 360° direction around the sender spot. It was well hidden under leaves, approximately 40 meters away. The person left. Andersson arrived with no clues regarding the watch's location and started the sending. After a few minutes, KW arrived and walked with an outstretched arm in ever-widening circles around Andersson. When the arm started to shiver, he made a mark on the ground. Finally, the marks on the ground formed a straight line. Andersson followed it and found the watch. The double-blind experiment was repeated twice with KW and thrice with TT, each with success.

Summary "Other Ways of Perception"

Collectively, the data suggest four different methods of perceiving the subtle fields of the "Extended Field'" as described here and the "Psi-track" previously recognized by dowsers: (1) using dowsing rods, (2) sensing with bare palms, (3) experiencing arm shivers, and (4) visual sensation as for Pontus. Although it is uncertain whether the methods detect the same phenomenon, the correlation of results suggests that this may be the case. Andersson's procedure for generating the fields is consistent. Moreover, the "Outer Field" appears to be a critical element in a dowser's capabilities, whereas the role of the "Inner Field" remains obscure. Notably, the location where two dowsers experienced sensations in their bare hands corresponded to an area of light that, according to Pontus, did not react to the magnet. These pilot experiments indicate shared behavior and common characteristics between Pontus' vision-based fields and the dowsers' tactile-based energies, potentially lending credibility to the existence of these complex, enigmatic fields.

DISCUSSION

We report on a young boy's extraordinary observations of colored fields of light. The case study is notable for its meticulous level of detail, including original illustrations and a comprehensive series of experiments validating that the boy's perceptions are not simply illusions (Duerden, 2004). The results raise several challenging questions concerning the nature of the boy's sensory capacity and the exogenous stimuli, primarily the four principal light patterns: the Inner and Outer fields, the Extended field, and the Thought-forms. In this partially descriptive study, we have chosen not to employ the term "aura" for the Inner and Outer fields, as the concept of an aura is prone to ambiguity (Tart, 1972). Instead, our ambition is to describe the phenomenon as Pontus experienced it. The study was conducted when research into fields like human sensing and perception, optics, biofield physiology, biophysics, quantum biology, and consciousness was nascent. Today, these sciences may offer valuable multidisciplinary insights and harbor potential ideas about the mechanisms behind the still unexplained mysterious phenomena such as the one described. Therefore, we must explore a wide array of sources, which we exemplify and touch upon in this Part 1 publication. The more profound implications of the findings will be deliberated in collaboration with a diverse panel of experts in cutting-edge scientific fields as "Conclusions & Discussion Part 2".

Although finding similar cases has been challenging, historical research dating back 170 years uncovers significant similarities (Nahm, 2012; von Reichenbach, 1851). von Reichenbach's controversial theory of "Od" as a pervasive force and "odlight" emissions from magnets were explored through studies involving "sensitives", a group of 60 individuals with enhanced light sensitivity after un-

dergoing dark adaptation. Some experiments have been independently replicated and evaluated (Nahm, 2012). A notable parallel is that, although still in darkness, the "sensitives" perceived distinct blue and yellow-to-red emissions from magnet poles, like Pontus' daylight observation of a magnet (tested once). Heating the magnet led to reduced light emissions, disappearing at 75°C and returning upon cooling (von Reichenbach, 1851). Pontus found the colors around the magnet remarkably similar to the transparent nuances he observed close to the body, referred to as the "Inner field." After a long series of different experiments spanning over the years, von Reichenbach concluded that the human body appears to have magnetic properties with an inherent (odic) opposition between the left and right sides: the left hand corresponding to the magnet's southward pole and the right to the northward. This finding is consistent with the current study: the left-sided blue inner field exhibited consistent attraction to the magnet's north pole and repulsion from the south pole, with the reverse effect observed on the right side.

Regarding the specific relationship between Od and magnetism, von Reichenbach proposed (1851), "The development of Od occurs independently and without magnetism in the majority of cases: magnetism never occurs alone but is always associated with Od" (p.305). Also, Pontus described a transparent, luminous green field and spiral that did not respond to the magnet. Von Reichenbach acknowledged that "Od" might be scientifically defined and renamed, and he concludes, "Whether magnetism, diamagnetism, and Od shall one day prove identical, or solid distinctions shall remain between them, is a question of which the solution appears to me to lie at present at a considerable distance" (p. 298).

Given that Pontus characterized his visions as falling within the visible light spectrum and, akin to the "sensitives," convinced that it was all about his eyesight, let us suggest this was the case. Recent advances in quantum optics support the idea that the human eye can detect one single photon (Tinsley, 2016). The detection is not always registered as a flash of light but may be perceived more subtly, perhaps intuitively. The discovery underscores the exceptional sensitivity of human visual perception and that Pontus' experiences may have been induced by light, leading to the question: What type of light? Kobayashi et al. (2009) made a relevant statement: "The human body literally glimmers" (p. 1). They refer to the phenomenon known as ultra-weak photon emissions (UPE) or ultra-weak bioluminescence generated by the fluctuations in energy metabolism within living organisms, including humans (Popp et al., 1988). The intensity is extremely weak, 10-1000 photons/sec/cm^{2,} spanning a spectrum of 350 to 1300nm (Cifra & Pospisil, 2014; Du et al., 2023). However, the literature concerning UPE provides insufficient details on whether it can manifest as the type of asymmetry that Pontus described. Other candidates to explore could be the numerous spatially distributed fields, which originate from biomagnetic and bioelectric phenomena generated by and responsive within living systems (Hammerschlag et al., 2015; Nordenstrōm, 1992). Biofield physiology research is investigating the as-yet-undetermined mechanisms underlying the left-right asymmetry of bodily organs, positing that biofields play a role in governing the lateralization process. (Levin et al., 2016; Masuelli et al., 2022). The topic is at the forefront of contemporary science, and we can only speculate whether there might be a connection to the left-right asymmetry as discovered by Pontus. The biofield strengths are very weak, below one pico-Tesla (pT), as measured at the body surfaces outside the heart, brain, muscles, and retina (Malmivuo & Plonsey, 1995). Leaving biofields of light for biomagnetism raises another crucial question: whether humans possess the capacity for direct perception of such faint magnetic fields, less than a millionth of the Earth's geomagnetic field strength? Should this be the case, it would represent identifying a novel human sensory modality. For this to pertain to Pontus, we must conjecture that his perception operates analogously to synesthetic mechanisms, where he perceives the external stimuli through a different sensory modality – the sense of sight (Safran & Sanda, 2015; Schwartzman et al., 2019). However, it is essential to note that the green spiraling color and the center of the Inner and the Extended fields did not respond to the magnet, suggesting additional stimuli might be present that cannot be attributed to weak magnetism.

Empirical clinical studies focusing on acupuncture, one of the fundamental therapeutic practices in Traditional Chinese Medicine (TCM), also warrant close examination when elucidating the human body's responses to magnetic fields generated by handheld small magnets (Manaka et al., 2014). When placing a north-facing magnet on the acupoint in the right auricle corresponding to the large intestine source point, registered pressure pain at the source point on the same side immediately decreases. Reversing the magnet in the right auricle increases the pressure pain in the large intestine. The polarities reverse when stimulating the opposite side. Notably, the effects are instant, too quick to be molecular. This virtually unknown system was named the "X-signal system" and postulated as the *modus operandi* of acupuncture (Manaka et al., 2014). The reversibility of polar effects aligns with Pontus' observations in the magnet experiments and, if related, suggests a fundamental biological system at play

that needs to be discussed.

Distant Mental Influence, DMI, attributed to healing, prayers, and telepathy practices, has been frequently studied and reviewed. Studies on DMI delve into the influence of the potential effect of focused intention on remote targets in ways not explained by conventional sensory or physical means, i.e., anomalies (Braud, 1990; Braud, 2003; Radin et al., 2015; Dibble & Tiller, 2011). The proof-of-principle has been explored through more controlled studies called "Distant Mental Interactions with Living Systems" DMILS. Meta-analyses show small yet significant effect sizes, suggesting that A can affect B remotely (Radin et al., 2015). Usually, DMI studies focus on what happens in the sending mind, A, and at the receiving end, B, while the sequence of events between A and B remains a mystery. It is often attributed to the quantum mechanical concept of nonlocality. One of the more remarkable findings in this study is that the uninitiated Pontus discerned a light pattern between A and B. The phenomenon appeared instantaneously in response to A's intent. Pontus claimed he saw the field being built up and made a drawing (Figure 2a, f). However, his detailed drawings from multiple perspectives raise the question of whether the portrayal of the advancing peak's apex represented a delayed response in his sensory perception. If so, did the field already exist at the speed of light, or did it manifest instantaneously in alignment with theories of nonlocality and quantum entanglement?

Moreover, if the latter is true, did the depicted "conceived" spiral pattern function as a channel for information? The information concerning the object appeared critical for the sending, while data regarding distance and direction were not deemed significant. Distances between the sender and target ranged from a few meters to 400 kilometers without affecting the color phenomenon's brightness. Regarding direction, there are documented instances, primarily involving Andersson, where the sender did not know the direction, a finding that aligns with earlier dowsing research (Jacobson & Tellefsen, 1994; Ryd & Andersson, 2016, manus in progress). The direction information must, therefore, be linked to a domain beyond the sender's conscious awareness.

Probably the most provocative "ghostly" phenomenon presented in this study is the "thought-form," initiated by an abstract idea, labeled as being B behind the sender's intention, A. Interestingly, this phenomenon is also described in the early literature by the theosophists Annie Besant and C.W. Leadbeater in their book *Thought-Forms* (2005/1901). They propose a classification system for different types of thought forms: (1) forms in the shape of the person who creates them, (2) forms that resemble objects or people, and (3) forms that represent inherent qualities. All three classes are represented in this study. Notably, the term "thought-form" was independently selected by Pontus and Andersson, unaware of the literature.

Another potentially similar phenomenon, called tulpa, is described within the old scriptures of Tibetan Buddhism. The Belgian–French explorer Alexandra David-Néel, who received the honorary titles of Lama and Doctor in Tibetan Buddhism after spending many years in Tibet, defines tulpas as "magic formations generated by a powerful concentration of thought" (David-Néel, 1929).

In ancient Indigenous and Eastern philosophies, spirals swirls, colors, and vortex shapes represent life energy that permeates all things, interwoven with consciousness (Dale, 2009; Goswami, 1999; Yang, 1997). Aborigines experience living bodies as magnetic and have always acknowledged and used the forces of magnetic energy (Lawlor, 1991). The concepts are also the foundations for healthcare systems like Ayurveda and TCM (Jain et al., 2015; Rubik et al., 2015). Thus, it can be observed that the findings from this study bear a substantial resemblance to those described not only a century ago but also in various scriptures dating back over millennia.

It is essential to note some limitations of this study. First, Pontus, who demonstrated these unique abilities, sustained injuries while deployed to Afghanistan. He has probably lost his skill for unknown reasons. We are thus limited in our ability to repeat and expand beyond the experiments. Second, Andersson was the primary participant who generated these spiral projections and thought forms in the experiments. While three other individuals demonstrated the ability to generate these projections, the extent to which Pontus could detect or interact with the forms generated by these individuals was not extensively tested and thus limited our ability to characterize the capacity for Extended field generation to a broader population. Finally, in our experiments, the robust control mechanisms employed in Series 1–4, especially the double-blind approach in Series 3 and the strict external oversight in Series 4, add substantial credibility to our findings. However, the methodological rigor of Series 5 warrants scrutiny. Given the compelling results of the earlier Series, there may have been inherent expectation of "correct" outcomes in the magnet assay of Series 5, raising concerns about potential biases. Therefore, caution must be exercised when interpreting these results as definitive proof of the "Extended Field." Notably, an element that bolsters the validity of Pontus' perceptions is his consistent precision in directing the positioning of the box throughout all five Series, including the more challenging Series 5 and various experiments entailing "thought-forms." Such accuracy, especially in the context

of low probability for random correctness, suggests the presence of a genuine perceptual phenomenon, further warranting future investigation.

CONCLUSIONS

Our initial findings lead us to several conclusions: (1) the boy's perceptions are not simply illusions (Series 1–4), (2) the human body exhibits polar asymmetry along the left/right axis (Series 1–4), and (3) cognitive states might significantly influence these fields, even at distances extending beyond the physical body (Series 5 and blinded experiments with hidden objects).

Further conclusions and implications of the findings will be deliberated in collaboration with a multidisciplinary panel of experts, documented in a follow-up "Conclusions & Discussion Part 2." We advocate for interdisciplinary research to further explore the nature of this remarkable sensory experience and potential physiological or physical mechanisms that could explain how an individual might perceive this unique phenomenon.

IMPLICATIONS AND APPLICATIONS

We hope this report on a young boy's extraordinary sensory mode and perception will encourage more individuals with similar experiences to come forward, thus increasing the strength of the evidence through replications. Although the findings must be considered preliminary, they may also have the potential to provide a significant piece of crucial information contributing to the forefront of basic and clinical research.

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CREDIT AUTHOR STATEMENT

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RESEARCH ARTICLE

Vapor Phase Electrochemistry 3: Preparation of Metastable Nitrous Acid

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HIGHLIGHTS

Ball lightning can be formed when an air plasma cools through a chemical process, creating a stable outer layer that contains the plasma and gives it a defined shape.

ABSTRACT

A qualitative electrochemical model for ball lightning was developed during the 1990's (Turner, 2002). The key requirement was electrochemical refrigeration at the surface of an air plasma. The cooling was shown to result from the conversion of metastable, fully ionized, gas-phase nitrous acid to its stable molecular form. If the refrigeration cools the plasma surface to below 15^0 C, aerosols of nitric acid can be produced in subsequent oxidation processes. These particles restrict the inflow of air toward the plasma and provide the ball with a very effective surface tension. This helps explain several unusual characteristics of lightning balls and also their close relatives, such as earth-lights and Unpredictable Flying Objects. The experiments to be described were undertaken because of their relevance to ball lightning stability, but they also have relevance in other fields of meteorology. They were attempts to reproduce several early observations by C.T.R Wilson that have been largely neglected ever since they were first reported. He irradiated moist, dust-free air with focused beams of ultraviolet light. Using the emission from zinc or cadmium arcs, mists were produced after about 30 minutes of exposure. All our nominally similar experiments failed to produce mists. However, UV radiation from a mercury vapor lamp produced them after a few minutes. The mists contained both nitrous and nitric acid. We also confirmed Wilson's observations that these mists could be produced at relative humidities slightly below 90%. This is considered impossible according to all models of cloud formation.

KEYWORDS

Air plasmas, ball lightning, earth lights, UFOs, vapor phase electrochemistry.

INTRODUCTION

This study can best be seen as an unexpected outcome of the identification of a small area of physical chemistry that has never been developed. The very basic nature of the missing science gradually became clear to one of us (DJT) through attempts to understand several industrial problems associated with impurities in high-density steam. The studies had been conducted at the Central Electricity Research Laboratory (CERL), which was one of the laboratories of the former Central Electricity Generating Board (CEGB) in the UK - see Chown (1993).

By 2003, several different ways of describing the most basic problems had been employed (Beysens et al., 1987; Gates et al., 1982; Turner, 1983; Turner, 1980, 1987, 1988, 1990, 1998, 2003; Wood et al., 1983). Unfortunately, the same political forces as those that forced the privatization of the UK's electric power industry seem to have ensured that it is currently in no one's financial interest even to acknowledge that these very basic scientific problems exist (Turner, 2023).

A serious consequence of the missing science is that no *quantitative* explanation for the properties of ball lightning or of any other air plasma is currently available. This situation is likely to remain the same unless current ways of supporting certain very basic areas of science change (Turner, 2023). This seems very unlikely. Fortunately, it has proved possible to make some progress in understanding naturally contained air plasmas using arguments that are almost completely qualitative. For the systems considered here, the missing science can conveniently be referred to as vapor phase electrochemistry.

The most basic problem in understanding contained air plasmas is the electrostriction of water molecules in the very high electric fields close to any ion. The consequences are mainly thermodynamic, but they also make it impossible to develop valid kinetic arguments (Turner, 2023). There are several reasons for this situation, the most significant relating to the properties of metastable nitrous acid and its subsequent oxidation to nitric acid. Those relevant to the matters considered here are summarized in Section 2.

Since very diverse arguments are employed, it is desirable to summarize their basis at this point. The arguments all stem from experiments, dating from the 1890's and conducted by C.T.R. Wilson, *a few of which* were never replicated. There were two main consequences of Wilson's findings. Decades later, he developed the cloud chamber that is named for him. The other consequence was a general acceptance by meteorologists and others that condensation of water vapor into droplets of liquid water *always* requires that the degree of saturation of the air be greater than 100% relative humidity. Nearly all of the experiments that Wilson conducted in the late 19th century supported the now accepted view, but some clearly did not.

They showed that, when very clean air was irradiated with UV radiation spark gaps, made of either zinc or cadmium, condensation was obtained at about 90% relative humidity. It seems that other investigators must have failed to replicate these particular findings and they have been ignored until fairly recently.

By the last decade of the nineteenth century, many experiments on moist air had been described, some of which were attempts to understand the role of ions in cloud condensation. Three of the most informative studies were by C.T.R Wilson (1897, 1899a,b). All three studies were mainly concerned with the *physical* process of condensation, but many of the findings appeared to be *influenced by chemistry*. These studies, and more recent ones with similar histories, imply that our current understanding of basic cloud condensation is very far from complete (Turner, 1998, 2003). It is now clear that, for over a century, very few scientists have felt the need to address the subject of vapor phase electrochemistry.

Our final choice of experimental approach was based on two considerations. The first was financial since, for decades, support for this kind of work had been unavailable. The second was the hope that confirmations of some of Wilson's findings might prove instructive. The limited nature of the study resulted from the UK's privatization of electricity generation in 1989. Gradual changes in political thinking, in both the UK and elsewhere, have resulted in the abandonment of all of the relevant electrochemical research that had once been supported by the electric power industries in several industrialized countries (Turner, 2023).

Beginning in the 1990s, hints of mistakes apparently related to those of concern here, but in scientific and technological areas *other than electricity generation*, began to be collected. Diverse reports in the literature seemed to result from the same missing science (Turner, 1998, 2003). This realization followed an earlier, very unexpected conclusion: that none of the well-established properties of ball lightning violates any known law of physics (Turner, 1994). This is also true of the real objects (as opposed to psychologically produced effects) that are usually referred to as unidentified flying objects, or UFOs. The name preferred here is *Unpredictable* Flying Objects since the objects will have been identified. It also seems that air plasmas can have several other manifestations. These include the plasmas occasionally observed inside tornadic super-cells and those that might well contribute to holding hurricane clouds together (Turner, 2003, 2023).

All the more obvious anomalies in the reported behavior of ball lightning (Arago, 1855; Barry, 1980; Brand, 1923; Charman, 1979; Flammarion, 1888; Singer, 1971; Stakhanov, 1979; Stenhoff, 1999) disappear once three facts are accepted: (1). that free ions necessarily exist *at equilibrium* in the air; (2). that the equilibrium levels of these electrolytes are always far too small to detect by conventional means; (3). that the reported properties of ball lightning can *only* be understood once it is accepted that a number of routinely used assumptions and approximations are not always appropriate.

These sometimes inappropriate assumptions include the following (Turner, 2002) :

- That the *chemical* properties of ions can be safely ignored,
- That chemical thermodynamics can be safely ignored,
- That electrolytes in gases *only* become fully dissociated at very high temperatures,
- That an electrolyte solution at equilibrium is inevitably homogeneous,
- That the Earth can usefully be treated as a near-perfect conductor of electricity,
- That electric currents in the air can usefully be treated as homogenous and
- That the absolute electric potential of the Earth is zero.

A more general problem in understanding vapor phase electrochemistry arises from the differences that exist in the ways in which quantum mechanics treats nuclear and chemical energy levels. Nuclear properties can be predicted precisely, and the result is that the theory and experiment have progressed extremely well. This is not the case for chemical properties. Hence, the largely qualitative rationalizations of properties provided by the Periodic Table are still vital to chemists. More importantly, in the present context, these limitations define the kinds of problems that most physicists *choose not to study*.

Specialization has obviously proved essential in advancing all of science, but most of the dramatic advances in physics have resulted from its reliance on mathematics. The limitations of prediction in chemistry arise from the fact that quantum mechanics can provide little more than qualitative guidance on such matters as the shapes of molecules and the thermodynamic properties of chemical species - whether these are stable molecules, radicals, or ions. Consequently, most thermodynamic properties of such species need to be measured experimentally, and obtaining all the data needed for every chemical entity would require a totally unrealistic research program. In practice, very few molecules have been characterized thermodynamically, and even fewer molecular ions.

2. SOME THERMODYNAMIC CONSEQUENCES OF NITROGEN OXIDATION IN MOIST AIR.

Because of the well-known health risks associated with the presence of nitrogen oxides in the air, large numbers of rate constants for reactions involving these oxides have been measured over many decades (Seinfeld & Pandis, 2006). Carbon and nitrogen are elements of the periodic table that are among the most plentiful and whose chemistry is far more complicated than that of any of the earlier elements in the periodic table - i.e., those with lower atomic weights.

As is well known, the complications with carbon chemistry result from the huge number of kinetically stable compounds that are based on long chains of carbon atoms. However, nitrogen chemistry is complicated by an entirely different characteristic: nitrogen compounds exhibit far more stable *oxidation states* than is the case with any earlier element in the periodic table. As a consequence of this fact, many simple nitrogen compounds are well-characterized thermodynamically. This applies to some stable ions that contain nitrogen, but, for fairly obvious practical reasons, it does not apply to unstable ions.

Most of the data we possess on nitrogen oxidation processes tacitly assume the air to be dry (Seinfeld & Pandis, 2006). It has long been realized that this can seriously limit the models. The potential existence of water (and solutions) in two phases adds so greatly to the complications (both thermodynamically and kinetically) that realistic attempts to deal with the chemistry (in the actual two-phase systems) have never been made. Clearly, the existing literature on air pollution can offer little help in understanding the matters of concern here - where the presence of water vapor is crucial. The situation is serious because ions are always present in the air, and they inevitably attract huge numbers of water molecules into their electric fields (Turner, 2023).

In the 1930s, Loeb (1934) showed the great importance of electrostriction in gases, and by the 1950s (Loeb, 1958), he had calculated extremely large hydration numbers for atmospheric ions from their transport properties. For example, ions classified in meteorological studies as "large" (though invisible) can have hydration numbers up to $3x10^8$. Effectively, this means that we know nothing at all about electrochemical processes that occur in aerosols whose solute-to-solvent molar ratios vary over eight orders of magnitude (Turner, 2023). The experiments to be described here attempt to obtain information on a few important chemical processes that can occur when aerosol chemistry seems to be very important.

The 19^{th}-century experiments we considered repeating were all chosen because ions and water vapor were both involved. The clearest *direct* evidence for unexpected chemical changes in water vapor when ions are present came from studies of von Helmholtz (1887) and von Helmholtz and Richarz (1890). They studied droplet growth at an electrified jet through which steam at atmospheric pressure was passing. Influences very specific to the identity of several nearby gases were found on droplet growth rates. The high energy content of ions will have been important because the presence of ions can catalyze otherwise very slow chemical reactions, such as

those involving any thermodynamically unstable gas that has drifted into the region of the electrified jet.

These chemical influences seemed very significant but no practical way was seen for learning much more than the qualitative facts that Helmholtz's studies had revealed. A serious additional problem was that there was no obvious way of learning anything about the electrochemistry that can take place *nearer to room temperature*. This is important because it is only at 25^0 C that enough relevant thermodynamic data are available to permit useful comparisons - assuming that such an attempt were to be made.

Townsend (1898) studied the electrical properties of the gases released during the electrolysis of HCl, H_2SO_4, and KOH solutions. He had earlier established (Townsend, 1897) that such gases carry with them a large percentage of the charge they hold even after passing them though glass wool, to remove liquid spray, and bubbling them through various solutions. The last few vessels were enclosed within an earthed metal screen and at least one of them normally contained concentrated sulfuric acid for drying the gases. The vessels were separated from the electrolysis cell by a short "tunnel" of paraffin wax and mounted on a block of the same material. They could thus be weighed before and after the passage of known quantities of the gases so that both the water content of the clouds and the charges on them could be determined.

It was found that the heavily hydrated ions carried with the gases from the electrolysis cell could be rapidly and reversibly de-hydrated and re-hydrated. However, *not all the gases released by electrolysis* formed clouds when bubbled through pure water. Condensation was found *only* to be possible if the gases were electrically charged. The *negatively* charged clusters that Townsend produced were found to be larger (and hence would fall faster) than those that were charged positively. Townsend noted that effects like this might explain the positive charge of the upper atmosphere (Townsend, 1897).

One seemingly important implication, from the description just given, is that, in some cases, electrolysis had failed to produce ions in the gases released during electrolysis. Both he and Wilson, his fellow student at the Cavendish Laboratory (whose early experiments will be discussed shortly), were very interested in atmospheric processes. It was, therefore, surprising to note that the electrolysis of nitric acid was not even mentioned in either of Townsend's papers. It seems most likely that the electrolysis of nitric acid *was, in fact*, studied, but it failed to produce charged clouds.

Such a failure would not now be considered surprising since we have subsequently learned (Turner, 1998) that *gas phase* HNO_3 is thermodynamically unstable (with respect to the components of the air) at the temperatures reached in Townsend's experiments. Only at temperatures below 15^0 C is gas-phase nitric acid stable in the air. All of Townsend's experiments rapidly reached far higher temperatures than this because he wished to produce his gases as rapidly as possible. In all his experiments, he first bubbled the gases released during electrolysis through temperature controlled, cool, water. This was presumably so that his method for measuring the charges on the gasses was not complicated by possible thermal effects .

Townsend's experiments showed clearly that electrostriction by ions is very important. However, any repeat and extension of Townsend's findings could only be improved at financial costs that would be economically unrealistic. The final conclusion, from all our early comparisons, was that one set of Wilson's earliest experiments was probably the most promising of all the neglected 19^{th} century studies.

Some of the facts discussed above are very relevant to the stability of ball lightning. If sufficient *metastable* nitrous acid were to be converted to its stable form *at the plasma surface*, a stable surface could form. The air temperature next to the plasma needs to be maintained below 15^0 C for the whole life of the plasma (Turner, 1998). Then nitric acid production, in parallel with the cooling processes close to the plasma, will be extracting *chemical energy* from the air. This easily explains the long lives of many lightning balls and the even longer lives of other air plasmas. The Sun's energy maintains the chemical composition of the air, so that (assuming the ball lightning model is correct) an air plasma is capable of extracting solar energy and converting it into another form of energy - such as tornadic energy (Turner, 2023) - or, far more usefully, into electricity.

Air plasmas are rare phenomena and, over the centuries, nearly all attempts to produce realistic simulations of the smallest of them, which are lightning balls, have failed. The last time anyone reported an adequate simulation of ball lightning was by accident in the mid 18^{th} century (Priestley, 1781; Cavallo, 1782; see Turner, 2002, for a complete but more readily accessible account).

The two matters over which we are most seriously ignorant are why it is so difficult to form an air plasma in the first place and why only the most powerful air plasmas seem able to survive for more than two or three minutes. It has long seemed clear that a major difficulty is maintaining the required delicate balance of physical and chemical forces that can provide structural stability at an air-plasma surface (Turner, 1994).

Currently, it seems we need most guidance on the processes involved during the *initial formation stages* of the plasma (Turner, 2002, 2024).

Because the sub-discipline of vapor phase electricity has never been developed, progress in understanding air plasmas has only proved possible using approximate thermodynamic arguments (Turner, 1994, 1998, 2023, 2024) In this context, it is worth noting that nitrogen oxidation reactions in moist air formally resemble the burning of a hydrocarbon *except* for one very significant fact: water, a very stable compound indeed, is a *reactant rather than a reaction product* in the "burning" of nitrogen. Energy contained in a highly stable compound, such as water, can only favor a process involving it if it is present as a *product* and not as a *reactant*. Entropy changes can sometimes, however, more than compensate for this fact. This is why the "burning" temperature of nitrogen (Turner, 1998) is so low.

The mechanism by which a plasma surface can be maintained below 15^0 C (and thus nitric acid formation can be possible) is clearly crucial to the stability of ball lightning (Turner, 1994). It would be expected that nitrous acid would form before nitric acid - although the production of this acid might be so fast that nitrous acid could never be detected. More importantly, it is now clear that *interference of any kind* in the production of either acid can prevent the formation of a long-lived air plasma. The experiments to be reported here relate mainly to the formation of metastable nitrous acid. Most consist of attempts to reproduce some early experiments of C.T.R. Wilson. Any failures to replicate his findings might well explain why some of his most important experiments have been neglected for over a century.

3. WILSON'S EARLY EXPERIMENTS ON CLOUD FORMATION AND SOME RELATED STUDIES.

Wilson is best known as the inventor of the cloud chamber, which, following developments he made years later, led to early discoveries in particle physics and to his Nobel prize in 1927. However, the experiments from which the device was developed were reported much earlier than this (one paper in 1897 and two in 1899). For convenience, these will be referred to as W1, W2 and W3. The earliest major paper of his (Wilson, 1897 or W1) described a very thorough study of condensation from contained volumes of dust-free gases that had been saturated with water vapor and then expanded adiabatically.

There is an obvious problem in studying systems that are saturated with water vapor: condensation on the walls of any containment vessel can sometimes be easier on such surfaces than in the gas itself. Wilson circumvented such problems, when necessary, in different ways depending on the details of his experiments. Efficient filtering of the gas was found to be absolutely essential if reproducible results were to be obtained.

Dust removal was also achieved by pre-expanding water-saturated gases and allowing the droplets so formed (on any dust particles) to settle before investigating how the degree of expansion influences the form of the condensate. In Wilson's study W1, radiation was employed in very few experiments. With the exception of these, the use of expansion ratios near 1.38 produced thick fog in the air at remarkably consistent ratios, while "rain-like" droplets were observed when the expansion ratios lay between this value and 1.25. No condensation was found to be possible at smaller expansion ratios than this. The degrees of super-saturation that produced fogs or droplets were calculated in nearly all cases.

The studies in W1, plus those described in Wilson's third major paper (W3) and later confirmations of many of his findings by others, have provided the basis for what meteorologists now believe to be true about all cloud condensation (Mason, 1971). In W3, Wilson employed the same pre-cleaning methods to water- saturated air as in W1 but this time the air was irradiated with X-rays before its final expansion.

Both these and gamma-rays had previously been shown (in W2) to ionize the air very easily so that ions were assumed to be responsible for the condensation. W3 was undertaken *primarily* to investigate a suggestion of Thomson (1898) that Earth maintains its negative charge because, in the air, condensation around anions occurs more rapidly than it does around cations. This possibility was also hinted at in Townsend's experiments (see Section 2).

The experiments proved clearly that Thomson's (1898) suggestion was correct: the anions present in the air do produce condensation considerably more rapidly than the cations. *Despite this finding*, however, Thomson's original explanation for the electrical charging of the Earth is *still ignored* in textbooks on the relevant aspects of cloud physics (e.g., Mason, 1971; Rakov & Uman, 2003). Strangely, Mason (1971) discusses several details of Wilson's other early findings (in W1 and W3) but completely ignores W2. Nor does he mention the main *reason* the W3 study was undertaken: to test Thomson's (1898) suggestion for how the Earth maintains its negative charge. The *inability to quantify* this idea seems to have left physicists and meteorologists uninterested in either the evidence itself or the very significant suggestion.

No explanation for the different condensation rates around anions and cations was available at the time, and this may partly explain why Wilson's *justification* for the study W3 was subsequently ignored. A qualitative explanation for Wilson's findings, based on chemical thermodynamics, was eventually provided (Turner, 1998), but

as far as can be learned from current meteorology textbooks, *Thomson's proposed explanation for charging the Earth is still completely ignored*. Collisions between raindrops and/or ice particles during thunderstorms are still the only charge separation mechanisms that are considered to be at all relevant (Mason, 1971; Rakov & Uman, 2003). *No study has been found that attempts to justify what seems the complete neglect of Thomson's (1898) idea or of Wilson's proof that he was correct*.

Wilson's second paper (Wilson, 1899a - or W2) has received almost no attention at all. His observations in W1 and W3, together with later confirmations of them by many others, are now routinely taken as evidence that the relative humidity of the air needs to be *at least 100%* if condensation is ever to occur.

However, this suggestion is *directly contradicted by evidence in Wilson's paper,* W2. This work clearly demonstrated condensation at relative humidities as low as 90%. Even before the results had been published in full, Rutherford (1898) had stressed their significance. This was a fully justified assessment if only because ultraviolet light, the form of radiation employed by Wilson in these studies, is far more plentiful near natural clouds than are the X-rays or gamma rays, which Wilson found made condensation very easy.

The only early investigation of the conclusions of W2 seems to have been by Vincent (1904). Guided by Thomson and Wilson, he employed equipment rather similar to some of Wilson's in an attempt to understand Wilson's puzzling finding that UV light was able to induce cloud formation in oxygen just as easily as it does in air. This objective was not achieved, but Vincent made two observations of potential interest. One led to doubts over Wilson's (W2) speculation that the presence of hydrogen peroxide (rather than nitric acid, his first assumption) was responsible for cloud formation in the air. Vincent found he could not detect any hydrogen peroxide chemically when he simulated Wilson's experiments. This could obviously have meant simply that the molecule's concentration was below the limit of detection. Arguments in the Appendix suggest otherwise.

The other point Vincent (1904) made was that, although most of the cloud particles were uncharged, small quantities of charged particles of both polarities could be detected when strong electric fields were applied. It seems that he (and Wilson) had been producing what those studying atmospheric electricity now refer to as "large ions". As we have seen, Loeb (1958) estimated that there can be thousands of millions of water molecules in these "large ions". It is, of course, most unlikely that the *chemical content of natural aerosols* would be identical to those produced under controlled laboratory conditions - the natural ones are almost certain to contain a wide range of other chemical species present as air contaminants. In fact, one possible reason for the rarity of ball lighting and other air plasmas is that these contaminants usually interfere with one or more of the chemical reactions needed to produce and maintain a stable plasma surface.

We decided to re-investigate W2 partly because condensation at less than 100 % relative humidity had been claimed but also because, with UV radiation, cloud formation had been found to be much slower than when either of the higher energy sources were used. This implied that differences in condensation rates might yield new information. Additionally, an *equilibrium state* seemed to be produced under irradiation by UV. We have found no modern meteorology textbook that refers either to these aspects of Wilson's work or to the findings of Tyndall (1870), which Wilson saw as closely related to his own. Even Mason's (1971) exceptionally well-documented book on cloud physics makes no mention of W2. Nor does the equally well-documented book of Rakov and Uman (2003) on lightning.

An additional fact, not discussed earlier, but implied in arguments that follow, is that UV light normally acts as an oxidizing agent in humid air. It can be helpful to think of high-energy photons as chemical species that can induce chemical reactions. It is then possible to assess the reactions they induce, using their energies in conjunction with ordinary estimates of reaction enthalpies. One reason UV photons usually act as oxidizing agents in real (moist) air is that they easily break up water into H atoms and OH radicals and that H atoms normally react very slowly in such systems, whereas OH radicals tend to react very rapidly.

For *really pure, really dry* gases (in which most detailed studies are made), it is usually found that UV photons lead to both oxidation and reduction at the same time. This is to be expected because the energy supplied can be easily sufficient to overcome any large energy barriers there may be in any of the relevant transition states. Such is the case, for example, with formic acid (Su et al., 2000), carbon dioxide (Schmidt et al., 2013), and nitric oxide (McGee & Heicklen, 1964). However, in moist air, the presence of oxygen and the great thermodynamic stability of water, normally mean that UV exposure can lead only to oxidation.

It has long been obvious that, under natural conditions, concentrations of trace contaminants in real air vary enormously in space and time (e.g., Wallace & Hobbs, 1977). This is less likely to be the case in air that has spent a long time away from continental contamination. Fairly recent measurements from an exceptionally

clean region of maritime air (taken on a coastal cliff top in Tasmania), support this claim and imply that exposure to low energy UV in very clean air yields mainly the radicals HO_2 and OH. This is the case provided that NO levels are low (Creasey et al., 2003). In our experiments, HO_2 and OH were probably the main long-lived, nitrogen-free, oxidizing radicals involved as reaction intermediates.

In the main part of W1, Wilson described experiments that had been conducted in several dust-free gases in which condensation was produced by their rapid expansion, and no source of ionizing radiation was provided. He found distinctly different condensation behavior from the observations of all of the earlier investigators. The reason was that they had not pre-treated their gases by thoroughly removing all dust particles from them prior to the adiabatic expansion. It seems clear that processes occurring in dust-free air are quite different from those that occur if condensation nuclei are already present. The water-saturated gases that Wilson studied included air, oxygen, nitrogen, carbon dioxide, and hydrogen.

Expansion ratios that were just high enough to produce condensation in all the clean gases were found to possess two different, but well-defined, critical values of v_2/v_1, where v_1 is the initial gas volume and v_2 the final one. For all the gases except hydrogen, these values were fairly close to 1.252 and 1.379 (the values for air). Below expansion ratios of 1.252 with air, no condensation occurred, but, between these two limits, "rain-like water droplets" would appear. Above the higher limit, fogs formed very rapidly. The higher value corresponds to air super-saturated by a factor of nearly 8 (based on calculated temperatures for adiabatically cooled gases). Just above a ratio of 1.408 with air, the clouds produced were green, followed, as v_2/v_1 was increased by other colors. The colors were clearly produced by optical interference in the clouds.

Wilson had shown that, in air at and above an expansion ratio of 1.38, no pre-existing condensation nuclei were needed for condensation. Later (in W3), Wilson measured the conductance of mist-containing air and concluded that, by $v_2/v_1 = 1.25$, condensation around anions is complete, but condensation around cations is only complete at $v_2/v_1 = 1.38$. It also seemed from the earlier studies that, between the two expansion ratios, condensation nuclei can be produced by cosmic rays or by high energy emissions from radioactive elements in the surroundings nearby.

On the basis of his W2 experiments in dust-free air that had been irradiated with UV, Wilson initially assumed, quite reasonably at that time, that condensation nuclei at expansion ratios above 1.25 but below 1.38 must have formed around protons and nitrate ions. However, his finding that pure oxygen required almost identical expansion ratios to those in the air convinced him that this was impossible. He thus argued that the only relevant chemistry must involve the formation of hydrogen peroxide. Three possible reasons for doubting this conclusion, including the findings of Vincent (1904), are provided in the Appendix. As will be demonstrated later, it now seems clear that Wilson's first thoughts concerning condensation from moist air (nitric acid formation) were correct.

There were three quite different kinds of unusual observations in W2. One was that condensation could be produced in the air *without applying any adiabatic expansion*. The second was that condensation from *dust-free* air in the presence of UV was observed to occur at *less than* the saturation vapor pressure of pure water (as opposed to the 790% of it when UV was absent). The third was the production of unusual patterns in some of the clouds and even stranger temperature-induced motions in them when a finger was applied to the bottom of the vessels near to where the light had been focused. These patterns mainly involved near-vertical motions in freshly produced clouds.

Both of the solutions used by Wilson to depress the vapor pressure of water (potassium hydroxide and sulfuric acid) were found to produce condensation at 90% of the saturation vapor pressure. This would occur *even in the absence of air expansion*. In much more concentrated solutions of either electrolytes, no clouds or fogs could be formed under UV irradiation (with no expansion). Clearly, one of the questions of interest is how it is possible, using UV radiation (with no expansion), to produce clouds at such low relative humidities while high degrees of expansion were needed to form clouds when radiation of much higher energy was used.

A possible *justification* for the subsequent neglect of W2 may have been the very reason the work was undertaken in the first place. This had initially been to *disprove* an earlier claim by Lenard that fogs produced in this way were a consequence of the interaction of UV radiation with the surfaces of *the silica windows* used to admit it. Wilson conducted numerous experiments that disproved this claim. Another possible reason for neglect was that later parts of the paper used a corona discharge instead of radiation as the source of ions. These findings might well have been thought to be more important than the earlier parts of the paper since they were, in effect, early contributions to the study of chemically related aspects of coronas. This subject would probably not have interested most meteorologists of the day.

Ions can be introduced into a moist gas during the electrolysis of electrolyte solutions (Townsend, 1897,

1898) by electromagnetic radiation of sufficiently high energy or from a corona discharge in the air.

Obviously, the *motions* of the charged chemical species produced will be very different in the different cases, but much of the underlying chemistry is likely to be the same. Subsequent work on electrical coronas has produced a truly immense quantity of experimental data but virtually no general principles that can provide the field with predictive power (Loeb, 1965).

The early experiments described in W2 showed clearly that the growth of new condensation nuclei produced by UV radiation is very slow compared with their initiation by higher energy radiation and subsequent expansion of the air. Later experiments using UV seemed to show that an equilibrium state is attained - usually on time-scales of a few minutes and apparently in both particle size and particle concentration.

As mentioned earlier, in all of Wilson's earliest experiments, visible evidence for the presence of condensation nuclei required a rapid (adiabatic) expansion of the humid air. Later, it was shown that *more powerful arcs* than those initially used could produce UV that formed clouds in humid air *without any need at all to expand it.* All our most informative experiments were of this type.

Two much more recent studies of the *chemical products* of corona discharges in water-saturated air are relevant when considering the nature of the condensation nuclei that Wilson must have produced. Peyrous and Lapeyre (1982) inferred, by measuring the influence of ozone and nitrogen oxides on the products of such discharges, that nitric acid was the likely source of condensation nuclei produced in their coronas.

Later, Pinart et al. (1996) showed, by direct analysis of an aqueous phase covering the lower electrode (in an investigation using a standard point-to-plane geometry), that both nitrous and nitric acids can be formed reproducibly in the air whose nominal humidity was 100%.

In the experiments of W2 that are of prime interest here, the source of ultraviolet light was an electric arc between either zinc or cadmium electrodes. This was energized by high voltage discharges from an induction coil plus capacitor combination, the component values being chosen so as to maximize the brightness of the arc. The UV light had been focused, using silica lenses of various focal lengths, into variously shaped vessels containing dust-free air that was saturated with water vapor.

These vessels were mostly horizontal tubes of several cm diameter. Perhaps the most encouraging aspect of Wilson's studies (to anyone attempting reproduce his findings) was that he used many different shapes of vessel, several different metal components in contact with the vapor and a variety of different materials for sealing the cells containing his water-saturated air.

The only apparent restriction was that the beam of UV should not be shone directly onto a metal surface inside the cell. Apart from this restriction, necessary to avoid complications from electron release at the metal surface, none of the materials chosen appeared to influence the conditions under which clouds were formed. For this reason, there appeared to be considerable freedom in the choice of the materials of construction and of those used as seals. We took full advantage of this fact.

Wilson did not explain his choice of zinc and cadmium for his arcs. It seems that a normal carbon arc must have failed to yield condensation in his experiments. This would probably have been the case because the emission is mainly thermal in a carbon arc but predominantly through spectral lines if the arc is metallic. Several years later, Vincent (1904) successfully used an aluminum arc to produce mists. All three metals produce numerous emission lines in the UV. It is worth considering *why* no independent confirmations of the most unusual of the W2 results ever seem to have been published.

Any early attempt to reproduce them is likely to have demanded, as in Wilson's own case, a basically trial and error approach that might well have proved far more time-consuming than was thought worth the effort. This could explain the lack of any supporting evidence by other physicists for the observations. Our early attempts to reproduce the findings of W2 certainly implied that if most of Wilson's unexplained findings were ever to be replicated, a largely trial-and-error approach would still be needed.

Most likely, this was because of the number of questions, the answers of which were unclear. The list includes the following:

(i) On what basis did Wilson choose to use zinc and cadmium electrodes to produce his arcs?
(ii) How pure would the two metals providing the arcs have been ?
(iii) Is it likely that multiple emission lines are needed, each facilitating a different reaction step?
(iv) How powerful and how thermally homogeneous would the arcs have been?
(v) How important might the focusing positions of the different wavelengths have been?
(vi) How certain is it that traces of volatile impurities in the water did not influence the observations?

4. OUR MORE RECENT EXPERIMENTS

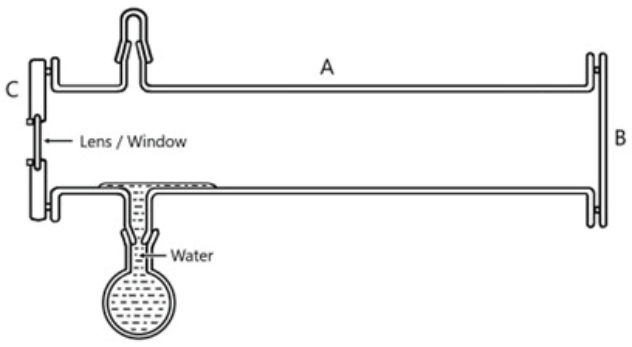
4.1 Experimental Details and Early Findings

Most of the above questions had not even been raised when our experiments were begun, but they very soon needed addressing since all our initial attempts to repeat the findings of W2 failed. It quickly became apparent that the above questions would not all be easy to answer. If attempts to reproduce all of Wilson's findings using UV light had been made soon after they were reported, there could still have been serious obstacles resulting from a lack of answers to one or more of these questions. The experiments of Vincent (1904) illustrated this problem. However, one simple point seemed clear: the strangest of Wilson's findings in W2 are unlikely to be explicable unless *ionization* was being produced by the UV radiation he used. All our experiments were conducted at temperatures close to 21^0 C. Most were conducted inside a glass cylinder 300 mm long with an internal diameter of 50 mm. Its ends comprised identical flat rings of glass (having 50 mm internal and 73 mm external diameters) with an o-ring groove incorporated, the outside diameter of which was 65 mm. Two tubes of 18 mm internal diameter were placed opposite one another and mounted normal to the axis. They were located 50 mm from one end of the cylinder. These allowed water in the cell to be adjusted to any required depth.

The cell was designed for flexibility. Its main features are shown in Fig.1. Component A represents the cylindrical glass vessel containing humid air while B normally consisted of an acrylic (Plexiglass) plate sealed, using o-rings, to one end of the vessel. With appropriately placed holes in it, B allowed a variety of inserts into the cell. Component C is a standard aluminum support for either lenses or windows (sold by Edmund Optics). The latter components were all made of pure silica, and they initially permitted radiation with wavelengths down to 200 nm to enter the cell.

Except in the very earliest tests, filtered water-saturated air was pumped into the vessel of Fig. 1 using a glass tube (sealed with epoxy) through B and out through the side tube at the top of the vessel. The process was normally continued for a minimum of 30 minutes at a rate of 2 to 3 liters per minute. Any residual gas motions in the vessel were then allowed to dissipate for at least 5 minutes before UV radiation was applied.

Figure 1. Sketch of the Basic UV Irradiation Cell.



Holes in item B of Fig.1 permitted introduction into the cell of filtered air plus components in the form of thin support rods, thermocouples, or thermistors. The end of the cell where these introductions were normally made will be referred to as the 'far end' while the UV admitting end, on the left, is called the 'near end'. The cell could be mounted with its 18 mm diameter side tubes near either end of the cylinder. All the early tests, plus a few of the later ones, used radiation from focused zinc arcs.

The vessel, and its associated components, were mounted on a metre length optical bench. The axes of the optical components, either lenses or windows, were normally aligned as closely as possible with the axis of the cylinder but the cell could be tilted to provide different depths of water along its length. It could also be moved transversely if the use of a rather large diameter insert was required.

UV light was always admitted at the near end of the cell and initially always through windows or lenses made from "UV grade" silica that had been coated for maximum transmission above a wavelength of 200 nm. In all the experiments from which significant conclusions were drawn, mists or clouds in the cell were identified through their scattering of light from the red beam of a helium-neon laser whose output had been expanded to provide a nearly parallel beam about 15 mm wide. It was necessary to undertake the testing for condensation in the dark, and digital images, either still or as movies, were made when appropriate.

The cell did not precisely duplicate any of the ones used by Wilson, but his work implied that this is unimportant. He used a wide variety of cells in his three papers. In W2, 18 different designs were employed, and still others were used in W1 and W3. A variety of metals and sealing methods was employed, but none appeared to influence whether or how fast mists formed. Slight differences in mist formation rate might have been present, but none were reported. In our first few experiments, Wilson's method of cleaning the air by forced condensation on dust in a preliminary near-adiabatic expansion was used. However, for our experiments, it was soon realized that commercially available filters effectively remove all traces of solid condensation nuclei. A very surprising observation Wilson made was that, with a UV source of sufficient power, in contrast with the use of X-rays and

gamma-rays, mists could be obtained using UV *without applying any adiabatic expansion at all* to the humid air. None of our experiments from which any conclusions are drawn employed such an expansion step.

Because arc lighting equipment is no longer commonly used, we initially formed our arcs using what is known as TIG welding equipment. This employs a thin, pointed electrode of tungsten held above the metal to be melted. When used on an easily oxidized metal like zinc, it is supplied with a flow of argon as close as possible to the metal being welded. In our arc source, the electrodes were mounted vertically, and the gas was supplied vertically from above. To keep the arc as cool as possible, the lower electrode, a 13 mm diameter zinc rod, was surrounded by a thick (35 mm outside diameter) copper cylinder. This rested on a square copper plate with four thick copper legs screwed to it. The whole assembly was cooled by forced air flow - at room temperature - underneath this copper "table".

Initially, the electrodes were supported inside a cube-shaped box (having 100 - mm sides) through holes in the box. The box was constructed from a building material sold as a substitute for asbestos. Two circular holes, opposite one another and at right angles to the axis of the electrodes, were provided. One was fitted with a short tube closed with a silica lens of 50.8 mm diameter. Another hole, on the opposite face of the box, allowed the extraction of any zinc oxidation products and the argon. The position of the arc relative to the lens was such that it allowed a 75 mm focal length lens to focus the parallel beam, leaving this lens, through silica components, into the glass cell. After a few minutes of operation, a small (3 mm dia.) puddle of liquid zinc would be established at the top of the zinc rod.

With this arrangement and modifications to the dc power supply of the welder - to reduce its power - a stable arc could be maintained for 30 minutes. This was the length of time that Wilson had found was quite sufficient for condensation to be produced in water-saturated air. All experiments prolonged much beyond 30 minutes resulted in obvious evidence for overheating inside the enclosure. The experiments all failed to produce mists. An obvious potential cause for our failure was that the ratio of IR to UV radiation was too high.

In the context of this failure, it is also relevant to refer briefly to some historical matters related to Wilson's findings in W2. Several physicists succeeded in following up on his earlier and later findings concerning condensation following the adiabatic expansion of water-saturated air (Mason, 1971). These studies have led to a general acceptance of the fact that air needs to be at a minimum of 100% saturation with water vapor before cloud formation is possible. However, Wilson's findings that this is not always the case (under UV irradiation) seem to have been completely ignored since about 1904.A point of potential relevance to our initial failures to produce mists seems relevant also to the matter of why these particular findings of Wilson were not duplicated soon after their first being reported. In Vincent's (1904) study, zinc electrodes were not used to produce the UV illumination; instead he used a spark between electrodes of aluminum. He did not explain this choice, but it might well have been that his zinc arcs had failed to produce mists just as ours did. If this is the case, it might well be that Wilson happened to have been very fortunate in the precise impurities (and their concentrations) in the zinc he had used (see later).

Vincent was a chemist at a far less prestigious laboratory than the Cavendish. This might help explain why his findings were neglected. Nevertheless, with the help of Wilson and Thomson, he did succeed in confirming condensation at 90% relative humidity. However, he failed completely to detect any hydrogen peroxide in the condensate. The latter evidence seemed to confirm Wilson's original assumption that his clouds had resulted as a consequence of nitric acid formation. This matter is discussed a little more fully in the Appendix.

One obvious potential cause of our failures to form clouds was that we had felt the need to use 21st century safety standards (by enclosing the arc in a box). Zinc was chosen since it is less poisonous than cadmium. A very plausible cause of the failure was that the ratio of IR to UV radiation was too high in our arcs. In order to investigate this possibility, a few attempts were made to measure internal temperatures, but it proved impractical to shield the sensing elements of the detectors from the IR radiation.

A more realistic approach was therefore tried. This was to remove the IR by means of a grating filter specifically designed for this purpose (Edmund Optics # 85-299). Again, no mists could be detected. It was clearly possible that the filter's inability to pass UV below a wavelength of 240 nm might be responsible for this failure. However, it seemed equally likely that the problem lay with the zinc.

It had originally been decided to use a commercial grade of zinc rather than a high-purity metal on the grounds that *impurities* in the zinc Wilson had used might have been responsible for the ionization his arcs had produced in the air. At this stage, multiple emission lines were thought more likely to aid condensation than to inhibit it. It also seemed possible that the pulse rate of the UV was important. Later experiments used the UV from a variable frequency pulsed power source that used an induction coil circuit. It was hoped that this would mimic (and be more flexible than) the circuit used by Wilson.

The electrodes used in these open-air arc experiments consisted of sharpened pairs of zinc rods. First, the old commercial-grade zinc was used with air extraction as close as possible to arcs. Then, 99.95% pure zinc was used. Neither kind of electrode succeeded in producing condensation in the cell. Wilson's success might have resulted because the precise impurity content happened to be optimal with the metals he had used. This suggestion seemed possible after consulting an old chemical encyclopedia (Mellor, 1928). It seems that trace impurities in any sample of zinc can differ surprisingly greatly depending on the *specific mine* from which the zinc ore was extracted.

For this reason, even the 0.05% of impurity in our "pure" zinc might have been significant. Alternatively, specific impurities might be needed. Emission line intensities for different lines differ enormously (Lide, 2003), so the impurity content of Wilson's zinc might well have been crucial. This seems to be the most likely reason we could not replicate Wilson's findings. Insufficient power seems a less likely cause of our failures. We never did succeed in discovering why we could not replicate Wilson's results with zinc electrodes. It is certainly possible that all early attempts by Wilson's contemporaries failed to replicate his findings for this reason.

Before describing our more significant experiments, it is convenient to mention some of our early ones which were only partial failures. They were conducted inside ordinary 2-litre glass flasks and in a 250 cm^3 Dreschel bottle, both vessels being open to the air. UV was admitted to the vessels using a miniature mercury vapor lamp whose emission tube was 50 mm long and 7 mm wide. It was made by Analyic Jena US and produced light intensities, at 254 nm, of a few mW cm^2. The use of this lamp failed to produce clouds over distilled water but succeeded, within a few minutes, above fairly dilute solutions of hydrochloric acid. This provided much-needed encouragement that it might still be possible to confirm at least some of Wilson's other findings.

Our most crucial experiment, using the cell of Fig. 1 and this miniature mercury vapor lamp, resulted from an accident. The lamp had been temporarily placed within a few mm of a silica lens that happened to be in use. While discussing many of our failures to produce mists (and the partial success using dilute hydrochloric acid), the lamp was accidentally switched on, and we were amazed to see that a mist was produced in the distilled water-containing cell within a few minutes. The focal length of the lens in use at the time happened to be 100 mm, and a lamp placed that close to the lens was obviously producing a hugely divergent beam within the cell. Using the mercury pen lamp, we then found it totally impossible to produce condensation in the cell when any of our other lenses or a silica window was employed - so this finding seemed incomprehensible.

No sense at all could be made of any of our numerous earlier results until the significance of two facts started to become clear. One was that the technology for producing low reflectivity coatings of optical components would not have been available to Wilson, and the other was that mercury possesses a much lower frequency emission line than the one specified by the manufacturer of the lamp. The specified line is at 254 nm but mercury also possesses a much weaker line at 185 nm. All our original lenses were rather thick and had multilayer coatings on them that passed very little energy at wavelengths below 200 nm. These coatings *should* have completely stopped mercury's 185 nm line - based on the curves in various manufacturers' literature.

The only possible explanation for our finding seemed to be that the more energetic line was the one producing condensation in our experiments - but how could the 100 mm focal length lens *and only that one* have passed radiation UV at 185 nm? This question was answered when our earliest records were consulted. These revealed that previously unobserved damage had been done to *part of* the anti-reflection *coating on one face of this particular lens*. The damage had occurred during the experiment *immediately prior* to the accidental production of our first cloud in the vessel of Fig.1. An area on one face of this lens (defined by a straight line that would have been horizontal when it formed) had *lost its coating*. The damage was only obvious when viewed very carefully in optimally directed light.

The partial removal of the anti-reflection coating occurred during what was the *only* early experiment in which the cell of Fig.1 contained dilute hydrochloric acid instead of distilled water. It had been noted at the time that the level of the acid in the cell was unusually high in this experiment, and this was consistent with the position of the line on the lens. It now seems clear that, during our first production of a mist in the cell of Fig.1, a little of the 185nm UV had penetrated one layer of the lens coating (on the outside), and then the portion of the lens that had been previously in contact with the UV-irradiated HCl, the accidental treatment having removed the submerged part of the coating. This explanation was confirmed by the intentional removal of the coatings on other lenses, using UV irradiated HCl solutions, and/or by gentle grinding of the lens surfaces, also when a new, un-coated window was used.

Because the 185 nm line is strongly absorbed by the air, we could not *focus* the light into our cell as Wilson had done. Fortunately, our *unfocused* 185 nm line of mercu-

ry produced mists much faster than Wilson's *focused* UV. However, because the beam was divergent inside the cell, and because it was clearly producing local refrigeration where the aerosols were forming, it was initially very difficult to avoid condensation on the inside of the glass vessel (component A of Fig. 1) in what would otherwise have been an optimum viewing position. Presumably, Wilson had been able to avoid this problem by using a focused beam, and nothing we found later contradicted this assumption.

Two reasonable expectations of the condensation behavior were soon established. One was that clouds would form more quickly the nearer they were to a water surface. Also, the presence of significant IR radiation does indeed inhibit cloud formation. With the exception of a few experiments in which a saturated solution of KCl replaced pure water, no effects from changing the water level or tilting the cell were observed - though more quantitative measurements might have revealed them. In a few experiments where changes were observed, a gradual separation of solid KCl from the surface of the solution was observed.

This was presumably caused by rapid surface evaporation of water as numerous invisibly small aerosols in the air grew in number and size.

The solid KCl caused an obvious change in the pattern of reflections within the cell, after which extremely thin mists were eventually detected - but only after prolonged UV exposure. It seems clear that Wilson's clouds could not have been produced by radiation at 185 nm because he had used focused beams requiring paths in the air that would have stopped all radiation much below 200 nm. The tests with KCl were made to check the effects Wilson found on relative humidity. He had only used an acid and a base to achieve this change, so we tried a salt whose solubility was high enough to reduce the relative humidity to below 90%. Condensation was easily detected with solutions slightly *below* KCl saturation, in which the relative humidity would have been about 86 %. The only reasonable explanation for mist production at relative humidities below 100 % is refrigeration close to small hydrated nitrite ions.

In our experiments, with both KCl solutions and distilled water, we eventually noticed that the pattern of condensation within the cell was not what would have been expected on the assumption that condensation would begin where the UV intensity is greatest. In some of our earliest experiments, this assumption appeared to be justified. In these experiments, component C of Fig.1 was replaced by an acrylic plate through which the mercury lamp was placed so that it was in direct contact with the air in the cell. In this case, condensation appeared to have first formed very close to the lamp. However, because of condensation on component A of the vessel, this was uncertain, and later experiments suggested that no condensation was likely to have occurred very close to the UV source. Shields for eye protection were always employed, and they could add to the difficulty of distinguishing condensation close to the lamp from that on the cylindrical glass of the cell.

Whenever cloud formation was observed *clearly*, which means that droplets were *not condensing locally on a surface in the viewing path*, the clouds would appear to fill the vessel in such a way that condensation was first observed a few cm from the lamp. Condensation would eventually be fairly uniform except close to solid surfaces and in regions that the cloud had yet to reach. We never managed to correlate the precise positions of the mercury lamp with the observed locations where water had condensed on the surfaces of the glass cylinder (A of Fig. 1). Multiple reflections inside the vessel, combined with the imprecise positioning of the lamp, seem to have been responsible for this. It was eventually concluded that a combination of slow aerosol growth and the diffusion of water vapor completely determined where mists would first be observed.

Had the accidental de-coating of one lens not occurred, we might never have learned enough to understand most of our earlier detailed findings. One thing seems very clear: Wilson's clouds could not have been produced by radiation at 185 nm because its absorption in the air would have stopped it completely. The clear evidence that Wilson's UV took longer to produce condensation than ours is fully consistent with the implication that it was the lower wavelength of the mercury radiation we used that was responsible for our eventual success.

Some Semi-quantitative Evidence

It seems obvious, based on earlier considerations (Turner, 1994, 1998), that the most likely cause of the unexpected condensation found by Wilson was that metastable nitrous acid is formed in experiments like his. It also seems obvious that any acids produced (nitrous or nitric acids) need only to have been present in very small quantities and that, quite possibly, insufficient material was present to permit either acid to be detected by any method that was both simple and reliable.

However, it so happened that some pond-water test papers had been purchased shortly before the experiments were begun, but none had been used, and all were still in their sealed can. These papers allow testing for pH, nitrates, and nitrites. Their normal use requires several ml of pond water to give reliable results. Nevertheless, it

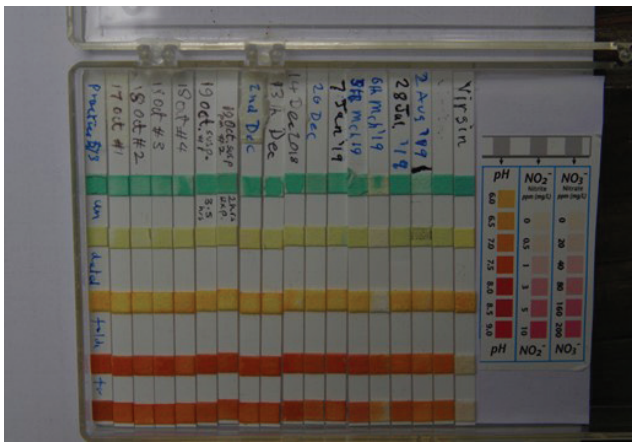
seemed just conceivable that something might be learned by testing the wet parts of the cylindrical glass vessel after the completion of an irradiation experiment. The test papers being to hand, a few tests were made using them. It is convenient to discuss here what was found with the test papers - before our more significant observations are described.

Plate 1 shows the results of 16 tests with the papers that were undertaken over a period of nine months. All the used papers were eventually stored together in a small transparent plastic box (visible in Plate 1), which was just wide enough to hold them. They represented a wide range of experiments, but no obvious relationship with the experimental type or detailed observations was found. The two top rows of colored squares in Plate 1 relate to pond chemicals of no current concern. The lower three represent pH, NO_2 and NO_3 respectively. A copy of the standard colors that permit estimates of concentration is provided to the right. The dates of the tests are indicated in the top row, with the oldest date on the left.

The last two papers on the right were never used in the irradiation cell, the one marked virgin having been placed with the others in the plastic box that held them all *just before* the photograph was taken. The other one, the unlabeled one, was put in the box at the same time as the last dated one. It is clear, from these two papers (never used in the cell), that slow changes in apparent nitrite and nitrate concentration had taken place *solely* as the result of being confined within the box. Obviously, *only freshly observed colors* have much value.

In some experiments, the papers were pre-positioned in the air near the cloud-forming region, while most simply tested the inner surface of the glass cylinder after the experiment had been completed. An important point concerns the pH values indicated. When the sealed can that originally contained the papers was first opened, the pH indicated on all the fresh dry papers was 7 - that is pH neutral. The first seven tests (up to the 19th of October, 2018) made inside the cell all indicated a pH at or below 6, while the dry, unused papers still indicated a pH of 7. By the time of the 2nd of December experiment, however, the unused, initially dry papers were all indicating a pH of 6 even *before* they had been used. This is quite normal due to the formation on the papers of carbonic acid from moisture and CO_2 in the air. The pH values of 6 or below in *all the earlier tests*, however, show clearly, that the aerosols formed were acidic. Since hydrated protons are the only cations likely to be present in the samples, this finding was to be expected in the presence of either of the nitrogen oxyacids.

Plate 1. Test Paper Results s for pH, Nitrite and Nitrate.



In Plate 1, the two papers that had never been in the cell (those on the right) show obvious evidence for color changes with time spent in the plastic box (for both acids). Presumably, these changes in color occurred in *all the anion-detecting strips* as a consequence of one or more volatile components (presumably nitrogen oxides) being released from other papers that had been stored together. Nitration of the aromatic rings of the dye used for detection is the probable cause of the color changes.

Whatever the cause, however, the papers used to test the droplets *immediately after* opening the cell (which were never photographed) were the *only ones* likely to be at all meaningful. It took several hours in the box before the fresh colors started to change noticeably, but even the fresh NO_2 and NO_3 tests are obviously of limited value *quantitatively* since they had probably started to change color while still in the cell (due to the presence of nitrogen oxides). Despite these problems, however, there is little doubt that, among the products of irradiation are nitrous and nitric acids or that more nitric acid than nitrous acid had been produced in all the aerosols (and in condensate on the cell walls). All the dated tests indicated in Plate 1 were made on samples that had been exposed to UV in the cell for longer than a quarter of an hour. No tests of shorter duration were made.

That the chemical reactions between nitrogen compounds in the air are very complex has been known for well over a century (Mellor, 1928), and because of their role in air pollution, huge numbers of relevant reaction rates have been measured over the last half-century. In the present context, such data cannot make any useful predictions concerning the important gas phase reactions because nearly all the rates available involve radical intermediates, and none of them have ionic intermediates. Of course, reactions mediated by radicals will still proceed and will occur in parallel with the more relevant ion-mediated reactions. For such reasons, some of the already known complications in air chemistry can usefully be mentioned.

One is an *equilibrium state* that has long been known to be attained fairly rapidly in a system that includes gas-phase nitrous acid and liquid water (Lewis & Edgar, 1911). It can be represented as Reaction 1. In this representation, *all the species, except for the ions, can be components of either phase*.

$$3\,HNO_2 = 2\,NO + H_2O + H^+(aq) + NO_3(aq) \quad (1)$$

Clearly, even if this reaction were to be the only one occurring in our experiments, data on at least the diffusion rates of HNO_2 and NO in both phases would be needed to quantify anything about the detailed mechanism of cloud formation. However, the real situation is far more complicated than this since other oxides of nitrogen will also be present. We can obviously only use detections of NO_2 and NO_3 as *qualitative indications* of the final products of some of the complex processes that must have occurred. However, this does not mean that the results are without value. None of the tests made immediately after exposure indicated a nitrate concentration of more than 60 ppm, but the aged ones *falsely* imply levels close to 200 ppm (if the obvious changes in color are ignored). Also, only three freshly indicated nitrite values were much above one ppm (compared with 10 implied from the papers later).

Despite these complications, it is virtually certain that nitrous acid was produced. The presence of ozone, which is a well-known product of UV irradiation of the air, suggests that nitrous acid was probably formed first, and most of it later oxidized, possibly by ozone, to nitric acid. Little more can be deduced. However, the stored papers do contain other information that is informative. It is obvious from Plate 1 that a few of the chemical test pads have been almost completely bleached while others are only partly faded. This implies that the chemicals formed by the photolysis were not uniformly distributed in the moist air of the cell. This is hardly surprising since the clouds were not uniformly distributed.

A likely bleach is ozone, since forming O atoms from oxygen does not require much energy, and these atoms can react fairly rapidly with oxygen molecules to yield O_3. Several test papers were supported inside the cell *during the experiments* (some were in contact with the cell surface and some were in positions where mist could form). There was no obvious correlation between any of the test results and where the papers had been placed. Bleaching of the papers occurred slowly and was not, in fact, noticed until they had been stored in the plastic box for several days.

The main conclusion from these crude experiments is that the production of mists, on irradiation with UV, almost certainly involves the formation, in the gas phase, of metastable nitrous acid and its subsequent oxidation to nitric acid. The formation of nitric acid could only have arisen either inside aerosols or very close to where the nitrous acid transformations were cooling the air. This is because nitric acid is stable *only* if the temperature is below 15^0 C (Turner, 1998) and the cell was at room temperature, which was close to 21^0 C.

In W2, Wilson reported producing very inhomogeneous clouds in some experiments, and we have clearly observed similar phenomena. The lack of homogeneity implied by the bleaching of the test papers implies that all the nitrogen-containing species present would also have been distributed non-homogeneously. Clearly, the processes involved in oxidizing nitrogen to oxyacids are very complicated. Despite this, it seems absolutely certain that both nitrous and nitric acids were produced in all successful tests and that much more nitrate than nitrite was eventually formed. Because of the lack of homogeneity, it is clear that far more detailed experimental studies (if possible at all) would be needed if we wish to use similar experiments to learn more about the *detailed processes* that produce *local refrigeration and cloud condensation* in moist air.

Comparisons with Wilson's Findings

After it became clear that we could not *precisely* duplicate any of Wilson's experiments, we tried to replicate them more closely by using a pulsed arc across a pair of zinc electrodes - instead of the continuous arcs produced by the TIG welding setup. It was speculated that a continuous and a pulsed arc might well lead to significantly different chemical outcomes in the two kinds of experiment.

Our pulsed arc was produced by driving the spark between zinc electrodes in the secondary circuit of a traditional motor car ignition system. The coil's primary circuit was fed with a current of rectangular wave- shape, the drive circuit allowing for control of the output pulse duration, frequency (in the range 40 -220 Hz), and polarity. The resulting 32 kV output pulses allowed us to generate arc-lengths of up to 8 mm.

Both the original zinc and a pure (99.95 %) variety were employed in the new experiments.

This method of energizing the zinc arc also failed to produce radiation that could induce condensation in our humid air. Following these tests, only the small mercury vapor lamp was used. Its use proved unexpectedly informative despite what turned out to be the impracticality of focusing its light into the cell. All attempts to focus our lamp's UV (using an evacuated focusing chamber fitted with CaF_2 windows) failed. CaF_2 transmits somewhat higher energy UV than does silica - but it seems not to be

available in lens form - only as windows. It should not be concluded from these failures that focusing the 185 nm line of mercury is impossible or even particularly difficult.

The reasons for believing this are twofold. Firstly, our lamps were not very powerful, and secondly, 185 nm is very close to the cutoff wavelength where silica loses its ability to transmit UV *even with the purest silica available*. Our experiences with a nominally identical mercury vapor lamp (from the same manufacturer) illustrated the second problem. A second lamp was purchased because of the possibility that the first one might be losing power. However, the new lamp turned out to produce mists considerably *more slowly* than the first one. Since we were using the lamps at a wavelength well below that specified by the manufacturer, we had no reason to believe that the new lamp was in any way substandard. It seems we had simply been very fortunate in the high degree of purity of the silica envelope that contained the mercury in our first purchase.

One of the most surprising findings that Wilson reported in W2 resulted from his placing a finger directly below one of his cylindrical glass vessels that contained a *freshly formed* mist. When UV light from his arc was focused into a cell containing only dust-free water-saturated air, mist eventually began to form at the precise location of the focus. It then slowly expanded in all directions from this initially small volume. The non-homogenous mists produced in this way would display totally random motions until a finger was placed underneath the cell near the position of the focused beam. Then, soon after heat from a finger was applied, the mists became organized into vertical patterns of scattered light. Localized thermal effects were implied.

Clearly, the mists produced by UV radiation are very sensitive to tiny temperature gradients. This is expected to result from the refrigerating gas phase reactions proposed in the original ball lightning model (Turner, 1994). Since we were unable to produce clouds using focused beams of UV, we were obviously unable to reproduce Wilson's findings precisely. Nevertheless, the unfocused UV beam from the mercury vapor lamp did display what appeared to be *closely related* motions of the clouds when a finger was placed for several seconds under the cell.

The 185 nm line of mercury is absorbed by silica and by air, so the thinnest available optical components were employed. Most used was a 1mm thick silica window close to which the mercury penlight was placed. Patchy clouds were produced that would sometimes display swirling motions. The swirls had curvature radii of a few cm. Their motions, not surprisingly, were very dependent on the precise positioning of the lamp.

This was mainly because of the finite length of the lamp discharge and multiple reflections inside the cell.

None of our original silica components could pass radiation at wavelengths below 200 nm. On the basis of the best thermodynamic data available, multiple UV photons would have been needed to promote ionization in the air. The need for more than one photon is presumably part of the reason Wilson found that ionization by UV is so much slower than by X-rays and why we found that condensation produced by the 185 nm line of mercury was significantly more rapid than that observed by Wilson.

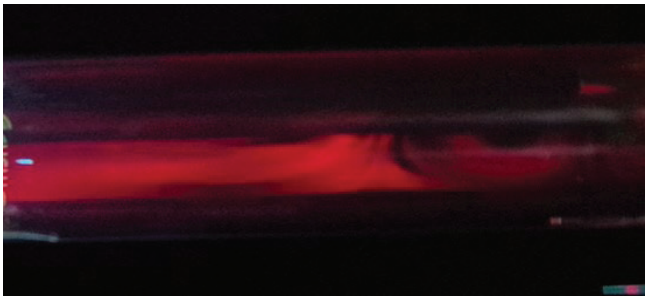
There have been numerous different chemical intermediates present in the UV-irradiated air, but these need not all be favorable for the ionization of the air. Extra emission lines in an arc are, in fact, just as likely to inhibit the overall ionization process as to enhance it. Any *essential* intermediate could easily fail to produce a specific intermediate that is crucial to ion production if it can more easily lose its energy through some alternative reaction path that might be facilitated by some specific spectral line. The differences between our results and Wilson's imply that this could have been the case.

Unfortunately, this is not the only possible reason for our earlier failures. Whether or not our difficulties resulted from different impurities in the various sources of our zinc, there is also the problem, raised at the end of Section 3, concerning the possible role of trace impurities in the air that might be introduced as the result of trace impurities in the water used. In all except our earliest experiments, the distilled water used was readily obtainable in supermarkets. This is provided in plastic containers, while Wilson will almost certainly have used water purified by distillation from a tin-lined still and then kept in glass. It is reasonable to assume that the oxidation state of any trace impurities in the water might differ between Wilson's experiments and ours.

For this reason, an opportunity was taken early to purchase a fairly old, tin-lined water still. In our earliest experiments, it was used to test whether there was any difference in the ease of producing mists using the two sources of water. There appeared to be no difference because, in these early tests, no condensation was induced. Thus, we did not investigate directly whether or not trace impurities in the water might have influenced the rates of mist development. Such an investigation might conceivably prove informative in future experiments, but simpler and more direct approaches seem preferable.

If we had later used water from the tin-lined still, the slow rate of water production would have significantly reduced our rate of experimentation. This was the main reason the use of the still was abandoned, but it already seemed probable that other causes of failure would present more serious problems. This assumption seems

Plate 2. A Single Frame from a Video Image of Cloud Motions.



to have been justified by our later experiments.

Plate 2 shows a single shot from a video image of mist formation. It is less clear than the original, but it still shows the mist in the expanded laser beam after a finger is placed repeatedly to the right of the swirls for between 1 and 3 seconds.

Plate 3 was obtained much earlier - before the initial problems of condensation and reflected light had been minimized. The colors in this image are by no means correctly reproduced but Plate 3 does show one type of swirl more clearly than do any of the later shots.

Many video images were obtained of the development of the clouds and of their responses to placing a finger underneath the cell. Condensation usually developed until thin mists covered most of the cell toward the far end and then they would thicken. Although thermally induced movements in these clouds could still be produced in the thick clouds formed after fairly long exposure, very much longer contact of the finger with the glass was required before any cloud motion could be detected. This is qualitatively to be expected on the basis of the *thermodynamics* of the ion re-combination reactions:

$$H_3O^+.nH_2O + NO_2^-.nH_2O \rightarrow HNO_2 + (2n + 1)\,H_2O \qquad (2)$$

The reasons for this expectation have been discussed elsewhere (Turner, 2024).

The individual reactions represented by the generic one (Reaction 2) are believed to be largely responsible for the occasional stability of lightning balls since, when n rises above about 6, the reactions begin to extract heat from the local air rather than adding to it (Turner, 1994). However, once n exceeds about 25, the reactions become *thermodynamically impossible*. Thus the large ions are stable, there being no longer a driving force for charge neutralization.

This implies that it is only in the very early stages of aerosol growth that refrigeration of the air is possible. The restriction probably explains the fact that the clouds are most sensitive to the heat from a finger at the earliest stages of cloud formation. It also shows the vital importance of Reaction 2 in cooling the air close to an air plasma surface. One consequence of this very localized refrigeration process, when air is close to an extremely hot plasma, is that lightning balls occasionally crack circular holes (of apparently the same sizes as the balls themselves) in glass windows (Grigor'ev, Grigor'eva and Shiryaeva, 1992; Turner, 1997).

In later experiments, a somewhat more straightforward view of the condensation process was obtained when the lamp was inserted into a silica tube (wall thickness 1 mm) that was mounted between acrylic plates at each end of the cell. The lamp was supported inside this tube close to the end of the cell, and a continuous flow of air was maintained down the tube to cool the lamp. With this arrangement, a thin band of cloud would form not far from the lamp, and then it would slowly move to the far end of the cell, leaving a cloud-free region of air behind the advancing cloud. Again this behavior is consistent with the thermodynamics of the processes summarized by Reaction 2.

Thermal influences like these appear to be close analogs of the effects that Wilson reported in W2. However, they may have the potential to be more informative in the future. Local refrigeration seems the only reasonable explanation for the effects. These effects might be interpretable quantitatively in the future. They would need to be interpreted in terms of hydration rates, cluster sizes, diffusion rates, and the thermodynamics of Reaction 2 and other reactions. We have seen that refrigeration seems only to be possible when hydration numbers lie between about 5 and 25. However, these figures strictly apply *only to standard state conditions* and with identical hydration numbers for the two ions H_3O^+ and NO_2. More detailed studies would be needed if much more is to be learned. However, such studies might at least allow us to learn the real degrees of hydration that are needed to produce naturally contained air plasmas.

By the end of the 19th century, ionization in gases induced by X and gamma rays was well known. However, this was not the case when UV radiation was used. Nevertheless, Wilson was in a position to contrast his own

Plate 3. A Much Earlier Clip from a Video Record.

findings with measurements of ion recombination rates in various gases that had been blown past a source of X-rays (Rutherford, 1897). Rutherford had found that, in pure oxygen, the ions produced were small - having diameters representing a cluster of about 5.5 molecules. He pointed out that to explain the observed results, the carrier (of electricity) need not be greater than 5 times the radius of the molecule. In these experiments, the oxygen will presumably have been thoroughly dry, so *only O_2 clusters* were present.

On the other hand, in W3, Wilson showed that the ions produced in water-saturated, adiabatically-expanded air that had been exposed to X-rays were very much larger than this. Their velocities, under moderate electric fields, were several thousand times smaller than those produced by X-rays. In some ways, the most surprising of Wilson's observations in W3 was that, following irradiation, the two characteristic sets of values of v_2/v_1 (1.25 and 1.31) needed to begin producing clouds when the moist air was expanded were remarkably similar to those observed in the *absence* of ionizing radiation (1.25 and 1.38).

Wilson deduced that the ions producing condensation at the lower value of v_2/v_1 were anions, while expansion ratios of 1.31 were needed before any cations could begin acting as condensation nuclei. This is consistent with Thomson's (1898) inference that the Earth maintains its negative charge because the anions in the air fall faster than the cations present. This explanation *still seems to be ignored* by meteorologists and lightning engineers even though it had been demonstrated experimentally more than a century ago and had later been shown to be readily explicable electrochemically (Turner, 1998).

Assuming that Wilson's basic assessment of his data is correct, there seems to be a simple explanation for why X-rays and high-energy UV behave so differently in promoting condensation. A single photon of an X-ray (or gamma ray) could be sufficiently energetic to separate a pair of ions *and* impart sufficient *kinetic* energy to them to propel them to a distance where hydration is possible, but mutual charge annihilation is not. As a consequence, clouds form almost immediately. Under UV irradiation, however, little energy above that needed to produce ionization is available to separate the ions very far (through their kinetic energy).

Hence, aerosols formed by UV irradiation can take half an hour or so before becoming visible. The condensation nuclei that eventually form clouds will, in this case, consist of large (water-separated) *ion pairs* so that their local electric fields will have been far smaller than with the isolated ions. Condensation will inevitably be slower. It seems very unfortunate that it has taken so long to learn a little more than Wilson had demonstrated. It seems we might, by now, have had a much better understanding of the physical and chemical processes that occur in clouds if Wilson's early findings had been followed up by more than a single chemist (Vincent, 1904) or if his experiments had been *conducted a decade or so later*, by which time the importance of Gibbs' work on thermodynamics might have been applied to the problem.

Some Quantitative Considerations.

Our findings, on their own, imply that the only requirement for forming clouds in moist air is that very high energy UV (so-called UVC) radiation be present. However, Wilson's results show that very energetic UV is *not* necessary. It is clear (from W2) that a range of lower energy spectral lines can *sometimes* achieve the same crucial result: the production of metastable nitrous acid that is later oxidized to nitric acid. The differences in the two studies should not be too surprising since many plausible intermediates in the oxidation of nitrogen exist, and they possess a very wide range of lifetimes.

As we have seen, we possess far too little information to discuss possible reaction mechanisms, but we can consider any *thermodynamic* constraint that it is possible to apply. In this context, it is particularly informative to consider the energetics of Reaction 3:

$$\gamma + N_2 + O_3 \rightarrow NO^+ + NO_2^- \qquad (3)$$

because ozone is easily produced by low-energy UV, and it is known to have a long lifetime in the air. Here, ã formally represents a mole of photons. All the other species are considered to be in the gas phase and in their standard states. The reaction products are the lowest energy ions known that can be formed from the main components of completely dry air (Turner, 1994). The reaction can be taken to describe, symbolically, the uptake of a single photon per molecule of nitrogen *as if* the photon is in equilibrium with species in the air. The process is a purely symbolic one for several reasons, among them that the photon is traveling at the speed of light, and so can hardly be at equilibrium. However, the *enthalpy* needed to *permit* Reaction 3 to proceed can be very relevant because, in general, energy differences are always important and because both gas phase ions produced in Reaction 3 happen to be well characterized thermodynamically.

While the problems introduced by electrostriction in moist air are expected to be very serious *for the free energies of formation of hydrated ions* at equilibrium (Turner, 2023), there is no known reason to expect that *standard enthalpies* of formation of the *dry ions* (those formed ini-

tially), will behave in any way anomalously. Thus, the enthalpy values for the formation of the molecules and ions involved in Reaction 3 all have well-defined meanings. These values are 0 + 142.674, + 990.185 and -202.715 respectively for N_2, O_3, NO^+, and NO_2^- according to the JANAF tables (Chase et al. 1985). The appropriate sum is 644.80 kJ.mol $^{-1}$ for the photon energy needed to allow the reaction to proceed.

When converted to a wavelength, this energy is 185.5 nm, which is remarkably close to the wavelength of the 184.9 nm line of mercury. In all probability, the uncertainties in the enthalpies of formation as well as the fact that only standard state partial pressures are available, mean that Reaction 3 might equally well have predicted that the reaction was supplied with *just too little* energy rather than just too much - as happens to be the case. Nevertheless, in view of the huge spread of the input enthalpies in the sum, it is extremely difficult to believe that the close similarity in the two wavelengths is a coincidence. In having provided photons of that specific energy, we seem to have been extremely fortunate that our mercury lamp was accidentally switched on and that it rapidly produced a mist.

Clearly, a single mole of photons formally allows Reaction 3 to proceed. However, another mole of photons must also have been involved in allowing O_2 to be split and then to form O_3. On the basis of the available thermodynamic data, it is clear that most other reactions that can produce ions using photons equivalent in energy to a wavelength above 185.5nm would require a minimum of three photons to produce ions. This can explain why, despite the far lower power needed to run the mercury lamp and the low intrinsic power of the 185.5nm line compared with that at 253.6 nm, the mercury lamp still produced clouds considerably more rapidly than Wilson's arcs.

The ions produced in Reaction 3 are believed to be of crucial importance to the stability of ball lightning because they are the *most stable ions* known to form from the main components of an air plasma (Turner, 1994). This conclusion was reached mainly as a consequence of a 1969 spectroscopic study by Powell and Finkelstein (1969). They had exposed a variety of mixtures of nitrogen and oxygen to brief but powerful radio-frequency discharges. They thereby obtained spectra from the mobile plasma blobs they obtained. Their spectra covered wavelengths between 300 to 600 nm, and the radiant power emitted was up to 160 W (for oxygen). Their not very spherical plasmas had temperatures close to 2,500^0 C, and radiation was emitted over a wide range of frequencies for periods of up to one second.

The authors took their plasmas to be incipient lightning balls - and so did one of us when their findings were used in the thermodynamic assessment referred to above (Turner, 1994). The following chemical species were among those considered by Powell and Finkelstein (1969) in attempting to interpret their spectra: N_2^*, O_2^* (where * indicates a long-lived excited state), NO, NO_2, O, H, OH, N_2^+, O^+, O_2^+, NO^+, O^-, O_2^-, NO^-, H_2O^-, H^- and OH^-. Once all the high-energy ions had reacted with other components of the mixture, only the most stable ones would be expected to remain. In order to assess the thermodynamic consequences of the most likely reactions (Turner, 1994), reactions involving the following chemical species were also considered: O_2, N_2, H_2O, H^+, NO_2^+, O_3, HNO_2, HNO_3, N_2O_3, N_2O_4, N_2O_5, NO_3, NO_2^-, and NO_3^-.

At a sufficiently high temperature, many of the above species might be expected to form - if only for very brief periods of time. However, in the time taken for an air plasma to cool near its surface, the gas laws tell us that millions of collisions will have taken place, and the highest energy species would all be expected to decompose to lower energy species. It is thus extremely unlikely that any of the species with the highest free energies of formation would survive at temperatures much below 500 K or so. In order to identify the most stable ions that could form from an air plasma, it is simple to eliminate all the least stable species from the list above. For the remaining ions, however, it is necessary to consider the actual energies released during all such plausible processes as the following:

$$2\ O_2^+ + N_2 = 2\ NO^+ + O_2 \quad (4)$$

$$2\ H^+ + N_2 + 3/2\ O_2 = 2\ NO^+ + H_2O \quad (5)$$

$$2\ NO_2^+ = 2\ NO^+ + O_2 \quad (6)$$

$$O_2^- + NO_2 = NO_2^- + O_2 \quad (7)$$

$$OH^- + HNO_2 = NO_2^- + H_2O \quad (8)$$

The Gibbs free energy changes for all these reactions are strongly negative - in other words, favorable. The clear conclusion from all the possible reactions considered feasible is that the only ions left by the time an air plasma has cooled to room temperature are NO^+ and NO_2 (Turner, 1994). Of course, if the air is not pure, nothing at all can be concluded about the ions present because the thermodynamic properties of very few other gas-phase ions have ever been measured.

5 CONCLUSIONS.

The main long-neglected findings of Wilson in W2

have all been confirmed. However, the clouds he produced could not have been produced by radiation at 185 nm; the air would have stopped such radiation from reaching his cells. The fact that Wilson's UV took longer to produce condensation than ours is fully consistent with the fact that his source of UV would have required at least one more photon to oxidize nitrogen than ours. It also seems clear that the nitrous acid, whose presence was confirmed by the test paper results of Plate 1, must have been produced by a somewhat *different chemical mechanism* from that which produced Wilson's clouds. Only the *thermodynamic facts* will have been common to the two sets of experiments.

The new experiments support the claim (Turner, 1994) that gas phase transformations of metastable (fully ionized) nitrous acid to the stable (molecular) form of the acid are endothermic processes which refrigerate the surfaces of lightning balls. In principle, the formation of the two acids can occur anywhere in the atmosphere where UV radiation of sufficient energy is to be found and where the relative humidity and other local physical and chemical conditions happen to be *appropriate*.

Unfortunately, we still have little idea what "appropriate" actually means in the above context – either in the presence or absence of a visible air plasma. The rarity of air plasmas could easily result from the fact that we are totally ignorant of the role of common impurities in the air that can drastically alter the crucial ratio of nitrous to nitric acids produced in any specific location. To establish a stable air plasma surface, low levels of radioactive species, or species deposited by cosmic rays, might also need to be present at an early stage in the ignition of an air plasma. It is even possible that traces of a volatile mercury compound might prove to be essential at some stage of air plasma ignition.

Although the results obtained here tell us little regarding these problems, they confirm the general nature of the electrochemical processes that can, on rare occasions, provide structural stability to ball lightning (Turner, 1994) and it may now be somewhat easier to understand why ball lightning and other naturally contained air plasmas are so rare. This problem probably needs to be understood much better if useable contained air plasmas are ever to be created artificially and used for electricity production.

There is little doubt that both nitrous and nitric acids can be formed at specific locations in the air if enough of the conditions are appropriate. Almost the only parameters that are thought to be crucial in these oxidation reactions are the local relative humidity and humidity gradient very close to any plasma ball.

However, we do not even know what the optimum values actually are before a plasma ball becomes stable. Worse, the required humidity might need to change as a function of time during the stabilization of a plasma surface and so could the rate of nitrogen oxidation. In addition, we have almost no idea what are the roles of air contaminants. Far more detailed experimental studies than those described here are clearly needed.

APPENDIX: WILSON'S RATIONALIZATION OF ONE OF HIS FINDINGS.

In Wilson's paper W2, UV-induced condensation in a variety of moist gases was studied. He originally suspected that when clean air was used, the production of nitric acid was responsible for the condensation that was produced between expansion ratios of 1.25 and 1.38. This assumption seemed reasonable since nitric acid was the only strongly ionized compound known at the time that might have been formed by the UV irradiation of moist air. However, the experiments performed in moist oxygen showed that almost exactly the same expansion ratios were needed for condensation in this gas as those needed in the air. For this reason, Wilson discounted his original idea and concluded that hydrogen peroxide was probably the chemical agent responsible for the condensation.

Apart from the subsequent finding of Vincent (1904), that hydrogen peroxide was not detectable in simulations of Wilson's experiments, there are two reasons for doubting a role for this compound in modifying the vapor pressure of water. One is that its structure is so similar to that of water that any effect it has on the equilibrium vapor pressure of water at an aerosol surface, is likely to be extremely small.

Another is the fact that only a very small number of ions need be present to act as condensation nuclei, so traces of nitrogen in the "pure oxygen" used might have been quite sufficient to allow condensation.

However, the main reason for discounting the hydrogen peroxide explanation probably comes from more recent experiments on the material from which Wilson's "pure oxygen" was made. There is now evidence that the method he used for oxygen preparation might *never produce a gas completely free of ions*. This method involved heating potassium permanganate until much of it has been converted to manganese dioxide. This is still a recommended procedure for preparing very pure oxygen. However, the extremely low levels of ions needed to produce a fog are likely to be far too small ever to be detectable chemically.

Wilson could not possibly have known that the thermal decomposition of permanganate to form MnO_2 is not the simple reaction it was once assumed to be:

$$2\ KMnO_4\ (s) \rightarrow K_2MnO_4\ (s) + MnO_2\ (s) + O_2 \quad \text{(A1)}$$

If this were to be the relevant reaction, permanganate decomposition could not have produced any gas phase ions. However, Herbstein et al. (1971) have shown that the reaction is far more complicated than this. There still seems to be no agreement over exactly what the detailed mechanism is, but there is no doubt about the main fact: K_2MnO_4 , MnO_2, and O_2 are *not* the only products. Manganese can exist in five different oxidation states: 2,3,4,6, and 7 (e.g., Moeller, 1952), and few of its gas phase reactions have been studied in detail. As is the case with other metals in high oxidation states, the higher oxidation states of manganese could easily include volatile oxyacids that are easily ionized. During the thermal decomposition of $KMnO_4$, only a very small fraction of volatile oxyacids need to be present to be responsible for fog formation. For all these reasons, it seems that the main stabilizing component of the mists formed by the UV irradiation of moist air must have been nitric acid - just as Wilson had originally assumed.

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RESEARCH ARTICLE

After-Death Communications From Non-Human Animals: Suggestions of Post-Mortem Survival

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HIGHLIGHTS

Follow-up research on a large set of alleged 'after-death communications' from animals/pets confirmed the patterns observed in an earlier study, showing that these events often linked to grief, occurred predominantly in the first week after death, and involved later visits associated with other purposes.

ABSTRACT

An earlier study of 442 after-death communications (ADCs) from non-human animals revealed animal ADCs to be remarkably similar to human ADCs in their types. Moreover, as with human ADCs, there was a dramatic fall-off in incidence over time, with the majority of communications coming in the first days after the death of a pet, when their owners' grief was at its height. This follow-up study added 587 accounts, for a total of 1,029. The findings of the earlier study were replicated, and the combined sample permitted the investigation of several less common, although recurrent, features. The great majority of animal ADCs in both earlier and later samples were perceived externally rather than internally. A fifth (20.5%) were perceived by more than one individual, sometimes by living animals as well as by humans. Of particular note was a highly significant ($p < .00001$) difference in the timing of visits associated with grief versus greeting dying loved ones, providing support in times of need, or warning of danger. Grief-related visits tended to come within the first week after an animal's death, but visits of other kinds came weeks, months, or years later. The overwhelming response to the visits was positive; in only six instances was a negative reaction reported. The study's findings are evaluated in terms of three major interpretations of ADC phenomena: (1) that they are hallucinations, produced in the minds of the bereaved as responses to their grief; (2) that they are hallucinations, informed by the psi of the human percipients; and (3) that they are actual communications from deceased animals. The findings arguably support the third interpretation, which is the one adopted by the accounts' contributors. This conclusion is consistent with recent studies of animal emotion and cognition. Sheldrake's notion of social fields is invoked in connection to a modified continuing bonds model of bereavement that acknowledges the post-mortem survival of animal consciousness.

KEYWORDS

After-death communication, animals, bereavement, continuing bonds, disenfranchised grief, pet loss, social fields, survival of consciousness after death.

INTRODUCTION

In an earlier paper, co-authored with Rupert Sheldrake, Pam Smart, and Michael Nahm (Matlock et al., 2024), we gave examples of after-death communications (ADCs) from non-human animals, showing them to be very similar to ADCs from humans. Sheldrake, Smart, and Nahm (Sheldrake et al., 2023) had previously demonstrated parallels between animal[1] and human end-of-life experiences (ELEs), such as apparent deathbed visions and terminal lucidity.

We now return to animal ADCs, dig deeper into our data, and consider how best to interpret these phenomena. Our earlier study included 442 animal ADC accounts.[2] For this follow-up study, we added 587 accounts, for a total of 1,029. The larger sample allows us not only to replicate our earlier study, but to examine several unusual, albeit recurrent, features of the accounts. Additionally, it places us on steadier ground in making sense of our findings.

We follow Matlock et al. (2024) in defining an animal ADC as "apparent contact with an animal after its death, without further specifying the form of that contact." However, as previously,

> We excluded animals in place-centered hauntings, in which there was no connection between the deceased animals and living human percipients. We also excluded mediumistic contacts with deceased animals, borderline accounts involving symbolic signs and synchronicities, experiences which seemed to us equally well or better interpreted as psi from living agents, and photographic anomalies (p. 62).

For this exploratory study, we did not set out to test hypotheses in a formal way. Nonetheless, we evaluate our findings in terms of three major interpretations of ADC phenomena: (1) that they are hallucinations, produced in the minds of the bereaved as responses to their grief; (2) that they are hallucinations, informed by the psi of the human percipients; (3) that they are what they appear to be, and understood by many percipients to be, communications from the deceased. These three interpretations apply equally to human ADCs (Elsaesser et al., 2021; Woollacott et al., 2022), and the animal data may shed light on issues relating to the post-mortem survival of human as well as animal consciousness, helping to reshape the continuing bonds model in bereavement studies.

METHOD

As in Matlock et al. (2024), we collected accounts of animal ADCs and coded them rather than utilizing a questionnaire. By this method, we avoided leading questions that could have produced an incomplete or misleading picture of animal ADCs.

Series 1 (Matlock et al., 2024) and Series 2 (the present study) consist of four sub-samples each. For Series 1, the sub-samples were composed of accounts reported to Sheldrake and Smart between 1996 and 2009 (S/S); accounts collected by us, primarily from Facebook, in 2022 and 2023 (M/H); accounts culled from periodicals and books originally published between the 1880s and 2020s (Literature); and accounts posted on the London *Daily Mail* web site in 2016 (*Daily Mail*). For Series 2, the samples consist of accounts collected from Facebook in the second half of 2023 (Facebook); accounts collected from Reddit during the same period (Reddit); accounts that reached us from other sources during this period (Other); and accounts from periodicals and books not included in the Literature sample of Series 1 (Literature; see Database Sources, following References).

Our Series 2 Facebook sample is large and varied. We posted appeals in several groups on the platform but received the best response from those groups in which we were well known.[3] In addition, we collected unsolicited accounts from the same groups. Signs of Reincarnation, which Matlock originated and manages, contributed the majority of Facebook accounts, 186 (61%) of 304. Another considerable number of Facebook accounts (82, 28%), all unsolicited, came in response to a single post in Dogspotting Society, a canine-focused group with well over one million members. Our Series 2 Other sample likewise derives from diverse sources, including 51 accounts from Quora (62% of 82) and 10 (12%) from ADCRF,[4] all unsolicited. A good number (38, 36%) of our 107 Reddit accounts come from the r/dogs sub-reddit, although the majority (61, 57%) are from r/paranormal.

In soliciting accounts, we simply requested after-death communications from animals. We refrained from explaining what we meant by this, in order to avoid biasing the responses. The great majority of accounts came from replies to the posts of others, rather than in connection with our solicitations, in any event. Because of the anonymous nature of our tabulation and analysis, we did not consider it necessary to request permission to include accounts in our database.[5]

Our choice of variables to code was dictated by the content of the accounts. In our earlier study (Matlock et al., 2024), where we were interested in the similarities between human and animal ADCs, we coded according to recognized ADC types.[6] However, we noticed several other features appearing repeatedly. We added these other features to our coding form for analysis in the

Table 1. ADCs from Nonhuman Animals in Two Series.

ADC Type / Subtype	Series 1				Series 2					Total Combined
										(N = 1,029)
	S/S Sample	M/H Sample	Literature Sample	Daily Mail Sample	Combined Sample	Facebook Sample	Reddit Sample	Other Sample	Lit. Sample	Comb. Sample	
	(n = 120)	(n = 82)	(n = 163)	(n = 77)	(N = 442)	(n = 304)	(n = 107)	(n= 82)	(n = 94)	(N = 587)	
Types of ADC Account											
Visual apparition	45	26	82	28	181 (25.3%)	120	29	29	63	241 (27.5%)	*422 (26.5%)*
Tactile apparition	50	28	58	32	168 (23.5%)	98	30	30	24	182 (20.8%)	*350 (22.0%)*
Auditory apparition	40	17	76	23	156 (21.8%)	91	41	21	25	178 (20.3%)	*334 (20.9%)*
Dream visitation	12	30	28	10	80 (11.2%)	56	30	22	1	109 (12.4%)	*189 (11.9%)*
Sense of presence	18	7	17	6	48 (6.7%)	32	8	13	10	63 (7.2%)	*111 (7.0%)*
Psychokinetic effect	4	5	26	6	41 (5.7%)	24	10	7	3	44 (5.0%)	*85 (5.3%)*
Other phenomenon	9	4	8	1	22 (3.0%)	29	1	7	2	39 (4.4%)	*61 (3.8 %)*
Olfactory apparition	8	1	8	3	20 (2.8%)	13	2	2	4	21 (2.4%)	*41 (2.6%)*
Total ADC types	186	118	303	109	716 (100%)	463	151	131	132	877 (100%)	*1593 (100%)*
Subtypes of Other Phenomenon (N = 61)											
Telepathic message	4	3	5	0	12 (54.6%)	8	1	2	2	13 (33.3%)	*25 (41.0%)*
Electric charge felt	2	0	1	0	3 (13.6%)	0	0	0	0	0	*3 (4.9%)*
Influence on living	1	0	0	1	2 (9.1%)	4	0	2	0	6 (15.4%)	*8 (13.1%)*
Temperature variation	0	0	0	0	0	4	0	1	0	5 (12.8%)	*5 (8.2%)*
Lighting anomaly	0	0	0	0	0	4	0	0	0	4 (10.3%)	*4 (6.5%)*
Sign/ synchronicity	2	1	2	0	5 (22.7%)	9	0	2	0	11 (28.2%)	*16 (26.2%)*
Total Other Phenomenon	9	4	8	1	22 (100%)	29	1	7	2	39	*61 (100%)*
Borderline/ Questionable Phenomena (N = 45)											
Living agent psi	12	2	2	0	16 (66.7%)	1	0	1	2	4 (19.0%)	*20 (44.4%)*
Photographic anomaly	0	2	1	0	3 (12.5%)	3	0	1	2	6 (28.6%)	*9 (20.0%)*
Electronic voice	0	0	0	0	0	1	0	0	0	1 (4.7%)	*1 (2.3 %)*
Sign/ synchronicity	3	2	--	0	5 (20.8%)	10	0	0	--	10 (47.7%)	*15 (33.3 %)*
Total B/Q Phenomena	15	6	3	0	24 (100%)	15	0	2	4	21 (100%)	*45 (100%)*

present study and undertook Series 2 to obtain a larger sample with which to investigate them. We included in our coding all recurring features we noticed. We followed up on many reports on Facebook and elsewhere for clarifications, although we did not attempt to collect data systematically on all variables. Thus, we are heavily dependent on information that was volunteered spontaneously, and our coverage of some variables (especially demographic ones) is spotty. Although we did not code independently, we checked each other's work, discussing and resolving all disagreements.

When contributors to our database related experiences concerning more than one animal, we assigned each animal its own account record. As in Matlock et al.

(2024), we classified accounts that seemed especially ambiguous or questionable as after-death communications as Borderline/Questionable (B/Q) if they nonetheless might have had animal agents or as Not Coded (N/C), if it did not seem likely they had animal agents, and excluded them from our pattern analyses. Such accounts were in the minority in both Series 1 and Series 2.

STATISTICAL PROFILE

In this section, we summarize our findings statistically. First, we compare Series 2 to Series 1 on the same set of variables we presented in Matlock et al. (2024), replicating our findings. Then, we introduce the additional variables, again comparing Series 2 to Series 1. Illustrations of ADC types appear in Matlock et al. (2024, pp. 65–74). Illustrations of the additional variables we treat in this paper are presented below.

Replication

Because it was only occasionally clear where account contributors lived, our data on the country is far from complete, and hence, we are not reporting statistics on this variable. As with Series 1, we believe most of our accounts came from the United States and the United Kingdom, with some from Canada, Australia, and countries in Europe and Asia. However, there may be a larger contribution from Asia and Europe in Series 2, given the international nature of the social media from which the majority of accounts derive. The great majority of contributors were female, but as noted in Matlock et al. (2024, p. 63), this should not be taken to mean that females predominate as animal ADC percipients. Husbands, sons, and other men are frequently mentioned as co-percipients of phenomena.

Table 1 compares figures on ADC types from Series 1 (Table 2 of Matlock et al., 2024) with Series 2 of the present study. The congruence between the series is striking—ADC types appear in the same order of prevalence with nearly identical percentages. The stability of the patterns across the types is so apparent that a formal statistical comparison does not seem necessary to state that we have successfully replicated our earlier findings. This conclusion takes on increased weight when one considers that we showed in Matlock et al. (2024) that very much the same patterns pertain in ADCs from humans.

The relative numbers of different species of animal are similar in the two series, although we have many more dogs than cats in Series 2 than in Series 1 (see Table 2). This may be due in part to our collecting a considerable number of accounts from the Dogspotting Society group on Facebook and from the r/dogs community on Reddit, although even combined, these two sources would not explain the difference in the counts in dogs and cats between the series. Another factor may be our use of two collections of ADCs from cats (Rainbolt, 2017, 2022) in our earlier study. In any event, the different numbers of dogs and cats in the two series had no discernable effect on the patterns of ADCs, judging by the figures in Table 1.

Table 2. Animals Involved in ADCs.

Animal	Series 1	Series 2	Combined
dog	220	354	574
cat	195	189	384
horse	5	14	19
llama	1	0	1
pig	1	0	1
ferret	1	0	1
guinea pig	1	2	3
hamster	3	2	5
rabbit	3	4	7
rat	2	4	6
mouse	1	0	1
opossum	1	0	1
wolf	0	1	1
bird	5	5	10
fish	1	1	2
spider	1	0	1
unclear	1	11	12
Total	*442*	*587*	*1029*

Series 2 included a much larger number of accounts whose animals were unclear, 11 as opposed to 1. This is thanks to a large number of accounts from Dogspotting Society that did not specify the animal involved. Most likely these were dogs, but since other animals are occasionally mentioned in the accounts we took from there, we did not make this assumption in our coding.

In Matlock et al. (2024), we reported that the majority of accounts referred to ADCs in the first days after death, with a dramatic falling off over time. We see the same with Series 2. Few accounts in either series specify the precise time from death to ADC. The majority provides no indication of the interval. When time after death was noted, we coded in periods of ≤ 24 hours, ≤ 1 week, ≤ 1 month, ≤ 6 months, ≤ 12 months, and >12 months. For Series 1, we had 291 accounts, and in Series 2, 301 accounts, with sufficient information to code the length of interval from death to ADC. The results are shown in Table 3, with a line graph representing the combined sample numbers in Figure 1. The slope is similar to that we obtained with our Series 1 accounts (Matlock et al., 2004, p. 64).

We now look at the other ADC features that appeared

Table 3. Animal ADCs vs. Time after Death.

Time after Death	Series 1	Series 2	Combined
≤ 24 hours	107	91	198
≤ 1 week	76	90	166
≤ 1 month	39	38	77
≤ 6 months	32	29	61
≤ 1 year	12	9	21
> 1 year	24	44	68
Total	*290*	*301*	*591*

recurrently in the accounts we coded under 10 headings—timing and duration; collective percipience; animal reactions; "stranger sightings," in which people unacquainted with deceased animals perceive them; "trailing phenomena," in which deceased animals follow their people to distant, often unfamiliar places; "greeting phenomena," in which deceased animals appear to welcome their humans or animal friends when they are about to die; "joint appearances," in which two or more deceased animals, or animals and humans, appear together; "support phenomena," in which deceased animals appear when their humans are in need; "warning phenomena," in which deceased animals appear to protect their people from harm; and negative responses to the appearances of deceased animals. We noticed these features in coding Series 1 and added Series 2 in order to obtain a larger sample with which to investigate them.

Table 4 supplies percentages of features by series and sub-sample. This is a different arrangement than in Table 1, which shows how the types of ADC rank in frequency against each other across series and across our entire dataset. Percentages of ADC type by sub-sample may be calculated from the figures given in Table 1, but do not seem to us as interesting as the ranking of types in relation to one another. The opposite is true for the additional ADC features. As can be seen in Table 4, the Literature samples routinely have larger numbers of additional features than the other samples do. This suggests selection bias in the Literature samples, probably because many of these additional features are especially suggestive of post-mortem survival and, therefore, of greater theoretical significance.

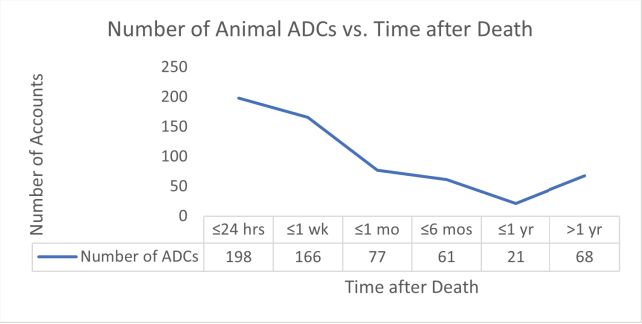

Figure 1. Number of animal ADCs versus time after death.

We will have more to say on this subject later. At present, however, we wish to comment on the interval between an animal's death and its communication with its surviving people. The periods shown in Table 3 represent intervals after death to the initial ADC, ignoring later visits if there is a series of ADCs involving the same animal. There was a single ADC in 243 (55.5%) of 438 accounts with pertinent information in Series 1 and in 276 (47.2%) of 584 accounts in Series 2 (50.8% of the Combined sample). ADCs recurred two or three times in 51 (11.6%) of the accounts of Series 1 and in 64 (11.0%) of the accounts of Series 2 (11.3% of the Combined sample). They recurred four or more times in 144 (32.9%) of the accounts of Series 1 and in 344 (41.8%) of the accounts of Series 2 (37.9% of the Combined Sample).

Recurrent visits were not always of the same kinds and did not always involve the same individuals as percipients. They went on for varying lengths of time, often for a few days, weeks, or months, sometimes for years. The reasons for stopping varied as well. Most often, no reason for the cessation of visits was known or given, or the phenomena were ongoing at the time of the report. When reasons for cessation were cited, they included asking the visits to stop, perhaps employing a ritual to get them to do so (in 3.3% of the Combined sample), and ending when a new pet was adopted (in 6.7% of the Combined sample). When recurring ADCs ended with the arrival of a new pet, contributors interpreted this to mean that their deceased companions were relieved that they had found another animal. A few respondents believed their deceased pets had led to the new animal.

As shown in Table 4, ADC initial visits coincided with the death of an animal in some instances (4.4% of the Combined sample). Visits frequently were perceived by more than one person, or person and animal, either on the same or separate occasions (20.5% of the Combined sample).[7] Persons unacquainted with the animals or their demise occasionally perceived them, at times when family members did not (3.7% of the Combined sample). Deceased pets were sometimes said to have found their people and appeared to them in places distant from the places they died, even when these places were unknown to them in life (7.5% of the Combined sample). At times, deceased pets were said to have made joint appearances

Table 4. Features of Animal ADC Accounts in Two Series.

Regular Feature	Series 1					Series 2					Combined
											(*N* = 1,029)
	S/S Sample (*n* = 120)	M/H Sample (*n* = 82)	Lit. Sample (*n* = 163)	Daily Mail Sample (*n* = 77)	Comb. Sample (*n* = 442)	Facebook Sample (*n* = 304)	Reddit Sample (*n* = 107)	Other Sample (*n* = 82)	Lit. Sample (*n* = 94)	Comb. Sample (*N* = 587)	
Death coincidence	7 (5.8%)	3 (3.7%)	19 (11.7%)	1 (1.3%)	30 (6.8%)	5 (1.6%)	4 (3.7%)	1 (1.2%)	5 (5.3%)	15 (2.6%)	*45 (4.4%)*
Collective percipience	25 (20.8%)	6 (7.3%)	57 (35.0%)	15 (19.5%)	103 (23.3%)	33 (10.9%)	28 (26.2%)	17 (20.7%)	30 (31.9%)	108 (18.4%)	*211 (20.5%)*
Animal reactions	8 (6.6%)	2 (2.4%)	16 (9.8%)	4 (5.2%)	30 (6.8%)	11 (3.6%)	6 (5.6%)	5 (6.1%)	14 (14.9%)	36 (6.1%)	*66 (6.4%)*
Stranger sightings	0	0	8 (4.9%)	2 (2.6%)	10 (2.3%)	8 (2.6%)	1 (0.9%)	0	19 (20.2%)	28 (4.8%)	*38 (3.7%)*
Trailing phenomena	12 (10.0%)	3 (3.7%)	19 (11.7%)	3 (3.9%)	37 (83.8%)	14 (4.6%)	6 (5.6%)	5 (6.1%)	16 (17.0%)	41 (7.0%)	*78 (7.5%)*
Greeting phenomena	1 (0.8%)	1 (1.2%)	3 (1.8%)	3 (3.9%)	9 (2.0%)	15 (4.9%)	0	4 (4.9%)	4 (4.3%)	24 (4.0%)	*31 (3.0%)*
Joint appearances	6 (5.0%)	5 (6.1%)	7 (4.3%)	1 (1.2%)	19 (4.3%)	14 (4.6%)	5 (4.7%)	5 (6.1%)	2 (2.1%)	26 (4.4%)	*45 (4.4%)*
Support phenomena	4 (3.3%)	4 (4.9%)	13 (8.0%)	1 (1.3%)	22 (5.0%)	13 (4.3%)	6 (5.6%)	7 (8.5%)	5 (5.3%)	30 (5.1%)	*53 (5.2%)*
Warning phenomena	1 (0.8%)	0	9 (5.5%)	1 (1.3%)	11 (2.5%)	1 (0.3%)	0	1 (1.2%)	4 (4.3%)	6 (1.0%)	*17 (1.6%)*
Negative responses	1 (.08)%	0	1 (0.6%)	0	2 (0.5%)	2 (0.7%)	0	2 (2.4%)	0	4 (0.7%)	*6 (0.6%)*

with apparitions of other deceased animals or humans, even when the latter had died years before (4.4% of the Combined sample). Negative responses to the ADCs were rare (0.6% of the Combined Sample).

Three other features call for special comment. These are greeting, support, and warning phenomena. Greeting phenomena were reported in 3.0%, support phenomena in 5.2%, and warning phenomena in 1.6% of the Combined sample. Although no more common than most of the additional variables, these three features are interesting because they, in particular, imply discarnate agency on the part of the deceased pets. It is as if the departed animals were returning intentionally to greet loved ones when they passed, support their people in times of need, or warn them of impending danger. Moreover—strikingly—these kinds of visits are likely to have been reported as occurring at substantial intervals after the death of the pet, well after the percipient's grief over the loss had faded.

We coded grief reactions as present only when contributors expressly mentioned them. Grief was mentioned in a substantial number of accounts (*n* = 119), 11.6% of the Combined sample,[8] most often within a week after a pet's death. Table 5 shows how grief, greeting phenomena, support phenomena, and warning phenomena relate to intervals after death.

From these data, it appears there might be a statistically significant difference in the timing of reports of grief and of greetings, support, and warning phenomena in relation to the length of the interval after death. Visits look like they come after much longer intervals with greeting, support, and warning phenomena, than with grief. We examined this possibility in a chi-square test, contrasting visits that appeared within one week of an animal's death to those that appeared more than a week after, in relation to grief versus greeting, support, and warning phenomena combined. This resulted in a chi-square statistic of 28.6745 (*df* = 1), producing a highly significant p value of < 0.00001, with a relatively strong effect size (φ) of 0.427364.

We noticed a problem with this calculation, however, because the figures we employed for the interval after death were the periods elapsed before the initial ADC from an animal, but greeting, support, and warning visits might come during a later series of communications. Moreover, the crucial issue for greetings was how long before the visit the greeting animal had died, not when it appeared in relation to the death of the greeted individual. The bottom section of Table 5 shows corrected figures, with intervals coded according to how long after an animal's death grief, support, or warning visits from it came or began, and how long a greeting animal had been dead

Table 5. Grief vs. GSW

Variable	Interval after Death					
	≤24h	≤1w	≤1m	≤6m	≤1y	>1y
	Series 1					
Grief	20	15	10	6	1	3
Greeting	2	1	1	0	1	1
Support	1	5	1	3	2	7
Warning	1	1	1	3	1	3
	Series 2					
Grief	6	12	3	0	1	1
Greeting	4	2	0	1	0	10
Support	1	1	4	3	3	8
Warning	1	0	0	1	0	2
	Combined					
Grief	26	27	13	6	2	4
Greeting	6	3	1	1	1	14
Support	2	6	5	6	5	15
Warning	2	1	1	4	1	5
	Corrected					
Grief	26	27	13	6	2	4
Greeting	3	3	1	0	1	16
Support	3	2	5	5	5	19
Warning	1	1	2	4	1	5

at the time it appeared. Table 6 shows the chi-square calculation for the corrected figures. The *p* level remains unchanged at < 0.00001, but the effect size (φ) of 0.516362 is now securely in the strong range.[9]

We also noticed a strong tendency for our contributors to report a persistence in the habits or personality of their deceased pets. The animals perceived as apparitions were reported to act very much as they had in life in just over a fifth (20.8%) of the accounts we collected.

Responses to the visits were overwhelmingly positive, regardless of how long after death they occurred. Negative responses were reported in only six accounts (0.6%) of our Combined sample.

EXAMPLE ACCOUNTS

In this section, we illustrate the 10 additional features of animal ADC accounts with accounts from our database.[10] We requested and received permission to use all accounts collected from social media sites. In editing the accounts for publication, we have retained differences in American and British wording, spelling, and punctuation. Sources refer to our Access database, which will be shared upon request.

Table 6. Chi-Square Test of Grief vs. Greeting + Support + Warning (GSW) Phenomena (Corrected)

	Grief	GSW	Total
≤1 week	53	25	78
>1 week	13	64	77
	66	89	155

$x^2 = 41.3276$ ($df = 1$); $p < 0.00001$; $\varphi = 0.516362$

Timing and Duration

Some animal ADCs coincide with the animal's death. Many of these appearances were unexpected because the observers did not know that the animals had died; often, observers did not know the animals were in danger. Similar phenomena have been noted with human ADCs, beginning with the first major survey of human apparitions, *Phantasms of the Living* (Gurney et al., 1886).

> A tiny mouse I rescued from one of my cats died in my hands. I was sitting on my bed, praying for him, and I felt him jump out of my hand and run across the bed. I opened my eyes to see his dead body in my hand[11] (Series 1, S/S, Record 231).

> I knew the moment one of my rabbits died. It was just after 4 a.m., and I felt him on the bed. I got up right away and looked in his hutch, and he had died[12] (Series 1, S/S, Account 126).

> My beautiful cat Bobo was at the vets having his coat trimmed. I had returned home because they said it would be a lengthy process and he would need anaesthetic, as he was so nervous. About midday, I was making a sandwich, and as usual Bobo was winding around my ankles. I laughed and told him not to be greedy. Then I realised he was at the vets' surgery. I looked down and there was of course no cat there. He was the only cat I had. It was so real. I'd felt the force of his head around my ankles, and the softness of his fur. When I went to collect him an hour later, they told me he'd died under the anaesthetic (Series 2, Facebook, Account 1232).

Although most such visits come in the first hours or days after death, they may occur later as well.

> I never ever saw a spirit until March 2017. I lost Sammy, my cat that I had a unique bond with. A couple of weeks after he passed away, I was sitting on the couch, looked up, and there was Sammy in spirit on top of the stairs, looking forward.

> Within a few seconds, he went down the stairs and disappeared (Series 1, M/H, Account 42).

> I had a dog that lived to be 12 years old. Her name was Brandy, an American Eskimo Dog. She was a wonderful friend to me, a good protector, and sweet to my daughter. When she got old, she stopped eating. I tried everything I could think of, but nothing worked. I took her to the vet; unfortunately, he said it would be right to put her to sleep. Saddest day of my life.
>
> Anyway, I was told that all they did with the dog's body was take it to a landfill. I just couldn't get that out of my head, that my wonderful dog's body ends up in a landfill. About four months later, one morning, I was sitting on my bed, putting on my shoes, getting ready to start the day, and then right in front of me, Brandy appeared. She was lying on the floor, definitely breathing, looking around. I knew she had passed, but she did NOT look like a ghost. Immediately in my head, I thought, this is cool! I just sat and watched her. In a couple of minutes, she disappeared. I felt so blessed that she came back, even though it only lasted two minutes. I think she came back because I felt guilty that she was put in a landfill (Series 1, M/H, Record 20) .

Not infrequently, ADC experiences occur repeatedly. Some recurring ADCs appear over a few days, but others continue for months or years before declining in frequency or ceasing altogether. Generally the animals in recurring experiences are seen, heard, or felt to be performing habitual actions almost by rote, but at other times, no pattern to their behavior can be discerned, similar to human apparitions (Gurney et al., 1886).

> My dog, Oscar, had a chain collar. I always knew when he was nearby, because I could hear it clinking. After he died, I took the collar off and put it on the mantlepiece. That evening after he died and for several more evenings, I heard the chain clinking (Series 1, S/S, Account 153).

> I had an old calico cat who had renal failure and I took her to the vet, who euthanized her. I brought her home and buried her in the garden. She would sleep at the foot of my bed, and for two weeks after her death, I would feel her jump on the foot of the bed. After those two weeks, I didn't feel her anymore (Series 1, M/H, Record 13).

> Bentley was an Old English Sheepdog who I had for the seven years of his life. I lost him very suddenly to heart disease. I have had animals all my life and have been attached to each and every one of them. Maybe because Bentley was so young when he died, or because he went so suddenly, I had a lot of trouble accepting he was gone. About three days after he died, I 'saw' him sitting by the gate where he always waited for me. I then started 'seeing' him in a number of familiar places around the farm I lived on. These places were not always the same and were not always necessarily his normal favourite places (Series 1, S/S/ Record 125).

The reasons for the cessation of recurring events vary. Sometimes, they stop for no apparent reason, and at other times, after intervention. Frequently, they halt when a new pet joins the family.

> My much-loved black and white male cat Socks disappeared one night. For weeks afterwards, I could feel him jump on the bed and sleep with me. I normally sleep on my side with my legs bent at an angle – almost curled up. Socks would sleep curled up in the space between my derriere and lower legs – behind my knees. For several months following his disappearance, I would feel him jump on my bed at night and curl up behind my legs as he always did. The bed springs would actually move. Sometimes I would say hello and it seemed that he would snuggle closer. I can't really remember when he stopped coming to visit me – I just remember that one point, I realized he wasn't visiting any longer (Series 1, S/S/, Record 182).

> My old dog had to be put down. He always barked, whined, et cetera, to wake me up every night at 2 a.m. to go outside to potty. Three nights after his passing, he woke me up with his sounds to go potty. I was startled; I sat up in bed, looking around. I didn't see him, but heard his distinctive bark and the whistling sound he made. I acknowledged him, but told him to go to bed. He stopped. Several nights later, it occurred again. I told him he was in the afterlife and in the Heaven for dogs. He stopped. But it started up again, and this kept happening for two months! I finally prayed to whomever his Guardian was, letting them know that he was slipping out of

his realm to come whistle and bark at me. I suggested that he needed some help to stay on his side, not mine, and asked that he be healed. With that, it finally stopped for good (Series 1, M/H, Account 88).

I lived in this house where a cat lady must have lived. When I was in bed, invisible cats would jump on the bed and walk across it. The mattress would sink, so I could feel them. They did this every night and it was eerie. I got my own cat and it stopped just like that[13] (Series 1, M/H, Record 16).

Collective Percipience

Collective apparitions of humans have been widely reported and well-studied (Gurney et al., 1886; Hart & Hart, 1932–33). Our sample includes several examples of collective apparitions of deceased animals, involving a variety of ADC types, and a variety of animal species.

In collective percipience, often the same animal is perceived on separate occasions by multiple individuals, but the sighting may also be witnessed by multiple people on the same occasion.

Both my husband and I have seen our little guinea pig Fluffy. Fluffy was a house pet and lived with us for about two years. He would follow you around the house, sit by your feet in the evenings, shout when he wanted feeding, and made a wonderful pet to all the family. When he died suddenly from illness, we were devastated, and missed him terribly. We have pictures of him around the house still. Both my husband and I, on separate occasions, have heard Fluffy, caught glimpses of him, and felt him next to our feet. All this made us very happy that he was still with us and that he obviously loved us too (Series 1, S/S, Record 150).

Our hamster passed last week. Ever since her passing, my wife and I have noticed many signs that she is still around, including scratching in her house, her ball rolling on its own, and then this morning, a piece of paper she had chewed appearing on my desk (Series 12, Other, Record 839).

My sisters and I would hear a couple of my horses after they were put down, one or two or more times, while caring for the remaining ones. I remember pausing while scooping feed into buckets for their dinners, listening to the distinctive sound of a horse tail smacking the wall between me and the nearest stall—which was empty, as the horse had died the day before. I looked at my sisters and asked if they could hear that, and they nodded. Then we would hear a snort or a sigh from the stall. We felt it was kind of a goodbye (Series 2, Reddit, Record 751).

Occasionally, deceased animals appear in shared dreams.

My dog passed away last year. Shortly after, I had a dream we were all in the car on a road trip, and she was so excited. I was hugging her. I woke up. I didn't think anything about it, except that I miss our dog. I took my kids to school that morning and my youngest was telling me she had a dream about our dog. How we were on a road trip and I was hugging her (Series 2, Reddit, Account 769).

Our dog Max knew when a family member was coming home—he would stand by this window looking at the road about 20 minutes before they would cross the bridge into the grounds where we live. He died, but came and said goodbye about a month after he left us.

I was asleep, but I got up to go to the deck off our bedroom. I guess I was in two places at the same time; in bed, and by the sliding doors to the deck. Anyway, there was Max, all wet in the rain. Steam was rising from him, and he had this great smile on his face. He said, "I have come to say goodbye and I'm so happy because I can run everywhere—you see, that was the one thing while I lived with you that I could not do." He understood that we could not let him loose because he would have been shot by our gun-loving neighbors. Taking him for long walks in the woods was alright, but not like running.

Now I'm in bed shoving my husband, "Wake up, wake up, George. Dear sweet Max has come to say goodbye." "What's wrong with you?" George says. "Well, it was Max out there. I know it was!" At the table in the morning, I'm telling our daughter Christina, and her mouth drops. "Mom, I had the same dream," she says. Max was an Afghan that we got from the pound. We all miss him (Series 1, S/S, Record 136).

Animal Reactions

Nahm (2016) describes cases in which living animals responded to apparitions of humans. Living animals also sometimes act as if they have seen deceased pets.[14]

> I had a little pure white cat, Tizzy, who was five years old. She had been in a car accident a couple of years previously, and she sadly died from a combination of that accident and heatstroke; she used to love lying in the sun. I was heartbroken when I found her dead—she had crawled under a van to die. Anyway, about three days later, I was up in my bedroom (on the computer as usual!) and my other cat, Tabitha, who is 12 years old, started acting very strangely indeed. She kept staring at the sheepskin rug on which Tizzy used to love lying, then she went over to the precise spot where Tizzy would lie and sniffed it. I just knew that Tizzy had come back to say goodbye (Sample 1, S/S, Record 270).

> My deceased dog had a very distinctive bark. I would be able to recognize her with my eyes closed. My grey parrot can do her bark with absolute accuracy. Every once in a while, the bird will stop a few feet from the sofa, stand stock still staring wide-eyed at something, then break into Clancy's bark. I swear she can see her, though I can't (Series 2, Facebook, Record 1254).

Living pets sometimes perceive apparitions collectively with humans. Our first example involves another parrot.

> For a year or so after he died, we got the sensation of the sofa dipping behind our heads in the evenings. It didn't actually dip, it just felt like it, like our cat was there. Hubby also felt it, and he's a very rational person. It only happened occasionally, but we are both convinced it is our beloved cat checking in. Interestingly, we haven't sensed it with any of the other three cats, even though one of my hubby's cats acted more like a dog, and was his shadow. As a spooky bonus, our parrot occasionally randomly calls that cat's name and makes the kissing noise you do to call your cat over. The parrot tends to use his repertoire of words and phrases intelligently and in the correct context, so I wonder if he's actually seeing something (Series 2, Reddit, Account 732).

> My cat Jinx was elderly and was beginning to have trouble seeing. For the last couple of years, whenever she wanted to drink water, she would hit her water dish in order to gauge the level of water in it (rather than just stick her face in). She died at home and for three days afterwards, I repeatedly heard her hitting the water dish. My dog heard it also, because he would charge into the kitchen, expecting to see her (looking surprised because he knew she had died) (Series 1, S/S, Record 148).

> In 1986, I'd been sitting up late watching TV. It was about 1 a.m., and as I came out from the living room with my cat Tommy following close behind, something made me look down the hallway to the spare bedroom, which was the very end room. I could see a dim light around the bottom of the door. As I looked, a black cat with a blue collar ran out from the half-closed door. I recognised him immediately as my cat Goosey, who had died in that room two years previously. As I looked at him, he was perfectly clear and real in every way. But then he vanished through the wall opposite. I might have thought I was imagining this, but by now Tommy was howling and spitting. Goosey was Tommy's father, but the two cats never got along. Tommy ran into the spare bedroom with his fur standing on end, scrabbling at the floor and wardrobe. He was very distressed. I couldn't understand how a human and a cat could both see what appeared to be a ghost at the same time. This was the only time I saw the ghost of Goosey and I moved shortly after that. It really was a strange incident that I couldn't explain (Series 2, Facebook, Record 1243).

Stranger Sightings

With stranger sightings, someone not familiar with an animal perceives its apparition, often when its erstwhile owners do not. Stranger sightings may occur as part of a collective percipience, or they may occur on their own. Again, this phenomenon has been reported with human apparitions also (Gurney et al., 1886).

> I'm a caregiver for an elderly woman. One day, I was upstairs cleaning, when I thought I heard a cat meowing. The woman does currently have a cat in the house, so I didn't think much of it at first, except that it didn't really sound like him. He's very skittish, and had never come upstairs

before while I was there. A few minutes later, I heard it again, and it still didn't sound like him, so I got concerned that maybe something was wrong with him, or he had gotten himself stuck somewhere. I didn't see him anywhere, so I checked downstairs, and he was lying on her lap. I kind of dismissed it in my mind and went back to cleaning. As I was walking by her bedroom, I happened to glance in and there was a white cat lying next to the dresser. It was on its stomach, kind of balled up with its front feet tucked under its chest, in a typical cat position. I only got a quick glimpse of it because I wasn't expecting it. When I turned back to look again, it was gone. I made a joke about it later, telling the woman I must need more sleep or something, because I had seen a white cat in the bedroom. And that is how I learned that years and years back she had had a white cat named Snowball who was now buried in the yard (Series 2, Facebook, Record 916).

Nine years ago my husband and I were walking our four dogs when we saw a lady approaching with two black labs. The dogs were not on leads, and as we chatted, they wandered around. I noticed one of the black labs wasn't anywhere to be seen. I mentioned this, and the lady said she only had one. But you had two coming up the path, I told her; I saw them! I looked to Andy for support, but he didn't say anything. The lady then burst into tears, saying she had lost a black lab six weeks before. I met her again a few weeks later, and she said she had felt so much at peace following our first meeting. I feel so lucky to have experienced this (Series 2, Facebook, Account 877).

When my favourite horse passed away at 24, I was extremely upset. About a month later I was down in the field feeding the sheep at 6.30 am and I heard as clear as day his whinney. There were no horses within three miles and his snicker was distinctive. Then about a week later, I was on a team call with my colleague who also is a practicing medium. She said, 'Whoa, you have a beautiful white horse behind your head.' There was no way she knew I had lost a white horse a few weeks previously (Series 2, Facebook, Account 980).

Trailing Phenomena

In a phenomenon resembling the "psi trailing" that allows living animals to track their people to distant places (Rhine & Feather, 1962; Sheldrake, 1999), deceased animals appear in new locations, even ones unknown to them in life.

I had a wonderful cat, Nini. She was my soulmate. We were moving house. She became ill and I told her that she had to live so she could come with me to our new house. She didn't live. But at our new home, I often saw her walking up the hallway or in the driveway, and once in the garden. She was letting me know that she had come anyway. She was a Burmese cat and was very talkative, with a very distinctive meow. She has talked to me in each of our new houses since, and she even sat in the garden of our present house. She died in 1987 (Series 1, S/S, Record 229).

After my 20-year-old cat passed, I felt her jump on the bed and felt pressure on my stomach where she used to sleep. I haven't stopped seeing her out of the corner of my eye, walking or running by. I look straight on when I think I see something, and then see nothing. The other day, I saw (from the corner of my eye) what looked like a short spurt run. I looked up. I didn't see her, but I saw through the open blinds a live cat walking outside. When my cat was alive and detected another cat outside (looking out a window), she ran inside the house in short spurts, like they do on alert. Interestingly, she has been deceased since February 2022, and after that I moved far from where we lived together. It's like her spirit is still with me. I wonder if she can stay attached to me. I hope so. She was with me a long time (Series 1, M/H, Record 21).

I've had a number of pets over the years, but there was only one that I know for sure came to visit me after he passed. I was 16 at the time and my dog, Max, had passed away about a year prior. He wasn't with us at the time that he passed, as we were moving to a new home, and my grandparents were taking care of him. I found out later that my parents had my grandparents put him down because he was very old and suffering, but at the time, I thought he died of a broken heart, thinking that we had abandoned him. I was dev-

astated and had never gotten over it. One day, I was sitting in the recliner in the living room with my eyes closed and just relaxing, and I felt a dog come up to the left side of the recliner where my elbow was and sniff at it the way Max always did when he was alive. He would do that when he wanted to go outside, wanted food, or simply wanted me to pet him. When I felt this, I instantly reacted by sitting up and looking at my elbow, but there was no dog there. I looked all around, but nothing. We had two other dogs at the time, but they were outside with the rest of the family, so I'm certain it wasn't them, and they didn't do that the way that Max did, either. I felt the sensation of a dog sniffing, but it also uniquely felt like Max himself (Series 2, Reddit, Account 758).

Greeting Phenomena

Sheldrake et al. (2023, pp. 53–54) described instances of dying animals seeming to perceive apparitions. We collected several accounts of animal apparitions perceived by humans, apparently having come to greet people when they passed.

A friend of mine had an older sister who passed in her 80's. Just before she passed, she saw their family dog, from childhood, come to visit her (Series 2, Facebook, Record 992)!

When my mother was dying in hospice, I slept at her house. I felt her dog, who had passed, come to me. I felt his breath and tail wag. I was almost asleep, so in between realms. I literally was trying to pet him. I felt him there so much. I felt as if he came to me to tell me, "It's okay. Mom will be with me again and I'll protect her and help her transition to the other side." That's the message I got. It felt so real (Series 2, Facebook, Record 981).

My toy-terrier-mix dog died in 1971. He was never allowed in the house, because my mother didn't like animals in the house. We moved to a new house in 1974. My dad passed in 1993. A day before my dad passed, I saw this dog quickly, out of my peripheral vision, sitting up with his front paws on my parents' bed. Then he was gone in a flash. My dad always was an animal lover. I think my little dog came to accompany Dad on his journey the next day (Series 2, Facebook, Record 1240).

It is not just people that deceased animals seem to greet on their deathbeds; they come to welcome animals, too.

When we moved to Kansas, a stray cat found us. He was pretty feral. I had been feeding him outside until one day he just strolled into the house. I was lying on the sofa. He came over and lay on my chest. My husband Michael went crazy, thinking this was not a sweet cat—except he was. He became a treasured member of our household. Years later, we were back in Phoenix. Bogie would literally lie next to anyone sick, cat or dog. He leapt into my arms one day, and died. We got him to a vet within minutes, but it was too late.

We also had a little West Highland Terrier named Ian. He and Bogie loved each other, and would curl up together. From age 9 on, Ian had everything imaginable go wrong with his health. We got him through all of it. He was going on long walks every day. We even got him through cancer, but the end was coming, we knew. The night before he died, about a month after Bogie, Michael and I were in the master bedroom. I looked down the hall to the bedroom where Ian slept, and saw a grey shadow cat walk through the closed door. Michael saw it too. Ian died the next day, and Bogey was with him (Series 2, Facebook, Record 891).

I kept this to myself for fear of ridicule, as not many people tend to think of smaller animals as something that could possibly have souls. I had two guinea pigs, Bella and Swift. I fought to keep Bella alive, spending thousands for the best specialist care when she became ill, as I loved her so much. Unfortunately, she passed, but I still had Swift, who lived for over another year after Bella's passing. At the end, I was told there was nothing more I could do for Swift, and basically had to spend time with her before taking her to the vet to cross the rainbow bridge.

I was devastated, I loved my guineas so much. Bella was more anti-social, but Swift was very cuddly, so I would sit in her darkened room with soft lights and soft music whilst stroking her in my lap, telling her how much I loved her, and basically saying goodbye. I was interrupted a few times by the noise of her water bottle. The first time I heard it, I forgot for a split moment that Bella was no longer there. I kept hearing the

water bottle rattling like they were drinking from it, so that I came to expect the noise whenever I sat with Swift in my lap.

When Swift passed too, I took a while to go back into their room to clear their bedding, et cetera, for good. I went in the room and sat on my knees and shed a few tears, as it felt so final. Again, I heard the water bottle, clear as day, so that it made me turn around to look at it. I have to add that I live in a very quiet part of Scotland where there is no traffic, or anything that could cause the water bottle to shake (I also have a detached home). I felt zero vibrations. I've never heard it again. That was the last time. I feel Bella was there to take Swift and was showing a sign, to say goodbye. Not as exciting as others' stories, but it's my little story, and it meant something to me. I know what I heard, but I kept it to myself (Series 2, Facebook, Account 887).

Joint Appearances

On other occasions, deceased animals are said to appear together as if they have found each other after death.

Three years after my move to France, Raffy (a female cat whom I'd adopted after my male cat Wellington's death) was killed on the road. On the day of her death, I took a long walk in the mountains. Raffy came with me, in spirit: I could see her, and presumed that her death had been so sudden that she didn't really understand it. However, I was too distressed to be able to tell her to go towards the light until the following day, after which she no longer appeared.

Some months later, when driving to work, I glanced at the passenger seat and was amazed to see Wellington sitting there, looking at me, with Raffy next to him. I was astonished – not just because I could see them, but also as Wellington in life would not tolerate any other cat on his territory. I blurted out, 'I'm surprised to see you sitting there like that, with Raffy!' His calm answer came into my mind: 'Why not? You loved us both.' I believe he wanted to show me that he was taking care of Raffy, in much the same way as relatives take care of those who have recently died. Wellington's choice of time and place to contact me was perhaps not the safest, but it certainly helped me (Series 1, S/S, Record 235).

My German shepherd died just before Christmas last year. He was 6 years old and had had cancer of the bone. I was very grief-stricken because in life we had an extraordinary bond. I could send him a command or thought from a considerable distance and he would respond! Three days after his death, in the middle of the night, I was awoken up by a presence in the room. There he was, absolutely magnificent to see, showing me his four legs (he had had an amputation of the rear left leg). Four days after his death, my cat died also, and he appeared with the German Shepherd three nights later. It was really beautiful (Series 1, S/S, Record 227).

Deceased animals may make joint appearances with deceased people. When the deceased person, rather than the animal, acts as the apparent agent, we did not code the accounts as animal ADCs, although we recorded them.

Ten years ago, while grieving my husband's premature death, he came to me in the middle of the night. At first I was a little frightened, but I immediately noticed he was very happy and laughing. He ecstatically announced, "I have them! I have them!" I asked him, "Who do you have?" He impatiently said, "Honey Bear and Mandy!" Our Malamute and German Shepherd (Series 2, Other, Record 1407)!

I adopted a Border Collie mix named Buddy. After he died, he appeared with my deceased sister, who loved animals. It was a couple years after he died, and after I had gotten a Bichon Frise. I was out in front of the house, sitting in a chair with my two-year-old pup on a leash. All of a sudden, he started pulling and prancing. I looked straight towards him and saw my sister with Buddy wagging his tail, and my sister said, "Thanks for the dependent." That was the same thing she said when I took her a goldfish for her backyard pond when she was alive (Series 2, Other, Record 1408).

A week after my grandmother died, I had her in my dream holding a black dog. The dog was jumping up and down on her and she waved to me. I told my sister about the dream, and she asked me to describe the dog (she is seven years older than me). I said it was a black mid-size lab. She said, "Oh my god, it was Pretinho. That miserable dog waited for her all this time!! You were a baby when he died. He was awful. He didn't let

anyone go close to her. I don't know how many times he bit me." She said Pretinho died in the 60's, so he waited three decades for my grandmother. I was happy he found her again (Series 2, Facebook, Record 670).

Support Phenomena

Deceased pets sometimes appear as if to support their people in times of need, especially during health crises.

My beautiful friend, a white cat called Fluffy, passed away, and, of course, I was grief-stricken. So a few months later, I decided to go and see a 'psychic' who claimed she could communicate with pets who had died. I was due to go to her (having made an appointment) after finishing work this particular day and was the only person left in the office by that time. I thought I'd go to the bathroom, then collect my bag from my office, lock up, and leave for the day. But as I returned from the bathroom to walk into my office, I was absolutely ASTONISHED to see Fluffy hovering just above my desk. I stared at him in disbelief, saying to him, "Fluffy!! You've come back!" He then literally disappeared before my eyes!

I was bewildered by the entire experience and just stood there, when suddenly he appeared again for about ten seconds, then again disappeared. Unlike his very sick countenance just before he passed away (cancer), when I saw him, he was completely glowing with good health—and, I'll never forget, he had a pink and gold aura around him. What I'm saying is the absolute TRUTH. I realized that day that he must have known my pain and knew why I was going to visit this psychic (which I then cancelled as it simply wasn't necessary). He came to show me himself that he was indeed still alive and healthy, and to put my mind at ease (Series 1, M/H, Record 2).

My Shih Tzu died 16 years ago. A few weeks past, she came to my side and I felt her on my lap. I knew she was comforting me but for what?? A few days later, my brother had a serious stroke. She kept popping in my mind until he was out of the woods. I know she was there to get me through. My little Jack and I will meet again (Series 1, M/H, Record 49).

My deceased angel dog, Meg, came to me in the ER when I was very ill. She calmed me by lying on my feet. My husband and my doctor were stunned by the change in my condition. I've seen her several times since. She comforted me in life and I believe she is waiting for the day we are reunited (Series 2, Other, Record 831).

Warning Phenomena

Sometimes, apparitions of deceased animals make appearances seemingly to keep their people out of danger. Our first example is from Pam Smart, whose dog Jaytee performed experiments Sheldrake (1999) described in *Dogs Who Know When Their Owners are Coming Home.*

Thought I would give you this snippet of an event that happened late last night. I was tired and fixing to go to bed, boiling water for my hot water bottle. Out of the corner of my eye, I thought I saw Jaytee! I've had a lot of electrical activity, which makes me feel he's still around, from time to time over the years, but never before had he actually manifested. I shouted 'Jakes!', then I said to myself, don't be ridiculous. He seemed to have followed me from the front room to the kitchen. As I was thinking how ridiculous, I somehow had to check that he wasn't around, and found myself back in the front room looking for him. Then I laughed to myself, feeling stupid, thinking I must have been mistaken and the light was playing tricks.

A couple of minutes later, putting my hot water bottle in my bed, a huge firework went off somewhere in Ramsbottom, making a lovely sight but a big bang. It was around 11.30 pm, and I thought it was a bit late for such a bang, but it was only one. Pottered through towards the bathroom and heard an almighty crash, bang coming from the bathroom. Clearly something had fallen. I opened the door very carefully to see a huge mirror smashed all over the room, with glass everywhere. It took me an hour and a half to carefully clean it all up. When I eventually climbed into bed, exhausted, especially as bending still hurts my sciatica, it suddenly struck me that I could have been injured quite badly had I opened the door about five seconds earlier! It's all very strange, and hopefully you know me not to be fanciful or over-dramatic about things, but it felt very spooky (Series 1, S/S, Record 253).

Our Blue Merle Collie Jess got cancer of the back

legs and had to be put to sleep. We were all so devastated. One day four or five months later, while walking in the woods, I found the whole root of a tree. I wanted to take it home, as it would be a fantastic garden feature, but suddenly the rain pelted down. I tried to carry my prize, but it was far too heavy, so I rolled it to the base of a tree. Thunder was loud and quite frightening along with the lightning, and as I stood wondering what to do, I saw Jess just sitting, not even looking my way. I walked towards her, temporarily losing sight of her, but she wasn't there where I had seen her. We all hurried back to the car. I thought I would fetch my husband back later to collect my tree root. This we did, and there was my root, with the top of the tree lying across it! It had been struck by lightning. Jess had somehow got us out of the wood and to safety. Even in spirit she was some dog! Thank you, Jess (Series 2, Facebook, Record 876)!

I had a beautiful black dog who followed me around and saved me from being robbed one night. When he died, I heard his bark three nights in a row when thieves tried to break into our house. He guarded us even after death. RIP Ruff, we miss you (Series 2, Other, Record 1396)!

Negative Responses

Negative responses to visits from departed pets are rare in our samples, but we heard of a few.

My pet rabbit had an adorable habit of doing Figure 8s around my legs. She would race around and around my legs really fast and it was the cutest thing. I would stand perfectly still until she wore herself out. She died during a routine surgery and I was incredibly sad. When I was home, I silently stood in the living room staring at where her cage used to be, and sure enough, I felt the familiar softness on my lower legs of "her" doing the Figure 8s. I kept brushing at my legs, thinking there was actually something there, and again, nothing. This went on for weeks. Once or twice a day, I would feel her, and then I started to hear her. I could hear scurrying noises throughout the house. It started to become unnerving; it was happening much too often, and I didn't think it was so cute anymore.

I consulted a friend who was a "ghost hunter." She was doing something different regarding spirits of animals haunting their owners. She and her crew came over and interviewed me for her radio broadcast and internet podcast. The crew consisted of her, psychics, and sensitives, and they all claimed they could sense there was an animal (and other spirits as well) in my home. Regardless, it all ended shortly thereafter. I honestly don't know what it was. I can't say for sure. All I can say is that it really happened and I am glad it stopped (Series 2, Other, Record 852).

My Springer Spaniel, Hoover, bit me very badly five days before Christmas. He was my soul friend for eight years and three months and I can still not stop crying about it. I saw him everywhere. When I was in hospital after two operations for the bites I had, I saw him in my hospital room. I was in a room of my own, as the bites were quite bad. He was lying there just staring at me, having been put down the day before. I dismissed it, as I was afraid, not of him, but of what I was seeing, and I started to shake quite a bit. I saw him in the reflection of the TV in the room, which was turned off, and then in the reflection of my make-up mirror. I can't explain this and it still makes me afraid. He stayed in the hospital room all the time with me and would walk on my bed at night to settle behind my head as he always did. I called the nurses, as I was so scared. They were lovely and let my husband stay overnight to comfort me. He never saw anything, but it happened when he was there, while I was trying to sleep.

Sounds like I'm nuts now, but please believe me, I saw him, and he stayed with me all the time. He came home with me when I was discharged. It was Christmas day afternoon when I left the hospital. I went on the internet to see if I could release him and immediately found a way. After a very sorrowful two hours, he was gone. You will probably not believe me at all, but I can only tell you what actually happened to me. I will never want that to happen again in my lifetime. It was not comforting and has made losing my beloved, darling friend even harder (Series 2, Other, Record 863).

DISCUSSION

How do our findings bear on the three main interpretations of ADCs—(1) that they are internal hallucinations of living people; (2) that they are living-agent psi medi-

ated; or (3) that they demonstrate the survival of consciousness after bodily death?

Marwat and Klass, who helped construct the "continuing bonds" model in bereavement studies (Klass et al., 1996; Klass & Steffen, 2017), considered ADCs to constitute "inner representations of a deceased person." These inner representations included "the sense of presence, hallucinations in any of the senses," and "beliefs in the person's continuing active influence on thoughts or events" (Mawat & Klass, 1996, p. 298), exactly the sort of phenomena we have been considering.

Woollacott et al. (2022) concluded their study of human ADCs by rejecting the "internal representation" interpretation of ADCs. They achieved this in part by asking how internalized or externalized the ADCs seemed to their respondents. Because we coded the animal accounts we collected rather than utilizing a questionnaire, we do not have similar systematic data to go on, yet it is clear from our accounts that our contributors also regarded most of their ADCs to be objective and externally perceived, rather than hallucinations internal to their minds. Moreover, some internal impressions, such as a sense of presence and dreams, were shared between percipients. Not infrequently, apparitions of different types were perceived by multiple individuals, sometimes by animals as well as by humans. Objectively observable psychokinetic (PK) effects were also reported. The internal-hallucination model fails in the face of ADC accounts, those involving animals as much as those involving humans.

The second interpretation - that ADCs are living-agent psi-mediated events suffers other problems. There have been attempts to reduce apparent survival phenomena to living-agent psi ever since *Phantasms of the Living* (Gurney et al., 1886). In that work, Gurney argued that apparitions perceived within 12 hours of death could be the results of a clairvoyant or telepathic awareness by the living percipient. Gurney's explanations for apparitions appearing long after death and for collectively perceived apparitions were more involved, although he and others have done their best to show how psi acquisitions might spread from one percipient to another so that there need be but a single living agent for the latter (Braude, 2016b).

Braude (2016a) expanded living-agent psi into what he called "super-psi," a hypothetical ability that has no definable bounds and is capable of explaining away all phenomena suggestive of discarnate agency.[15] But if living persons possess psi abilities, must we suppose they cease to function when they die? Could we not suppose that psi abilities belong in the first instance to the discarnate mind? Psi functioning in living humans is supplementary to the body's senses, and there has never been a satisfactory explanation for why the faculty exists. Perhaps psi's principal value is not to the embodied mind but to the disembodied, and in that case, given the evidence for animal psi (Sheldrake, 1999), is there any reason to doubt that deceased animals, as well as deceased humans, would be able to wield it? Not only is the living-agent super-psi idea unfalsifiable as a scientific postulate, it does not stand up to logical scrutiny.[16]

The third view, that ADCs indicate the survival of consciousness after bodily death, is the interpretation embraced by our contributors, who also accept its corollary, that after death, animals knowingly interact with their living human companions and animal friends. This position cannot simply be accepted at face value, as a default, however. In order to make it credible, it must be shown not only that post-mortem survival is a reasonable conclusion to reach, contra skeptical arguments about its a priori unlikelihood (Augustine & Fishman, 2015),[17] but that animals experience emotions and think and act much as humans do.

We will take up the latter issue first. Recent decades have seen considerable work on animal cognition and emotion that has shown these to be present (and strikingly humanlike) in many different animal species (e.g., de Waal, 2019; Godfrey-Smith, 2017; Masson & McCarthy, 1995; Sachser, 2022). The accumulating evidence led a group of researchers (cognitive neuroscientists, neuropharmacologists, neurophysiologists, neuroanatomists, and computational neuroscientists) gathered at the University of Cambridge in 2012 to issue a declaration regarding the consciousness of animals in relation to humans. They wrote:

> The absence of a neocortex does not appear to preclude an organism from experiencing affective states. Convergent evidence indicates that non-human animals have the neuroanatomical, neurochemical, and neurophysiological substrates of conscious states, along with the capacity to exhibit intentional behaviors. Consequently, the weight of evidence indicates that humans are not unique in possessing the neurological substrates that generate consciousness. Non-human animals, including all mammals and birds, and many other creatures, including octopuses, also possess these neurological substrates (Low, 2012).

A similar declaration was made by New York University in 2024 (Andrews et al., 2024; Falk, 2024).

> Which animals have the capacity for conscious experience? While much uncertainty remains,

some points of wide agreement have emerged.

First, there is strong scientific support for attributions of conscious experience to other mammals and to birds.

Second, the empirical evidence indicates at least a realistic possibility of conscious experience in all vertebrates (including reptiles, amphibians, and fishes) and many invertebrates (including, at minimum, cephalopod mollusks, decapod crustaceans, and insects) (Andrews et al., 2024).

The last few years have seen the introduction of the concept of "basal cognition" (Levin, 2021; Lyon et al., 2021; Lyon & Cheng, 2023), which concerns strategies by which even single-celled prokaryotes, such as bacteria, are able to learn (hence demonstrating the capacity to remember). In his theory of the cellular basis of consciousness, Reber (2019) imputes subjectivity, phenomenological experience, and sentience to prokaryotes. He posits a "cognitive unconscious" at the cellular level for all life on Earth, then adds: "It is possible, in fact I think it's likely, that life and sentience co-occurred back when the prebiotic soup was transformed into a biotic chowder roughly 3.7 billion years ago" (Reber, 2019, p. 191). If Reber is right, in the beginning, consciousness would have been restricted to the unconscious or subconscious stratum of mind. We do not yet know at what stage conscious awareness arose phylogenetically, but it may be a feature to some degree of all complex animals, and have a supereminent function.[18]

Now, affirming that consciousness came into being with the origins of life is not the same as holding that consciousness can exist independently of physical form or that it can survive bodily death. Reber (2019) proclaims his adherence to materialist ideas; even though he rejects the assumption that consciousness is an effluence of the brain, his stance remains unabashedly reductionist. Nonetheless, tracing consciousness back to the "biotic chowder" that gave rise to life as we know it would appear to enhance, rather than diminish, the possibility that consciousness enjoys an existence independent of physical form. Perhaps, as Matlock has suggested (2016, p. 200; 2019, pp. 258-259), individual consciousness streams are drawn from an amorphous, impersonal consciousness that stands in the background of the universe. If that is so, the separation of consciousness from physical form could be a trait of all kingdoms of life.

Dogs and cats not only predominate in our samples, but they are the most engaged with human percipients and are associated with the greatest variety of ADC types. However, we collected accounts involving several other mammals and other vertebrate classes as well (Table 2). In Matlock et al. (2024), we gave examples of a deceased bird pecking its owner on the face (p. 67), a deceased fish projecting its image on the glass of the tank in which it had lived (p. 66), and a possible death-coincident communication from a dying or deceased snake (p. 74). We also reported finding the account of a spider (an invertebrate) on the London *Daily Mail* website:

> Here's a bizarre one; even spiders have souls, it seems! I was caring for a house spider we named Horace, which lived in a small glass fish tank. The spider had only three legs left, having had the rest chewed off by one of our cats. Sadly, one day I managed to squash poor Horace, whilst carrying his tank. Something rolled on him. I was very upset and guilt ridden about my carelessness. A few days later, while laid in bed, I saw a little white light, about the size of a penny, alight on the pillow beside me. It only alighted for a few seconds, then whizzed off vertically and vanished. When it whizzed off there was a whirring noise like tiny wings fluttering. I just instinctively knew it was Horace come to say a final goodbye. It had taken a lot of courage to care for Horace, as I have a big spider phobia, but I had become very bonded to him with time. I think he came back to thank me for having the courage to overcome my great fear and care for him (Series 1, *DM*, Record 511).

A prominent feature of animal ADCs is the bond between human percipients and their deceased pets. This is mentioned again and again in our accounts, and it may be a key factor in them.[19] Sheldrake (1999, pp. 23–26) discussed social bonds between humans and animals as a variation of the social bonding important to many animal species. In terms of his hypothesis of formative causation, social bonds are a reflection of social fields, a type of morphogenetic field (Sheldrake, 1988). Social fields connect individuals during life, providing a channel for (regular) psi, which undergirds group and family bonds. In our ADC accounts, we see social fields established in life persisting after death. The persisting social fields allow animals to stay in touch with their people, even if they move; to return to support them in times of need, even after years apart; or to warn them of impending danger.[20] But our accounts suggest that social fields are not alone in surviving death—they are accompanied by memory, personality, emotion, and other aspects of personal identity, likely recorded in the older subconscious stratum of mind (Matlock, 2019). Moreover, the accounts suggest that a discarnate animal consciousness is capable of thought

and deliberative action. In sum, if we take the accounts as literally as our contributors do, animals are capable of much more than our sciences historically have given them credit for.

The continuing bonds model is not committed to viewing ADCs as internalized, as framed by Marwat and Klass (1996). In a seminal paper, Field and Filanosky (2010) considered a larger array of bonding expressions and classified ADCs (characterized as "illusionary and hallucinatory experiences") as externalized, in comparison to mentation like, "I thought about the positive influence of the deceased on who I am today," which they conceived of as internalized. This formulation has been adopted by other researchers (e.g., Black et al., 2022; Golbeck, 2024; Ho & Chan, 2018), but because it shares with Marwat and Klass (1996) the view that ADCs are figments of percipients' imaginations, it does not represent much of an advance on the original idea. The continuing bonds model continues to reject ADC percipients' assessment of their experiences in favor of a materialist evaluation that assumes those experiences to be illusory. This has the effect of doubly disenfranchising grief over pet loss, by denying the percipients' experiential assessment on top of the disrespect accorded those who mourn their departed pets as if they were human family members.[21]

The continuing bonds (CB) model would do well to recognize that not only do recipients of after-death communications feel bonds with the deceased, but the deceased also feel bonds with the percipients; the continuing bonds are mutual. From the perspective of the continuing bonds model, percipients hallucinate the presence of their animal companions out of their deep grief. But this is not what our contributors say they experienced. Our contributors say they believe their deceased pets are appearing to assuage their grief. Studies like ours have looked at the response of percipients to after-death communications and have found much the same as we have. The respondents of Packman et al. (2011) "reported a tendency to experience CB as more comforting than distressing" (p. 341). Golbeck (2024) says that in her study, "the vast majority of reported feelings (74.6%) were positive, bringing people comfort, reassurance, and a sense of protection" (p. 1). Interpreting these findings as reflecting perceptions born of a desire to make oneself feel better strikes us as perverse, the product of an intense impulse to deny not only the possibility of post-mortem survival, but animal consciousness and discarnate agency along with it.

IMPLICATIONS AND APPLICATIONS

This contribution is part of a series of studies that seek to open up new areas for exploration by focusing on the evidence for animal consciousness and its post-mortem survival, emphasizing commonalities with human experiences of the same. Next, we plan to examine animals seen during near-death experiences (NDEs), out-of-body experiences (OBEs), and other putatively discarnate states, followed by accounts of intra-species reincarnation and inter-species transmigration involving animals. Although this work is still in its exploratory phase, we believe that our findings carry important lessons not only for grief counseling but for a range of empirical disciplines, including parapsychology, consciousness studies, evolutionary biology, and ethology. The issues we raise are significant for philosophy as well. Finally, it is to be hoped that a greater appreciation of, and respect for, animal minds leads to the more humane treatment of animals, as proclaimed in the third paragraph of the New York University Declaration on Animal Consciousness:

> Third, when there is a realistic possibility of conscious experience in an animal, it is irresponsible to ignore that possibility in decisions affecting that animal. We should consider welfare risks and use the evidence to inform our responses to these risks (Andrews et al., 2024).

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AUTHOR CONTRIBUTIONS

James G. Matlock (ORCID: 0000-0003-1280-2476): Conceptualization, methodology, data collection, coding, writing – first and final drafts. **Bethany Hilton** (ORCID: 0009-0009-6259-4696): Data collection, data curation, coding, database queries.

ENDNOTES

[1] Henceforth, we use "animal" in the sense of non-human animal

[2] We follow Matlock in distinguishing an account from a case. In Matlock's terminology, a case is "a set of events that have been investigated or closely observed." By contrast, "an uninvestigated account is a story or anecdote about whose reliability we can say nothing"

(2019, p. 91). Matlock here is concerned with cases and accounts suggestive of reincarnation, but the same applies in principle to any realm of experience.

[3] The Facebook groups in which we posted appeals or gathered accounts include Afterlife of Animals, Dogspotting Society, Pet Reincarnation, Reincarnation, and Signs of Reincarnation. Our requests to post in several animal specialty and grief-related groups were rebuffed by group administrators.

[4] ADCRF is the Afterdeath Communication Research Foundation, https://www.adcrf.org/.

[5] Golbeck (2024) reported a similar use of social media posts on Twitter and Instagram. She analyzed responses to the question, "If you've lost a dog, have you had an experience like seeing their ghost, receiving a sign, did they communicate with you?" The University of Maryland Institutional Review Board (IRB) determined that this did not constitute human subjects research and her study was approved for publication. Although neither of us has institutional affiliations and our study was not subject to IRB approval, we have made an effort to operate in conformance with IRB ethical standards.

[6] Golbeck (2024) utilized a more complex process to decide on her coding categories but ended up with a set very similar to ours: "Physical interactions," which included sound, sight, and physical touch (our auditory, visual, and tactile apparitions), and "Interpreted interactions," which included "ghostly activity," "dream," and "signs" (our psychokinetic activity and sense of presence, dream appearances, signs and synchronicities). Additionally, Golbeck has a sub-category of "dog interaction" (under Interpreted interactions) that includes "sent new dog," "passed on trait," and "reincarnation," all features we captured as well, although we are holding animal reincarnation accounts for a later study.

[7] Surviving animals in the family sometimes reacted to the appearance of their departed friends (6.4% of the Combined sample). This statistic does not include 9 accounts (2 in Series 1 and 7 in Series 2) in which animals were the sole percipients.

[8] Curiously, grief was acknowledged far more often in Series 1 than in Series 2. Account contributors mentioned their grief in 73 (16.5%) of the 442 accounts of Series 1, but in only 46 (7.8%) of the 587 accounts of Series 2.

[9] With Yates's correction, the chi-square statistic is 39.2654. The *p* level remains unchanged at < 0.00001.

[10] We requested permission to quote all accounts we collected ourselves. Those collected by Sheldrake and Smart in response to Sheldrake's appeals are used with permission assumed.

[11] In addition to the tactile feeling of the mouse jumping out of the percipient's hand, this account includes a subjective impression we coded as Other: Internal impression. We discuss the subjective factor in the first part of our Discussion section below.

[12] We coded this Borderline/Questionable due to the possibility of it being due to the percipient's psi (living-agent psi) rather than a communication from the rabbit's discarnate consciousness. As in Matlock et al. (2024), we did not include such accounts in our statistical analysis. We have more to say about them in the second part of our Discussion section, below.

[13] This is an example of an animal haunting which we collected but coded as N/C and did not include in our pattern analyses.

[14] Because the ADC aspect of animal reactions has to be inferred if there are no human percipients, we did not include animal reactions that occurred by themselves in our ADC counts, although we tracked them for the purposes of analysis.

[15] Braude's (2016a) "super-psi" is an upgrade of the term "super-ESP" introduced by Hart (1959), which has much the same meaning.

[16] Braude (2009) argued that to grant discarnate psi abilities would be to acknowledge the possibility of super-psi among the living, but this is not self-evident. Most, if not all, psi activity attributed to discarnate minds requires no more than regular psi, the existence of which among the living is not in dispute among parapsychologists (Matlock, 2019, p. 248).

[17] Augustine and Fishman (2015) calculated the cost of reconciling claims of post-mortem survival with the findings of materialist neuroscience to be unreasonably high, based on a Bayesian analysis. Bayesian analyses are sensitive to starting assumptions, though, so if, in setting up a test, one disregards all evidence contrary to one's expectations (e.g., that assembled by Kelly et al., 2007), it is not surprising that the test outcome confirms one's expectations (Matlock, 2016a, p. 200). Garbage in, garbage out. In an energetic reply to Matlock, Augustine (2016, pp. 216–218) protested that he and Fishman had not wrongly weighted the priors in their Bayesian test; nevertheless, they left out a good deal of evidence for survival they could have included (Matlock, 2016b, pp. 242–243).

[18] Or, perhaps, if conscious awareness is a product of the brain, as materialist neuroscientists maintain, then it might have arisen with the development of brains. At any rate, conscious awareness distinct from the subconscious would explain the "reset" in self-awareness and memory observed in reincarnation cases, when a new body is acquired (Matlock, 2019, p. 252). It would also explain why, with some organ transplants and with certain rare reincarnation phenomena involving

apparent merged and divided consciousness streams, there is never the transmission of a full self-awareness and personal identity (Matlock, 2019, pp. 264-270; see also Matlock, 2021, 2023). These ideas will be explored in greater detail on another occasion.

[19] Indeed, attachment and bonding are thought to play important roles in explaining the intensity of grief, with animals as well as humans (Field et al., 2009; Jordan & Jennifer, 2024).

[20] Warning phenomena suggest a precognitive awareness. This might seem a departure from the hypothesis of formative causation, which is primarily concerned with influences of the past on the present, but in a trialogue between Sheldrake, Terence McKenna, and Ralph Abraham (Sheldrake, McKenna, & Abraham, 2005, pp. 137–138), Abraham suggested that morphic resonance be thought of as having a wave structure spanning space and time, its leading edge extending into the future.

[21] The concept of disenfranchised grief was introduced by Doka (1989) and explored further in Doka (2002).

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RESEARCH ARTICLE

Haunted People Syndrome Redux: Concurrent Validity From an Independent Case Study

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HIGHLIGHTS

Rather than purely spontaneous paranormal events, ghostly episodes seem to be a complex psychological phenomenon involving the right people in the right settings.

ABSTRACT

Auerbach et al. (2023) proposed an AECKO model to describe the features and dynamics of a poltergeist-like disturbance they investigated with virtual technology during the COVID-19 pandemic. A two-part exercise nonetheless shows that their findings fundamentally support Laythe, Houran, Dagnall et al.'s (2021) grounded theory of Haunted People Syndrome (HP-S), which was independently developed at an earlier time. HP-S asserts that ghostly episodes recurrently manifesting to certain people are an interactionist phenomenon emerging from individuals with heightened somatic-sensory sensitivities, which are stirred by dis-ease states, contextualized with paranormal belief, and reinforced via perceptual contagion and threat-agency detection. Part 1 of our research identified strong conceptual parallels between the AECKO and HP-S models, whereas Part 2 involved a content analysis by an independent and clinically-trained researcher (with cross-checking by an expert panel) who used standardized measures to compare Auerbach et al.'s case to the phenomenology of 'spontaneous' ghostly episodes and the five recognition patterns of HP-S. The available data suggested this case had below-average 'haunt intensity' that closely approximated baseline scores for Illicit and Fantasy narratives. Likewise, its *S/O* distribution pattern most resembled accounts with knowingly embellished or false testimony. These results imply that the anomalies considered here were not expressly 'spontaneous.' Content analysis further detected a majority of the HP-S recognition patterns in the case material, as well as evidence that the apparent focus person strongly matched the psychometric profile of poltergeist agents found in prior research. Auerbach et al.'s data, therefore, arguably provide good concurrent validity for the HP-S model. Taken altogether, we assert that ghostly episodes are best conceptualized, researched, and addressed through a biopsychosocial lens and phenomenological approach, irrespective of the potential contribution of putative psi. We discuss these ideas relative to new research directions and clinical applications.

KEYWORDS

Ghostly episodes, interactionism, liminality, poltergeist, psychometrics, systems theory.

INTRODUCTION

It has long been questioned whether some degree of terminological reform might help to counter the lingering negative stereotypes or ideological biases that can hinder research and publication efforts in frontier science (see, e.g., Braude, 1998; Houran & Bauer, 2022; Palmer, 1986). This issue particularly affects parapsychologists who must carefully distinguish between core 'anomalies' (i.e., documented experiences or events) versus percipient or researcher 'attributions' (i.e., assumptions or beliefs about the nature of experiences or events). Therefore, the field should perhaps strive more explicitly for operationalization reform, i.e., the widespread adoption of terms that ideally denote causal mechanisms, or at least, describe reliably measurable constructs for use in hypothesis-testing that promotes cumulative model-building or theory formation (Lange, 2017). For instance, as discussed in the next section, we previously introduced three data-driven operationalizations to advance research and debate on the controversial and often sensationalized subject of 'ghosts, haunts, and poltergeists,' namely: (a) *S/O anomalies*, (b) *ghostly episodes*, and (c) *Haunted People Syndrome* (HP-S) (cf. Houran, Lange, et al, 2019; Houran, Laythe et al., 2019; Laythe, Houran, Dagnall et al., 2021; O'Keeffe et al., 2019).

We explore these constructs via an empirical reanalysis of Auerbach et al.'s (2023) fortuitous case study of poltergeist-like disturbances during the COVID-19 pandemic. Although that investigation was conducted apart from our operationalizations, we argue that its results and conclusions unwittingly provide concurrent validity for tenets of the HP-S model and also important opportunities for their refinement. At the same time, Mayer (2019) rightly cautioned that case studies have major limitations when extrapolated to broader contexts. But these sorts of in-depth examinations nonetheless have a long tradition in science and meaningfully boost our knowledge of highly nuanced or complex systems (Rydberg, 2022). We thus heartily endorse Auerbach et al.'s (2023) approach as part of a broader array of research designs involving mixed or multiple methods that produce more robust and compelling results than single-method studies alone (Morse, 2003). Likewise, our present strategy of reassessing data from prior studies or historical cases using new tools and frameworks is a common research practice in this domain (e.g., Alvarado & Zingrone, 1995; Amorim, 1990; Gauld & Cornell, 1979/2018; Lange & Houran, 2001b; Roll, 1977). We therefore expect the outcomes here can help to refine or rewrite the HP-S model and direct future research on its applicability to different haunt-type cases.

Transcending a Morass of 'Spooky' Concepts with the HP-S Model

The 'anomaly vs. attribution' problem is well illustrated by ongoing proposals and debates about nuances and complexities with the concepts of 'apparitions (or ghosts), haunts, and poltergeists.' For example, Table 1 (online Supplemental Material:https://osf.io/nsv6a/) shows that authors have suggested a myriad of categories or subtypes of similar looking phenomena, whereas other researchers have advocated for a family tree of 'entity encounters' (e.g., spirits, angels, demons, tulpas, folklore-type little people, etc.) involving a common experience that is shaped or interpreted per ideological or sociocultural norms (Evans, 1987; Houran, 2000; Kumar & Pekala, 2001). Apparitions and entity encounters certainly link to haunts and poltergeists in important ways. To clarify from a phenomenological perspective, 'poltergeist outbreaks' involve clusters of unusual psychological or *subjective* (*S*) experiences (e.g., apparitions, sensed presences, hearing voices, or unusual somatic or emotional manifestations) and physical or *objective* (*O*) events (e.g., object displacements, malfunctioning electrical or mechanical equipment, and inexplicable percussive sounds like raps or knocks with communicative features at times) that occur in the presence of certain people called 'focus persons' (for a recent discussion, see Ventola et al., 2019).

Similar *S/O* anomalies that persist over time at particular locations are called 'hauntings' (Houran & Lange, 2001a). Researchers traditionally differentiate haunts and poltergeists, but a firm distinction currently seems arbitrary as both episodes (a) involve reports of similar anomalies, and (b) exhibit focusing effects on certain people and places (or objects) (Dixon et al., 2018; Roll, 1977; Williams & Ventola, 2011). In fact, *S/O* anomalies in these contexts reliably form a probabilistic and unidimensional factor, i.e., a literal hierarchy comprising outwardly different encounter-type experiences (Houran et al., 2002; Houran & Lange, 2001b; Houran, Lange et al., 2019). This finding undermines the common assumption that subjective experiences and objective events are fundamentally different phenomena; rather, they ostensibly constitute a continuum (cf. Houran et al., 2021). Moreover, this '*S/O* anomalies' construct is quantifiable via a standardized assessment called the Survey of Strange Events (Houran, Lange et al., 2019), which we describe later.

Additionally, those with thin or permeable mental boundaries (i.e., hypersensitivities to internal and external stimuli)—as measured by Transliminality or Paranormal Belief—are more likely to perceive various *S/O* anomalies (Houran et al., 2002; Kumar & Pekala, 2001; Laythe et al., 2018). Such individuals also are more susceptible

to 'dis-ease', i.e., when a person's normal state of 'ease' becomes markedly disrupted or imbalanced (Ventola et al., 2019). This ordered set of unexplained 'symptoms' in people with a distinct perceptual-personality and stress profile strongly implicates a core 'encounter' phenomenon that resembles a biomedical syndrome (Laythe, Houran, Dagnall et al., 2021). Consistent with research on symptom perception, the interpretation of recurrent *S/O* anomalies also often vary in accordance with the percipient's sociocultural milieu (Evans, 1987; Houran, 2000; Hufford, 1982). Consequently, the term *ghostly episode* denotes *S/O* anomalies that percipients regard as 'eerie' or 'unnatural' (Houran, Laythe et al., 2019). Some evidence further indicates that there are secular forms of ghostly episodes, including 'deep' imaginary companions that exhibit seemingly autonomous personalities or actions (Little et al., 2021) and 'group-stalking' whereby a person claims to be constantly harassed by a covert gang of unidentified people (O'Keeffe et al., 2019).

We think that the various terms and categories in Table 1 are mostly contrived, theoretically premature, or purposeless, or fail to acknowledge the broader context and phenomenology of *S/O* anomalies. To be sure, a systems theory (or biopsychosocial) perspective is required to properly frame their genesis, interpretation, or perseverance. This approach specifically highlights how people's thoughts, emotions, perceptions, and behaviors are influenced by many interconnected factors like one's physical environment and sociocultural setting (Curtis & McPherson, 2000). A systems view, therefore, provides a more comprehensive understanding of complex psychological phenomena. Laythe, Houran, Dagnall et al. (2021, 2022) consequently integrated the patterns above to introduce their grounded theory of HP-S—an interactionist model that holistically describes the features and dynamics of ghostly episodes in joint 'person-experience' centered terms. This phenomenological approach agrees with other authors who have urged researchers to directly engage these anomalous experiences (e.g., Hufford, 1982; Luke, 2011; Maher & Hansen, 1992). Specifically, HP-S asserts that all guises of ghostly episodes that recurrently manifest to specific people are an interactionist phenomenon emerging from (a) heightened somatic-sensory sensitivities, which are (b) aggravated by 'dis-ease' states, (c) contextualized with paranormal belief or other sense-making attributions, and reinforced with (d) perceptual contagion (i.e., diverse or snowballing perceptions) via attentional biases and (e) threat-agency detection. In short, our five-point model equates the psychological drivers of these occurrences to some of the fundamental mechanisms that stoke outbreaks of mass (contagious) psychogenic illness or autohypnotic phenomena (cf. Bell et al., 2021; Houran et al., 2002; Lifshitz et al., 2019; Ross & Joshi, 1992). Recent surveys, retrospective case reviews, and investigations of active events all lend strong credence to the HP-S recognition patterns noted above (Drinkwater et al., 2024; Houran et al., 2022, 2024; Houran & Laythe, 2022, 2023; Houran, Laythe, Little et al., 2023; Lange et al., 2020; Laythe et al., 2018; Laythe, Houran, & Little, 2021; Little et al., 2021; O'Keeffe et al., 2019; Simmonds-Moore, 2024; Ventola et al., 2019). Preliminary research further suggests that the statistical interrelations among these components or recognition patterns define a psychometrically-robust index of HP-S phenomenology (Lange & Houran, 2024).

PRESENT STUDY AND CASE SYNOPSIS

We conducted a quali-quantitative analysis of Auerbach et al.'s (2023) data and conclusions related to the phenomenology of a recent case involving a series of unusual events. Phenomenology refers to the structures of experience and consciousness (Seamon, 2000), which Laythe, Houran, Dagnall, et al. (2021, p. 198) described as having 'micro' and 'macro' aspects. Micro-phenomenology in this context refers to the contents of *S/O* anomalies, whereas macro-phenomenology denotes the conditions that mediate the onset or proliferation of the *S/O* anomalies. Our results are therefore organized in two sections for clarity: (a) Part 1 compares Auerbach et al.'s proposed AECKO model of poltergeist-like disturbances to the five recognition patterns of HP-S, whereas (b) Part 2 aims to corroborate these conceptual parallels with a confirmatory content analysis that applies standardized measures of micro- and macro- phenomenology to their particular spontaneous case. In this way, we can estimate the extent to which Auerbach et al. (2023) provides concurrent validity for Laythe, Houran, Dagnall et al.'s (2021, 2022) HP-S concept. The facts about the events in question were widely disseminated via a conference presentation (Auerbach et al., 2021), magazine article (Auerbach et al., 2022), and journal article (Auerbach et al., 2023). Thus, we only outline key aspects of the case below as complete details are easily found elsewhere.

Background of the Afflicted Family

Although alleged haunt-type experiences were not infrequent during the stressful COVID-19 pandemic lockdowns (Sery, 2021), Auerbach et al.'s case seemingly involved a series of events not easily attributable to conventional origins as outlined by Houran (1997). In particular, anomalous physical events occurred in a three-bedroom townhouse occupied by a middle-class family living in

Silicon Valley, California. The family consisted of Eileen (a 50-year-old stay-at-home mother and wife), Robert (a 56-year-old engineer), and their teenage children, Nathan (16-year-old) and Emma (14-year-old) (all pseudonyms). During the investigation, the researchers considered the family's needs. This involved non-judgmental listening, providing assurances, and producing a mutually agreed action plan. The researchers also obtained informed consent for the investigation and gained permission to arrange additional resources (e.g., counseling). On 22 June 2020, Loyd Auerbach received an e-mail referral. He subsequently made phone contact with Eileen and Robert, who sought an explanation and eradication of the disturbances, which apparently satisfied Auerbach et al.'s selection criteria for a follow-up probe. This occurred during the COVID-19 quarantine conditions that prevented on-site visits, so the researchers devised and implemented a virtual investigative approach via online video conferencing that involved conducting online interviews, a clinical evaluation session, and telehealth counseling sessions with family members.

Anomalous Experiences and Contextual Factors

The disturbances began in mid-June of 2020, although activity might date back to April or May. This was after the mandatory state-wide 'shelter-in-place' COVID-19 lockdown order on 19 March 2020. This forced Nathan, who was visiting the Middle East on a study abroad program, to return home. Subsequently, the family soon found themselves living together in close proximity because of quarantine and severe air quality hazard alerts from wildfires in the Santa Cruz Mountains and Napa Valley (August, September, and October). Another event that preceded the disturbances involved a pet rabbit the family was fostering (February 1 to June 1). Starting in mid-March, the rabbit was housed in a pen that occupied roughly half of the small living room that the family used as a multi-purpose area. The resultant space reduction caused family stress. The need to return the rabbit after fostering strongly affected Emma, who had bonded with it.

Eileen stated that anomalous events occurred almost daily. On some days, they continued for several hours, whereas other times, the activity was confined to one or two disturbances per day. As the phenomena progressed, Eileen and clinician Beth Hedva (B.H.) produced a written observational log, which Auerbach et al. (2023) offered as Supplemental Material to interested researchers. They noted the 'date, approximate time, witnesses present, and circumstances.' Over 7.5 months of active disturbances, the family chronicled 295 events (measured in units of days), that were also subdivided by categories to explore symbolic themes. Auerbach et al. (2023, p. 47) reported a significant decline in the number of daily recorded disturbances over subsequent months (r = -0.397, p = .001, two-tailed). With the exception of four days in which disturbances clustered (daily total > 5), the marked drop in recorded disturbances from September onward (when daily totals were < 5) aligned with telehealth session days that began in September (see below). Additionally, the anomalies were consistent with previously published poltergeist-type cases (cf. Houran, Lange et al., 2019; Houran, Laythe et al., 2019). They specified 295 disturbances, yet their sections indicated 337. This suggests that the disturbances may have appeared in more than one category; which is probable since phenomena were object and feeling related, though this suggestion was not made clear in their paper.

The investigators created psychological family member profiles from initial clinical evaluation and telehealth sessions. These afforded insights into personal psychosocial dynamics and individual characteristics related to disturbances. Additionally, clinical evaluation and telehealth sessions indicated that multiple stressors during the lockdown period affected the family. These included confining effects (i.e., due to COVID-19 and wildfires), loss of opportunity and fulfillment of expectations (e.g., missed interactions and events), separation effects, project delays, financial burdens, family disagreements, etc. Of these, Eileen linked family disagreements with frustration, anger, and disturbances. Eileen also reported that disturbances occurred in four specific contexts: (a) all family members present, (b) Nathan and Emma present, (c) Eileen and Emma present, and (d) Robert and Emma present. No disturbances occurred when there were just (a) Robert and Nathan and (b) Eileen and Robert. This pattern of interactions implicated Emma as the primary agent or focus person of disturbances. B.H. attributed the disturbances to existential uncertainty (life insecurity). Also, Emma's dislike of authority was central to family issues. The wider socio-political circumstances also contributed to family tensions and anxieties.

Interventions and Outcomes

The initial clinical evaluation session with Eileen and Robert was conducted by B.H. on 4 August 2020. This determined the family's general situation and identified any personal psychological issues they might be facing which could relate in some way to the disturbances. Collaborative family therapy included discussion of family history and dynamics, potential stressors, and desired therapeutic goals. In addition, clinical self-assessment measures

were administered. These comprised the Adverse Childhood Experiences Checklist (ACE: Felitti et al., 1998), Los Angeles Symptoms Checklist (LASC; King et al., 1995), Narrative Client Questionnaire (NCQ: Auerbach, 1986), Highly Sensitive Person Self-Assessment Scale (HSPS: Aron & Aron, 1997). The ACE assesses history of trauma, which can evaluate or predict future potential personal issues (e.g., depression, and suicide risk). LASC identified the presence of potential symptoms of general psychological distress and post-traumatic stress disorder. NCQ measures the personal history of psychic experiences. With the exception of the HSP, which was completed by Emma and Eileen, only Eileen and Robert attended and participated in the evaluation session.

Following the evaluation session, the family took part in 18 telehealth sessions conducted by B.H. They were initially scheduled on a weekly basis (between September 14 and November 18) and lasted 50 to 75 minutes. Since the researchers perceived the family was making progress, proceeding sessions were reduced to bi-monthly (December 2 to January 20). This sequence was punctuated by setbacks (February 17–23), which resulted in a brief return to weekly sessions. Participation in telehealth sessions varied across family members. The prime participants were Eileen and Robert, who attended all of the sessions. Although Nathan did not participate in the evaluation session, he typically briefly attended the start of the telehealth session (approximately 10 to 20 minutes). Attendance fitted around his homework schedule. Emma refused to attend sessions. Information on her personality and behavior in sessions was provided by other family members.

The researchers did not consider Nathan's and Emma's lack of engagement as an issue because systemic family therapy regards the family as a singular 'emotional unit.' Accordingly, the individual members participated in a dynamic, intricate, and interrelated system of mutual interactions. Hence, the system is impacted through family member interactions. During sessions, B.H. used a range of psychotherapeutic and intuitive techniques to facilitate issue resolution and achieve therapy goals. Techniques included education (i.e., provided information about poltergeist-type events and parapsychological research) to reduce fears or misconceptions; strategic 'brief' personal therapy techniques/assigning of homework (i.e., basic stress reduction and crisis intervention practices, designed to cultivate calmness and de-escalate tension), and family systems, transpersonal, and clinical parapsychological techniques (i.e., communication skills training, exploration of cultural and transpersonal elements, and intuition training). As no further anomalies occurred after February 3rd, the family decided that weekly sessions were no longer needed, and only one other session was held on March 9th. This final session closed the therapeutic relationship.

The Proposed 'AECKO' Model

Auerbach et al. (2023) interpreted the reported disturbances within a particular framework they dubbed the AECKO model, which specifies a minimum set of necessary and sufficient features to define a spontaneous case. The A and O in the acronym stand for *Anomalous Occurrence*. Anomalous is defined as "experiences that do not fit into one's usual understanding of the world," and Occurrence simply denotes that the anomalous experiences must be related, as well as occur in a cluster or group of two or more within a certain time frame or space (p. 60). *Episodic* (E) indicates that the cluster of AOs will play out to an episode, story, or narrative that connects the AO with the physical and psychosocial aspects of the individuals present in timeframe/space, with a beginning, middle, and (foreseeable) ending. *Communal* (C), ensures there are "a distinct, identifiable group of people who are witnesses, victims, and reporters of the AO, and who are somehow related as a group," p. 60). *Kinetic* (K) denotes that some of the AO are "measurably energetic, including percussive sounds and physical effects…that leave physical evidence of having occurred" (p. 61). Further, a sixth component of the model is its reliance on a "systems-theoretic perspective" or "…interrelated parts/factors which combine to produce some outcome of interest which is possibly greater than the sum of its constituent parts" (p. 61).

We understand AECKO to be a clinical model that primarily contextualizes 'poltergeist-like' events in order to help ease the distress of the focus person (or, the 'poltergeist' agent) and their family, which, in turn, presumably decreases the frequency or intensity of the anomalous events. Auerbach et al. were apparently interested in the origins of the disturbances but did not disclose any detailed thoughts about the etiology of this particular case. They nevertheless cited William Roll's (1972/2004, 1977) work on the hypothesis of 'recurrent spontaneous psychokinesis' (RSPK; i.e., involuntary mind-matter interactions by certain living people), which might suggest this was a working assumption in their investigation. On the other hand, Auerbach et al. (2023) boldly asserted that RSPK is a "flawed first step towards building a systematic science," and so the AECKO model does not identify an "RSPK agent" and likewise encourages researchers to abandon the human-PK theory as a key etiological factor (p. 13). Instead, they portrayed AECKO as a versatile, fluid, and flexible model that can accommodate new evidence

irrespective of whether RSPK is involved in these haunt-type cases.

PART 1: CONCEPTUAL EVALUATION OF AUERBACH ET AL.'S (2023) AECKO MODEL

For convenience and efficiency, we worked as an expert panel (Bertens et al., 2013) to specify key similarities and differences between the AECKO and HP-S concepts. Each co-author conducted an independent visual inspection of the respective published descriptions and then shared the results with the broader team. One co-author subsequently collated and summarized the areas of collective agreement for our review and approval. We resolved any ambiguities or disagreements about the parallels between the two concepts via iterative discussions.

Table 2. Comparison of key features between the HP-S and AECKO models.

Haunted People Syndrome (HP-S)	Corresponding AECKO Component	AECKO model
(Laythe, Houran, Dagnall et al., 2021)		(Auerbach et al., 2023)
Thin Mental Boundary Functioning		**Hypersensitivities in Focus Persons**
	Not specified in AECKO Model.	
Transliminality (i.e., hyper-sensitivity to internal & external stimuli) , noted in multiple studies to be predictive of anomalous experience and PSI.		Highly Sensitive Person Scale.
Dis-ease States		**Psychosocially Adverse Situations**
Periods of marked psychological disruption or imbalance.	***Communal C, as implied by use of word "victim" in definition.***	Emotional disruption but not severe mental illness.
Recurrent Anomalies		**Repeated Occurrences**
		'Kinetic' (objective) phenomena.
Perception of diverse S/O anomalies per the probabilistic haunt hierarchy, applied to diverse forms of 'hauntings", with ability to address type and nature of phenomena, as well as severity.	***Anomalous Occurrence (A & O), Episodic (E) , Kinetic (K)***	Two or more events, specifically defined as "measurable", and "energetic".
Perceptual Contagion		**Communal**
'Flurries' of anomalous perceptions due to attentional bias or expectancy effects with individuals or groups, noting 'communal interpretation', and lab generated contagion effects.	***Communal C & Episodic (E)***	Cultural/Spiritual/Religious Orientation (i.e., beliefs, and practices can either help or hinder a resolution of the disturbances.
		Percipients are part of a social group.
Threat-Agency Detection		
(i.e., anxiety levels of the percipients relate to the nature, proximity, & spontaneity of the anomalous experiences).	***Communal C & Episodic (E)***	Cultural/Spiritual/Religious Orientation (i.e., beliefs, and practices can either help or hinder a resolution of the disturbances.
		Percipients are part of a social group.
Sense Making Attributions Using Interactionism to Denote Phenomena Witnessed and Interpretation Within Macro and Micro Phenomenology Frameworks		**Systems Theoretic Perspective With Gestalt Features**
(i.e., creation of a narrative reality based on the percipient's biopsychosocial context.... Ideology, Beliefs, Upbringing, and Environment in context of phenomena witnessed).	***Underlying Framework***	"...interrelated parts/factors which combine to produce some outcome of interest which is possibly greater than the sum of its constituent parts." (p. 61).
Paranormal Belief (i.e., endorsement of supernatural phenomena).		Auerbach's Parapsychological Questionnaire (past paranormal beliefs).
Additional assessment through interviews or measures to address's percipient(s) 'meaning making' of anomalous occurrences.		Clinical interviews and related clinical measures.

Accordingly, Table 2 compares the components of the AECKO model (Auerbach et al., 2023) to the five recognition patterns of HP-S and their underlying theoretical frameworks (Laythe, Houran, Dagnall et al., 2021). Several, if not all, aspects of the two approaches are strikingly similar despite their independent development and differences in specificity. This assertion derives from the fact that Auerbach et al.'s (2021, 2022, 2023) multiple case presentations neither claimed nor implied that their study linked to Laythe, Houran, Dagnall et al.'s (2021, 2022) grounded theory of HP-S or its foundational research. This includes earlier studies that first specified a 'transliminal dis-ease' view of ghostly episodes (e.g., Houran, 2013; Houran et al., 2002; Ventola et al., 2019) or our wider discussions of these phenomena in terms of systems theory, narrative reality, and immersive experiences (e.g., Hill et al., 2018; Houran & Lange, 1996; Lange & Houran, 2001a). Thus, Auerbach et al.'s results can be considered 'unintentional data' with respect to the development and validation of the HP-S concept.

As a broad comparison, four major comparative themes are evident. *First*, HP-S relies on transliminality as a central variable among percipients, noting the extensive literature linking thin mental boundaries to anomalous experiences (e.g., Laythe et al., 2018). But, AECKO noticeably lacks explanations with respect to Auerbach et al.'s (2023) use of a parallel measure of 'highly sensitive persons' and how it fits with the AECKO model. *Second*, both models address anomalous experiences, but AECKO places much more 'definitional emphasis' on the A, E, K, and O components, defining 'anomalous experience' from the paragraph above and noting the requirement of "two or more" anomalous events that are measurable and external via some method. In contrast, HP-S uses a standardized measure that allows for *S/O* anomalies across different interpretational milieus, and methods for addressing the severity and type of the occurrences (Houran, Lange et al., 2019; Houran, Laythe et al., 2019).

Third, AECKO refers to a Communal component and addresses this aspect in a clinical sense by emphasizing 'psychosocially adverse situations,' whereas HP-S has additional empirically supported predictions about the interaction of individuals and groups in the immediate environment. These include Perceptual Contagion effects and Threat-Agency Detection relative to the percipient's Dis-ease States (equating to psychosocially adverse situations) and, which reinforce or lead to Sense-Making Attributions. *Fourth* and finally, AECKO relies on a 'systems-theory' view that directly parallels the HP-S model's 'interactionist' (i.e., person-environment interplay) perspective, which also differentiates between anomalous experiences and associated attributions (cf. Lange et al., 2019). Furthermore, HP-S specifies that a percipient's beliefs, sociocultural setting, and immediate environment collectively shape the interpretation of *S/O* phenomena perceived by individuals or groups. Specifically, HP-S highlights the macro- and micro-phenomenology of a ghostly episode in contrast to the AECKO model, which does not specifically guide how systems theory applies to these types of reports.

PART 2: CONTENT ANALYSIS OF AUERBACH ET AL.'S (2023) POLTERGEIST-LIKE EPISODE

Assuming that Auerbach et al. (2023) were blinded to the HP-S model when planning, conducting, or interpreting their fieldwork, the set of correspondences identified in Part 1 represents an example of multiple discovery or simultaneous invention. This is the well-known phenomenon of scientific discoveries or inventions being made independently and more or less simultaneously by multiple scientists or inventors (Lubowitz et al., 2018; Ogburn & Thomas, 1922). However, several case studies demonstrate that specific tools and techniques can reliably map the phenomenology of a ghostly episode and assess the construct validity of HP-S (Houran et al., 2022; Houran & Laythe, 2022, 2023; Houran, Laythe, Little et al., 2023; O'Keeffe et al., 2019). We therefore used a thematic analysis with a narrative lens to evaluate Auerbach et al.'s (2023) case details relative to indicators of 'spontaneous' ghostly episodes and the five recognition patterns of HP-S (Laythe, Houran, Dagnall et al., 2021, 2022). This deductive approach applies existing theory and codes that follow from it to qualitative data (Braun & Clarke, 2006).

Our research design thus parallels a retrospective chart (or medical record) review in which pre-recorded, patient-centered data are used to answer one or more research questions (Vassar & Holzmann, 2013). In particular, an independent analyst used a set of standardized measures to assess for high-confidence indications that (a) *Transliminality* (or thin mental boundaries), reinforced by *Belief in the Paranormal*, was a springboard for percipients' anomalous experiences; (b) *Dis-ease* exacerbated the onset of anomalous experiences; (c) Anomalous experiences showed diversity in content and 'event flurries') suggestive of *Perceptual Contagion* at the individual- or social- levels; (d) *Sense-Making Attributions* for the anomalous experiences conformed to the percipient's biopsychosocial context, and (e) Arousal or anxiety levels of the percipients related to the nature, proximity, and spontaneity of the anomalous events (i.e., *Threat-Agency Detection*).

We strived to follow the Journal Article Reporting Standards (Kazak, 2018), so below we describe how we

determined our research samples, data exclusions (if any), research questions, applicable manipulations, and all measures and data abstractions used in the content analysis. Our design, analysis, and research materials were not pre-registered but conceptually replicate the procedures used in our prior peer-reviewed research as cited above.

METHOD

Measures

Survey of Strange Events

(SSE: Houran, Lange et al., 2019). This is a 32-item, Rasch (1960/1980) scaled measure of the overall 'haunt intensity' (or perceptual depth) of a ghostly account or narrative via a true/false checklist of anomalous experiences inherent to these episodes. The SSE's Rasch item hierarchy represents the probabilistic stacking of *S/O* events according to their endorsement rates but rescaled into a metric called 'logits.' Higher logit values denote higher positions (or greater difficulty) on the Rasch scale (Bond & Fox, 2015). Houran, Laythe et al., (2019, 2021) provide more information about the conceptual background and psychometric development of this instrument. Rasch scaled scores range from 22.3 (= raw score of 0) to 90.9 (= raw score of 32), with a *mean* of 50 and *SD* = 10, and Rasch reliability = 0.87. Higher scores correspond to a greater number and perceptual intensity of anomalies that define a percipient's cumulative experience of a ghostly episode. Supporting the SSE's construct and predictive validities, Houran Lange et al., (2019) found that the phenomenology of 'spontaneous' accounts (i.e., ostensibly sincere and unprimed) differed significantly from control narratives from 'primed conditions, fantasy scenarios, or deliberate fabrication.' That is, spontaneous ghostly episodes have a specific structure (or Rasch model) of *S/O* anomalies that is distinct from the details of narratives associated with other contexts.

HP-S Recognition Patterns Checklist

(Houran et al., 2022; Houran, Laythe, Little et al., 2023). This template was used to guide the raters' content analyses of the contextual aspects of the present case. It outlines the five recognition patterns of HP-S via seven specific questions that are rated on four-point Likert scales anchored by "Strongly Disagree" (scored '0') to "Strongly Agree" (scored '3'). Raw ordinal scores, therefore, range from 0 to 21 (*mean* = 14), with higher scores indicating a judgment of greater likelihood that the respective HP-S recognition patterns were present. Table 3 shows the exact wording of the seven items. This coding sheet likewise refers to the Revised Transliminality Scale (RTS: Lange, Thalbourne et al., 2000) and the Rasch version (Lange, Irwin, & Houran, 2000) of Tobacyk's (1988, 2004) Revised Paranormal Belief Scale (RPBS). Thus, we also provided copies of these two instruments to the coders as important supplementary information.

The RTS is a 17-item, T/F, Rasch-scaled instrument to gauge "a hypersensitivity to psychological material originating in (a) the unconscious and/or (b) the external environment" (Thalbourne & Maltby, 2008, p. 1618). This perceptual-personality variable thus parallels Hartmann's (1991) boundary construct and also the notion of sensory processing sensitivity (Aron & Aron, 1997). In contrast, the Rasch version (Lange, Irwin et al., 2000) of Tobacyk's (1988, 2004) Revised Paranormal Belief Scale (RPBS) is a 16-item, Likert-based measure that comprises two subscales hypothesized to reflect different control issues, i.e., (a) 'New Age Philosophy' (11 items) appears related to a greater sense of control over interpersonal and external events (e.g., belief in psi) and (b) 'Traditional Paranormal Beliefs' (five items) seem more culturally-transmitted and beneficial in maintaining social control via a belief in magic, determinism, and a mechanistic view of the world. Note that the Recognition Patterns Checklist is a tactical worksheet, so no psychometric properties are reported here.

Haunted People Syndrome Screener

(HPSS; Lange & Houran, 2024) consists of six items to be rated on four-point Likert scales anchored by "Strongly Disagree" (scored 0) and "Strongly Agree" (scored 3). These assess the presence of four of the five recognition patterns of HP-S (Laythe, Houran, Dagnall et al., 2021, 2022) relative to recurrent haunt-type experiences—that is: (a) Thin Boundary Functioning (i.e., Transliminality), (b) Dis-ease States, (c) Perceptual Contagion (i.e., event flurries and/or diverse perceptions), and (d) Sense-Making Attributions (i.e., a narrative reality drawing on personal or ideological beliefs). The Rasch-scaled scores (reliability = .87) range from 37.1 to 71.2, with a mean of 50 and standard deviation = 10. Its scores also strongly and positively predict SSE scores (attenuation corrected correlation = 0.78, $p < .001$).

PROCEDURE

A professional clinician and experienced field researcher (i.e., the second author)—who was familiar with our measures and HP-S model—first independently analyzed the contents of Auerbach et al.'s (2021, 2022, 2023) case materials. This included their supplemental 22-page Full Appendix that presented a "...chronological table of

all 295 events recorded in the log" (Auerbach et al., 2023, p. 35). The analyst used: (a) the SSE to measure the 'haunt intensity' by assessing the pattern of reported *S/O* anomalies, and (b) the HP-S Recognition Patterns Checklist to initially provide ratings on contextual factors attending the *S/O* anomalies, which were subsequently applied to the HPSS to obtain a more robust standardized score. No time limit was imposed for the content analysis, and the analyst returned the completed forms approximately 1.5 months later. For convenience and efficiency, the remaining research team (all except the second author) again worked as an expert panel (Bertens et al., 2013) to 'double-check' the reliability, accuracy, and completeness of these primary ratings (Hewitt et al., 2016). This five-per-

Table 3. SSE profile of Auerbach et al.'s (2023) poltergeist-like case.

Survey of Strange Events (SSE)	1 = True	Frequency
1. I saw with my naked eye a non-descript visual image, like fog, shadow or unusual light	0	0
2. I saw with my naked eye an "obvious" ghost or apparition – a misty or translucent image with a human form	0	0
3. I saw with my naked eye an "un-obvious" ghost or apparition – a human form that looked like a living person	0	0
4. I smelled a mysterious odor that was *pleasant*	0	0
5. I smelled a mysterious odor that was *unpleasant*	0	0
6. I heard mysterious sounds that could be recognized or identified, such as ghostly voices or music (with or without singing)	0	0
7. I heard on an audio recorder mysterious sounds that could be recognized or identified, such as ghostly voices or music (with or without singing)	0	0
8. I heard on an audio recorder mysterious "mechanical" or non-descript noises, such as tapping, knocking, rattling, banging, crashing, footsteps or the sound of opening/closing doors or drawers	0	0
9. I had a *positive* feeling for no obvious reason, like happiness, love, joy, or peace	0	0
10. I had a *negative* feeling for no obvious reason, like anger, sadness, panic, or danger	0	0
11. I felt odd sensations in my body, such as dizziness, tingling, electrical shock, or nausea (sick in my stomach)	0	0
12. I had a mysterious taste in my mouth	0	0
13. I felt guided, controlled or possessed by an outside force	0	0
14. I saw beings of divine or evil origin, such as angels or demons	0	0
15. I saw folklore-type beings that were not human, such as elves, fairies, or other types of "little people"	0	0
16. I communicated with the dead or other outside force	0	0
17. I had the mysterious feeling of being watched, or in the presence of an invisible being or force	0	0
18. I had a sense of déjà vu, like something was strangely familiar to me about my thoughts, feelings or surroundings	0	0
19. I felt a mysterious area of *cold*	0	0
20. I felt a mysterious area of *heat*	0	0
21. I experienced objects disappear or reappear around me	1	93
22. I saw objects moving on their own across a surface or falling	1	28
23. I saw objects flying or floating in midair	1	80
24. Electrical or mechanical appliances or equipment functioned improperly or not at all, including flickering lights, power surges or batteries "going dead" in electronic devices (e.g., camera, phone, etc.)	1	51
25. Pictures from my camera or mobile device captured unusual images, shapes, distortions or effects	0	0
26. Plumbing equipment or systems (faucets, disposal, toilet) functioned improperly or not at all	0	0
27. I saw objects breaking (or discovered them broken), like shattered or cracked glass, mirrors or housewares	1	3
28. I heard mysterious "mechanical" or non-descript noises, such as tapping, knocking, rattling, banging, crashing, footsteps or the sound of opening/closing doors or drawers	1	19
29. I felt a breeze or a rush of wind or air, like something invisible was moving near me	0	0
30. Fires have started mysteriously	0	0
31. I was mysteriously touched in a *non-threatening* manner, like a tap, touch or light pressure on my body	1	6
32. I was mysteriously touched in a *threatening* manner, such as a cut, bite, scratch, shove, burn or strong pressure on my body	1	17
Raw Sum	**8**	

son panel encompassed collective expertise across clinical, cognitive, personality, and social psychologies. Each member independently reviewed the second author's initial ratings and provided commentary to the group. We resolved any ambiguities or disagreements about particular aspects of the case's phenomenology via iterative discussions. Moreover, we re-examined Auerbach et al.'s (2023) Full Appendix for the reported frequencies of different *S/O* anomalies in order to explore for previously undetected or unreported patterns.

RESULTS

Micro-Phenomenology

Table 3 converts Auerbach et al.'s inventory of reported events in the case to an SSE profile comprising the presence (T/F) and incidence rate (frequency) of particular *S/O* anomalies inherent to ghostly episodes. The raw sum of '8' equates to a below-average SSE score of 47.3 (*SE* = 2.9). This result most closely matches the mean SSE score for an Illicit narrative (*M* = 45.90) as compared to the means for Spontaneous (*M* = 51.70), Primed (*M* = 52.30), Fantasy (*M* = 49.43), or Lifestyle (*M* = 50.60) narratives (Houran, Lange et al, 2019, p. 176). Note that we omitted three events from the coding/scoring due to their vagueness: (a) a string was found loosened, (b) shampoo allegedly changed color, and (c) a candle flame went out. Two of these anomalies might fit the SSE items of either "object movements" or "object (dis)appeared around me," but an appropriate category for the shampoo event is elusive. That said, the SSE score would slightly increase to 48.6 (*SE* = 2.8), assuming a raw sum of '9' to accommodate this latter anomaly as a new SSE item. This adjusted SSE score best approximates a Fantasy narrative. These results imply that the 'haunt intensity' of the *S/O* anomalies defining this case might best be construed as something between, or a hybrid of, Illicit and Fantasy episodes.

To cross-check, we correlated the recorded frequencies of each SSE item to the Rasch logit values for the same items across each of the five different haunt conditions in Houran, Lange et al. (2019). Recall that a logit is the unit of measurement in Rasch scaling corresponding to a point along an interval-level continuum where a given item is positioned per its likelihood of being endorsed relative to the other items in the measure. Houran, Lange et al. (2019) found that the logit values of some SSE items shifted by context, i.e., specific anomalies were under or over-reported by survey respondents in Spontaneous, Primed, Lifestyle, Fantasy, and Illicit contexts. Thus, these five narrative-specific 'haunt hierarchies' have some diagnostic value. The *S/O* anomalies reported most frequently should thus correspond to SSE items with lower logit values in a particular haunt hierarchy (i.e., 'easier' endorsement, or relatively more common experiences). Likewise, the SSE items with higher logit-values (i.e., 'harder' endorsement or relatively rarer experiences) should relate to *S/O* anomalies with comparatively lower frequencies in a particular haunt hierarchy. In other words, a stronger *negative correlation* in this exercise indicates stronger compatibility between a given account and a narrative-specific haunt hierarchy. Correlational analysis indicated that Auerbach et al.'s stated frequency distribution of *S/O* anomalies in this case most closely resembles an Illicit narrative (r = -.24, p = .19), followed by Fantasy (r = -.14, p = .44), Spontaneous (r = -.01, p = .96), Lifestyle (r = .25, p = .17), and Primed (r = .43, p < .01) contexts. Nearly all these associations are not statistically significant, but their directionalities offer important insights for further contemplation.

Lastly, we evaluated the broad structure of the *S/O* anomalies in the case via Houran, Lange et al.'s (2019, p. 180) decision-tree process. Based on current benchmarks, this statistically-derived classification heuristic suggested that the general structure of the *S/O* anomalies align with 87% accuracy to an 'Illicit' narrative, i.e., an account containing some amount of false or embellished testimony. This outcome might also fit a Fantasy narrative if self-deception or self-gaslighting was involved due to, for example, expectancy-confirmation effects (e.g., Drinkwater et al., 2019) or efforts to cope with trauma (e.g., Rubinstein & Lahad, 2023). Overall, the present case is estimated to have the haunt intensity of an Illicit-Fantasy narrative with *S/O* anomalies showing a distribution pattern most similar to accounts benchmarked as knowingly dubious.

Auerbach et al. (2023, p. 53) asserted that several factors mitigated the possibility of a hoax, such as the family's (a) outreach to the local police, (b) resistance to socializing or publicizing the case, and (c) cooperative and anonymous participation with a formal investigation. Yet Auerbach et al.'s (2023) Full Appendix (supplemental material) included hints that pranking sometimes occurred. For instance, Event 282 (p. 20) involved Eileen and Robert hearing the sound of glass falling as they watched a Netflix program on the living room sofa (just in front of the dining room). They discovered that Eileen's full glass of water had moved from the dining room table to the floor, but Event 283 indicates that the glass was picked up and found to have approximately "10-feet of dental floss wrapped around it and tied in a knot." Another time (Events 98-100, p. 6), the family decided to sleep together in the master bedroom to ease their anxiety. During this time, three "water materializations" occurred: (a) water was found spilled on Robert's shirt, bedsheets, and com-

forter, as well as on Emma's foot after the lights went out (Event 98); (b) water then appeared on Robert's dry clothes and on Emma's head and shirt after family again turned off the lights to sleep (Event 99); and (c) water again spilled on Emma after the lights had been turned off a third time (Event 100). Later, three crumpled Dixie bathroom cups—discovered under the bed while cleaning the room the following day—were suspected of being involved in these incidents.

We, therefore, conclude from both the psychometric modeling and circumstantial evidence that this ghostly episode was *not* a purely spontaneous event but instead involved the role of active imagination (purposeful or not) as related to Thin Boundary Functioning rather than explicit cuing or demand characteristics exemplified by commercial paranormal tours or ghost hunts. Working from these assumptions, Houran, Laythe, Little et al.'s (2023: Appendix) simplified process for vetting cases would not have recommended a parapsychological (or proof-oriented) field investigation of this case. Still, this does not mean that the clinical attention Auerbach et al. gave to the family was a misguided or wasted effort. We agree that regardless of the ontological reality of psi functioning in certain cases, the reported phenomena are often idioms of distress that ethically deserve supportive responses from researchers (Hess, 1988; Houran et al., 2002; Rogo, 1982).

Macro-Phenomenology

Table 4 gives the analyst's mapping of contextual details in this case per the HP-S Recognition Patterns Checklist. There were moderate-to-strong ratings on six

Table 4. HP-S recognition patterns mapped to the Auerbach et al. (2023) poltergeist-like case

HP-S Recognition Pattern	Corresponding Attitudes or Behaviors	Score (0-3)	Sample Evidence Auerbach et al., (2023)
Transliminality (i.e., permeable mental boundaries) is the foundation for percipients' anomalous experiences, reinforced by *Paranormal Belief*.	1. Does the witness/ focus person report experiences consistent with items from the Revised Transliminality Scale?	3	Emma scored '18' on the Highly Sensitive Person Self-Assessment Scale, which classifies her as a highly sensitive (p. 43).
	2. Does the witness/ focus person report attitudes or beliefs consistent with items from the Rasch-Revised Paranormal Belief Scale?	2	Family members believed that Emma had psychic abilities and could predict the future (p. 43).
Dis-ease (or psychological dissonance) as a catalyst for the onset of anomalous experiences.	3. Does the witness/ focus person report circumstances of notable distress (negative stress) or eustress (positive stress) immediately prior to the onset of the anomalous experiences?	3	Emma endured prolonged stress, anxiety, and uncertainty throughout the course of the case related to several psychosocial stressors including; confining effects, loss of opportunity and fulfillment of expectations, separation effects, financial burden, insect infestation, personal effect over local/national events. (p. 45)
Recurrent anomalous experiences that *exhibit temporal patterns suggestive of perceptual or social contagion*.	4. Does the witness/ focus person report an ongoing array of diverse *S/O* anomalies per the Survey of Strange Events?	3	Auerbach et al. (2023: Appendix, pp. 2-3): On 6/18/20, the family experienced 19 different anomalous events over the course of 2.5 hours
	5. Does the perception of *S/O* anomalies clearly occur in "flurries," especially when a group of percipients is involved?	3	Auerbach et al. (2023: Appendix, pp. 6-8): The family witnessed a series of 32 anomalous events which occurred from 11pm on 7/18/20 until 7/19/20 at 5am.
Attributions for the anomalous experiences *align to the percipient's biopsychosocial context*.	6. Does the witness/ focus person interpret the *S/O* anomalies in a way that is consistent with his/her religious or cultural belief system(s)?	0	It was noted without specifics that the family has "religious beliefs" (p. 43), but no indications in the paper or Appendix that any family member associated the disturbances to their cultural or religious beliefs.
Anxiety levels of the percipients *relate to the nature, proximity, and spontaneity of the anomalous experiences*.	7. Does the witness/ focus person report greater intensity of fear or anxiety when the *S/O* anomalies occur (a) suddenly or without warning, (b) within the person's personal space, and/or (c) involve more tangible or physical anomalies?	2	Emma's responses to the anomalous disturbances resulted in psychosomatic aftereffects such as hand trembling and one instance of fainting (p. 43).

Table 5. Comparison of Auerbach et al.'s (2023) focus person to Ventola et al.'s (2019) psychometric profile of poltergeist agents.

Psychological Variables Linked to Focus Persons (Ventola et al., 2019)	**Sample Behaviors of Focus Person in the Case Study** (Auerbach et al., 2023: Full Appendix)
Imagination/ Magical Thinking/ Fantasy-Proneness	---
Rebellious Attitude/ Impulsivity/ Aggression/ Hostility	"Several of the issues relating to authority and being judged seem to relate to Emma, who does not like being told what to do and is fearful of being judged for being "different" from the rest of the family, leading to a sense of isolation (i.e., a "black sheep" scenario)" (p. 46).
Somatic Complaints/ Anxiety/ Irritability	Emma was diagnosed with Generalized Anxiety Disorder, started on Zoloft, and participated in individual psychotherapy (p. 44).
Low Self-Esteem/ Self-Concept or Ego-weakness/ Insecurity	Concern with body image. Frequently felt self-conscious about her weight, often asking other family members " if they think she's fat" (p. 43).
Unhappiness/ Shame/ Jealousy	Emma presumably had difficulty with prolonged social distancing and confinement, which resulted in negative psychological effects such as stress, depression, anxiety, loneliness, and boredom (p. 44).
Dissociative Tendencies	---
Temporal Lobe Lability	---
Introversion	Family and teachers reported to have noted that Emma was "very, very shy" and did not like speaking in class or being called on by the teacher. Also did not like talking with waiters to order food (p. 43).

(or 86%) of the seven nuances of HP-S, namely: (a) Thin boundary functioning via high transliminality and reinforced by some degree of paranormal belief; (b) Dis-ease coinciding with the onset of the *S/O* anomalies; (c) diverse *S/O* anomalies that manifest in flurries (i.e., possible perceptual contagion); and; (d) percipients' anxiety levels aligned to principles of threat-agency detection. However, the available evidence did not clearly implicate the adoption of sense-making attributions by the afflicted family. The ratings nonetheless summed to an above-average score of '16' on the Checklist. These patterns further yielded a raw score of '14' on the separate HPSS tool, which converts to an above-average Rasch scaled score of 59.3 (*SE* = 2.5). In other words, the content analysis found reasonably strong and reliable evidence that Auerbach et al.'s (2023) case exhibited HP-S phenomenology.

Table 5 shows that Emma also exhibited several clinical characteristics that corresponded to Ventola et al.'s (2019) review of the psychometric profiles of focus persons. In particular, prior psychological testing suggests there are eight individual differences observed with poltergeist agents, with each variable positively correlating with transliminality. The content analysis found reasonably strong indications of five (or 63%) of these characteristics. It is difficult to draw firm conclusions about Emma's potential lack of (a) Imagination/ magical thinking/ fantasy-proneness, (b) Dissociative tendencies, or (c) Temporal lobe lability, since absence of evidence is not evidence of absence (for a clinical discussion on this point, see Alderson, 2004). However, the overall results align well to Ventola et al. (2019) and thus underscore the likely roles of thin boundary functioning and dis-ease in this case.

CLINICAL ISSUES AND FUTURE RESEARCH DIRECTIONS

Our audit of Auerbach et al.'s data and observations highlights three important topics for further consideration and exploration. Each could merit its own paper, so we only give synopses below.

Potential Phases or Subtypes of Ghostly Episodes

HP-S is not an omnibus theory but instead pertains to ghostly episodes that recurrently manifest to certain people. However, the content or valence of 'symptom perception' in these cases can alter with different biopsychosocial contexts, such as a percipient's culture, social milieu, psychological profile, or physical environment (Houran, 2000; Houran, Lange et al., 2019). This implies that a core experience or condition can appear outwardly different depending on various factors, and it might be misguided, therefore, to categorize cases based on singular characteristics like presumed source, contents or themes, duration or intensity, or even psychological aftereffects. At this time, we would argue that 'micro/ macro phenomenology' is perhaps the most reasonable criterion for case

classification. The SSE and HPSS tools can assist in this regard, though more research is certainly needed to improve their diagnostic or measurement quality.

Part of that precision involves considering categories or subtypes of ghostly episodes, as exemplified by the competing concepts and terms in Table 1. Moreover, the SSE might need to be expanded to accommodate more types of *S/O* anomalies or to acknowledge important nuances with certain phenomena. For example, it might prove useful to differentiate among specific classes of focus objects, as in Auerbach et al. (2023), different kinds of apparitions as discussed by Tyrrell (1953), or different physical manifestations as documented by Dullin (2024). SSE scores might also need to accommodate 'symbolic meanings' inherent to certain *S/O* anomalies within or across cases, though it is unclear how to make these determinations assuming they are unconscious in nature or require psychotherapy to uncover. Labeling in this context might be overly tenuous or vulnerable to suggestion effects. And too, the 'narrative development' of a ghostly episode should be considered (e.g., Houran, 2013) as cases could involve distinct phases or stages with their own nuances in phenomenology (Houran et al., 2024). It is also possible that supposed categories or subtypes of episodes can shift or transform among themselves, as with Dixon's (2016) study of a case in which physically-oriented 'poltergeist' anomalies were seemingly replaced by typical psychologically-oriented 'haunt' phenomena after the focus person was gone. Taken altogether, the question of phases or subtypes of ghostly episodes remains blurred, so Table 1 arguably reflects a vast range of hypotheticals to be tested. Any efforts along these lines should nonetheless help to refine the SSE and HPSS measures.

Finally, there are questions of measurement-equating in terms of (a) the *incidence rate* of *S/O* events versus (b) their *absolute presence* or absence. Consider three scenarios as an example: one case comprises the recurrent perception of a lone apparition vs. a second episode with multiple reports of three apparitions that are always observed simultaneously vs. a third incident involving object displacements (as with Auerbach et al., 2023). All three cases would yield an SSE score of '1' per the simple presence/absence of particular anomalies. This suggests an equivalent 'depth or intensity' of experience across the scenarios, despite this assumption appearing to be implicitly flawed or incorrect. Thus, the current version of the SSE might need to be revamped for multi-level scaling that accounts for the potential interplay of 'anomaly type × anomaly frequency × episode duration.'

Stigmatization with Ghostly Episodes

People frequently interpret anomalous experiences as paranormal occurrences (Drinkwater et al., 2013, 2017, 2022). Blinston (2013) classified potential reactions to such claims. Whereas these were designed for children's encounter phenomena, they generalize well to the vast variety of exceptional human experiences. These responses include (a) *pathologizing* (labeling the experience as symptomatic of mental ill-health), (b) *acceptance* (viewing the account as authentic), (c) *rejection* (ignoring or dismissing the testimony), (d) *condemning* (criticizing the percipient for fabricating the incident), (e) *demonizing* (depicting the occurrence as the work of the devil or a demon), and (f) *deifying* (the narrative is believed and the person is viewed as special). From this perspective, many scholars and practitioners often view paranormal-type experiences as maladaptive or dysfunctional perceptions or behaviors. This trivializes the reported experience, undermines the percipient's acuities, and marginalizes the associated explanations and opinions. At a societal level, this delegitimizes the paranormal and ensures that the predominant scholarly view is one of refutation, rejection, or denial. This leaves little or no tolerance for the notion that paranormal forces or abilities can genuinely exist (e.g., Reber & Alcock, 2020).

In this context, some people have critiqued the HP-S model for allegedly pathologizing percipients via the use of biomedical terminology that sounds derogatory like 'syndrome' or 'dis-ease.' Even the concept of 'narrative reality' strongly parallels that of 'delusional' ideations (Houran & Lange, 2004). Nonetheless, there is no skirting the fact that the HP-S model comprises a 'transliminal dis-ease' view of ghostly episodes. Researchers and practitioners should, therefore, neither minimize nor ignore the clinically relevant facets inherent to many cases for the sake of political correctness that is fashionable in some academic circles (Enkvist, 2018). The psychological dynamics in these occurrences need not be strictly pathological, but they are often dysfunctional given that the anomalous events or their aftereffects can significantly disrupt an individual's daily functioning or that of an entire family. Accordingly, 'normalizing' these cases for percipients must be done in a careful and responsible manner that does not catastrophize the events, while at the same time, acknowledges the important clinical features of the focus person or the family dynamics that are typically at play. This leads to the next issue of parsimony in professional interventions.

Parsimony in Clinical Approaches

Much evidence suggests that emotional reactions or psychological aftereffects with ghostly episodes are

mediated or moderated by an individual's (or family's) interpretation of the *S/O* anomalies. For instance, Brett et al. (2014) showed that an undiagnosed population (compared to those diagnosed with a psychotic condition) were less concerned about a need for control and further applied more positive and benign interpretations of anomalous experiences compared to percipients with mental illness. Drinkwater and colleagues (2013, 2017) likewise found that percipients' interpretations of their paranormal experiences significantly mediated their perceived anxiety. Drinkwater et al. (2021) also discussed the threat index of *S/O* anomalies and how the nature of the events and their proximity to one's personal space affects one's threat index of a situation. These results suggest that the narrative process of sense-making might also influence percipients' distress levels in ghostly episodes.

The recommended strategies for clinical relief or sense-making— i.e., reducing either the frequency/intensity of ghostly perceptions, or the anxiety level felt in response to such perceptions — are often rooted in clinical, phenomenological, or transpersonal frameworks that accommodate percipients' belief systems (Laythe, Houran, Dagnall et al., 2021, pp. 201–205). More traditional techniques include religio-spiritistic rites like exorcism, prayers, or so-called spirit-cleaning or spirit-releasement (Storm & Tilley, 2020; Tilley, 2002; Tramont, 2023), although Roll (1977, pp. 403–405) also talked about inconsistent outcomes with such interventions or even when families relocate to new residences. On the other hand, Sersch (2019) discussed several studies that showed exorcisms working as well or better than clinical therapy in cultures that accepted 'spirit possession' as a reality. It is easily presumed that certain rituals induce placebo effects which minimize dis-ease, and, in turn, mitigate perceptions of (or negative reactions to) *S/O* anomalies. Other interventions might work via the principles of Rational-Emotive Behavioral Therapy (REBT) model (Ellis & MacLaren 1998), which is the original form and one of the main pillars of cognitive-behavioral therapies (CBT) (David et al., 2018). The key feature that separates REBT and CBT from preceding cognitive therapies is that both frameworks target 'beliefs' as the fundamental course of intervention. Albert Ellis' basic idea was that our emotions and behaviors (C: Consequences) are not directly determined by life events (A: Activating Events), but rather by the way these events are cognitively processed and evaluated (B: Beliefs) (Oltean et al., 2017). It is also curious that Ellis adapted liberally from ancient philosophers and Buddhist theology in the creation of his REBT model (Christopher, 2003; Ellis, 2000).

Regardless, calls for mindfulness of 'clinical parapsychology' are not a new proposal (Coly & McMahon, 1993; Evrard, 2022; Kramer et al., 2012), and augmenting field investigations with trained practitioners who can provide education on these anomalous experiences or facilitate sense-making for percipients should be encouraged as a best practice.

Yet, there are also important ethical considerations with interventions that implicitly endorse or reinforce people's unproven or emotion-based belief systems, or otherwise foster cognitive distortions in health-related contexts (Andrade, 2017; Chaet, 2018; Conlin & Boness, 2019; Irwin et al., 2022; Totton, 2007; Vicente et al., 2023; Zaiden et al., 2023). Moreover, simple counseling approaches do not necessarily advance a scientific understanding of ghostly episodes. Indeed, person-centered designs and clinical interventions need not be mutually exclusive to the critical goals of scientific data collection and hypothesis-testing. Carpenter (2012) spoke to this point with his suggestion to use psychotherapy to gain even deeper levels of understanding about the psychology and parapsychology of ostensibly psi-conducive individuals such as focus persons. This tactic might not be feasible in every situation, as most people will likely be more interested in symptom-relief than investing their time and energy in an ongoing process of intense self-examination. However, we concur with Carpenter's view that the data gathered could provide critical and unique insights that are otherwise unobtainable with psychometric testing alone.

GENERAL DISCUSSION

Academic studies normally include a review of prior and relevant publications to ensure that existing knowledge is recognized and discussed logically relative to current convergences and divergencies (Bordage, 2001; Pautasso, 2019; Webster & Watson, 2002). It is also necessary to uncover gaps that exist in specific research areas, as well as to explore the knowledge needed to make progress in a domain (Snyder, 2019). In these respects, Auerbach et al.'s (2023) case study could have been an opportunity for cumulative model-building and theory formation on ghostly episodes. In particular, a comparison of key features showed that the AECKO framework conceptually duplicates virtually all the core tenets of Laythe, Houran, Dagnall et al.'s (2021, 2022) earlier HP-S model. A content analysis of the spontaneous case in question likewise affirmed a moderate-to-high level of alignment with three of the five recognition patterns of HP-S. However, the extent to which paranormal belief and threat-agency detection played significant roles here was unclear. Separate observations nonetheless agreed on the basic 'transliminal dis-ease' view of these anom-

alous experiences, which was proposed many years ago (e.g., Houran, 2013; Houran et al., 2002; Ventola et al., 2019). But, the HP-S concept goes further to characterize ghostly episodes as narrative realities comprised of *enactive*, *immersive*, and often *performative* events.

We thus appreciate Auerbach et al.'s (2023) de-emphasis of the 'paranormality' question in favor of our shared attributional perspective that draws on systems theory. Some research has even strived to classify the various psychodynamics underlying various exceptional human experiences (Fach, 2011), which further supports the viability and usefulness of a phenomenological approach. Similarly, we have repeatedly stated that our HP-S model neither negates nor requires parapsychological influences such as the speculative concepts of discarnate agency (Betty, 1984) or RSPK (Roll, 1977), It is nonetheless possible that there is more to these phenomena than can be described by standard principles in the social, biomedical, and physical sciences. Particularly, research indicates that the published incidence rates of many (entity) encounter experiences and spiritistic anomalies are not fully explained by the known effect sizes of fraud, environmental factors, measurement error, mental illness, susceptibility to perceptual aberrations, the influence of suggestion (e.g., placebos or perceptual contagion), or even ostensible 'living-agent' psi (Rock et al., 2023). Furthermore, indices of putative psi show overall positive correlations with transliminality (Ventola et al., 2019, pp. 157–160) and various other cognitive-affective variables related to creativity (Carpenter, 2012). Like Auerbach et al. (2023), we are therefore open to the idea of putative psi contributing to some or all of the harder cases in this domain. However, we make no firm judgment about Auerbach et al.'s (2023) account apart from our assertion that the reported events should not be taken at face value because it seems likely that some of them involved causal factors unrelated to psi. Indeed, many experiences in this particular case seemed 'weak' from an evidential standpoint, such as a donut that reportedly 'disappeared' in a house with two teenagers. That said, an account infused with imaginal, misinterpreted, embellished, or performative events does not automatically exclude the possibility of genuine parapsychological events in some instances (Cox, 1961; Brookes-Smith, 1973; McClenon, 2024).

Several limitations temper our conclusions. For instance, content analyses always involve a level of subjectivity and bias (Creswell & Poth, 2016), and the generalizability of our psychometric approaches and benchmarks has likewise been criticized (e.g., Solfvin, 2020). Additionally, the present results follow solely from our team's ratings of Auerbach et al.'s case information versus input or 'member-checking' from the afflicted family or original investigators (McKim, 2023). Our research likewise considered only HP-S related variables despite the potential for other mediators or moderators. Future studies should, therefore, seek evidence that contrasts and supports the HP-S theory. For instance, artificial intelligence (AI) language programs could be efficient tools to conduct rigorous content analyses using inclusion-exclusion criteria aligned to competing hypotheses (cf. Morgan, 2023). Moreover, we were unable to assess whether the *S/O* anomalies here linked to the spatial features of the family's setting (Houran, Laythe, Lange et al., 2023) or physical fluctuations in their ambient environment (Dagnall et al., 2020). A comprehensive systems theory approach using mixed methods and fieldwork investigations should certainly explore these and other potential influences.

Lastly, we concede that the idea of multiple discovery of the HP-S recognition patterns in this instance could be overstated. It is indeed possible that Auerbach et al.'s (2021, 2022, 2023) approach and suppositions were not fully blinded to the HP-S model, its core components, or our previously published discussions of ghostly episodes relative to the mainstream concepts of systems theory, narrative reality, and immersive experiences. Particularly, their lead author wrote the Afterword (Auerbach, 2022) to Laythe, Houran, Dagnall et al.'s (2022) text that summarized the transliminal dis-ease perspective and broader HP-S model. Auerbach et al. (2023) also cited their prior Letters to the Editor and magazine articles that implicitly recognized our HP-S related work. We assert nonetheless that a lack of absolute independence does not seriously undermine the premise that the AECKO-based observations from their case study offers concurrent validity for the recognition patterns and systems approach of the HP-S model.

On the flip side, our argument for concurrent validity largely rests on Auerbach et al.'s (2021, 2022, 2023) declared operationalizations, data, and conclusions—all of which have shortcomings. For instance, their fieldwork arguably constituted more of a clinical intervention along the lines of Tilley's (2002; Tilley & Storm, 2020) work than an empirical evaluation of the family's anomalous experiences. Moreover, they neither explained their emphasis of certain psychological constructs in their probe nor their use of specific questionnaires that certainly varied in psychometric quality. Thus, their approach was apparently not designed as cumulative science that connected to or extended prior literature. Auerbach et al. also did not vigorously vet the veracity of the reported anomalies, although we sympathize with the challenge of establishing authenticity in such cases. Accordingly, the roles of fraud (e.g., malingering or attention- and

sensation-seeking behaviors) or self-deception with the afflicted family cannot be ruled out. Still, it is noteworthy that our two teams with different research orientations showed closely parallel thinking on the phenomenology of ghostly episodes.

IMPLICATIONS AND APPLICATIONS

Heeding the wisdom of mathematician Alfred Korzybski (1931), we recognize that the HP-S model is only a 'map' and not the 'territory.' That is, a description of a phenomenon does not necessarily equate to an explanation (cf. Schurger & Graziano, 2022). While we can leverage biopsychosocial principles and statistical models to describe several aspects of ghostly episodes, this does not mean that we have identified or solved all relevant questions and equations. But, we do not need complete solutions to draw some important conclusions about these occurrences from their apparent properties. Ghostly episodes seem to be an interactionist phenomenon ("the right people in the right settings:" Laythe et al., 2018, p. 210) with consequently 'emergent' properties, i.e., the collective behavior of a set of variables is qualitatively different from the behaviors of the variables separately. Accordingly, we think that the greatest strides in this domain will come from multidisciplinary team science that leverages hypothesis-testing with mixed methods whenever possible. Moreover, researchers should use validated assessments for data-equating and cumulative learning. This has been an ongoing problem with ghostly episodes (Houran et al., 2021; Houran, Laythe et al., 2019), as well as in parapsychology and consciousness studies more broadly (Lange, 2017; Lange et al., 2019). This circumstance, in part, has spurred our efforts with operationalization reform in this domain. Quality science ultimately follows from quality measurement (Kornbrot et al., 2018), so we urge researchers to leverage the foundational psychometric work and burgeoning literature that supports *S/O* anomalies, ghostly episodes, and the HP-S recognition patterns as reliably quantifiable constructs.

This is all probably easier said than done. Different ideological camps appear more interested in promoting their pet theories or tactics than participating in cumulative science (Hill et al., 2019). These rivalries can likewise be understood and modeled as products of systems theory (Drinkwater et al., 2019; Hill et al., 2018, 2019), but we find that participatory team science (including adversarial collaborations) can effectively counter groupthink, low intellectual humility, ignorance or omission of key literature, and the use of outdated, limited, or poor methodologies. Note that our call for more cooperative and cumulative science extends beyond parapsychology to include mainstream fields as well. For instance, Houran (2022) explained that the core anomalies and broader phenomenology of ghostly episodes are routinely studied across the biomedical and social sciences, although using different labels and theoretical groundings. This harkens to psychology's problem of having too many constructs and measures (Anvari et al., 2024), along with an over-emphasis on internal validity rather than construct and external validity, which leads to theories that often fail to replicate in the field and thus cannot be used to understand or address the phenomena in question (cf. Mitchell & Tetlock, 2022). Operationalization reform, including the constant refinement of constructs and measures (Arnulf et al., 2024; Bringmann et al., 2022; Trafimow, 2023), should, therefore, help parapsychology to overcome these and other hurdles that too often thwart scientific knowledge and its potential clinical application.

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ESSAY

Arguments for Recognizing the Future as Non-Probabilistic: Considerations in the Framework of a Hypothesized Precognition Theory

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HIGHLIGHTS

The debate over whether the future is predetermined or probabilistic cannot be resolved purely through physics or philosophy, but it instead requires considering precognition and a higher-level perspective that challenges the conventional concepts of predictability, causality, and reality.

ABSTRACT

The debate on whether the future is predetermined (fixed) or probabilistic (uncertain) dates back to ancient times but is still ongoing. An essential basis in this paper is the view that a conclusive answer can neither be drawn exclusively from physics nor additionally from philosophical modes of argumentation. It is considered necessary to take a transtemporal process of cognition, which is in parapsychology termed *precognition*, into account. This brings in the new aspect that predictability no longer needs to be synonymous with computability and the analytic describability of causal event chains, which also has an impact on the meaning of the terms that are used. Furthermore, this allows a superior timeless perspective that invalidates the logic from the present-time perspective and extends the concept of observability and reality. Since both subjects are interrelated and cannot be considered independently of each other, a psychophysical hypothesis about how precognition interacts with the future is an integral part of this proposal, its experimental verification is described. This encompasses explanations of how logical paradoxes, which are often attributed to precognition, do not exist and how intelligible information can be consistently shared between the present and the future in four-dimensional spacetime. The argumentation for a non-probabilistic, fixed future comprises the physical point of view, referencing special relativity theory and quantum theory, but considers the nonphysical aspects of the mind with the same matter-of-factness. A similar conclusion that the future is deterministic is not asserted since this term combines causality and predictability in an inscrutable way by making complex assumptions that are not precisely and uniformly defined. A closer description of the problem reveals that the frequently used keywords "deterministic" and "probabilistic" lose their usual meaning if the frame of reference given here is acknowledged. Therefore, many reservations that consider only a probabilistic future as reasonable might be unnecessary.

KEYWORDS

Consciousness, deterministic future, precognition, probabilistic future, retrocausation precognition, psi, unconscious.

INTRODUCTION

Precognition, a form of extrasensory perception (ESP), refers in psi research to the human ability to access information originating from a future point in spacetime. The experimental investigation was carried out in studies under controlled conditions by different researchers across different types of experiments, exemplary listed in Table 1. Historically, beginning in the 1930s, a major part falls into the category of *forced-choice experiments*, wherein the participant blindly attempts to choose the correct choice within a limited set of possibilities, as this became widely known in card-guessing experiments. In precognition mode (Table 1, 1.1), the *target* or sequence of targets is selected by a random process after the participant has made his/her decision. Modern versions use more sophisticated principles, for example, photographic targets as stimuli, where the perceiver's task is to detect a pleasant or to avoid negative future stimuli within a forced-choice procedure (Table 1, 1.2). Bem (2011), who introduced nine different types of this class of experiments called them, "anomalous retroactive influences on cognition and affect."

A subset that is here of major interest, called *free-response experiments*, use different methodologies (Table 1, 1.3 to 1.5, and 1.7) by which the percipient records weak subliminal perceptions or pre-visual impressions, objectified in simple descriptive adjectives and/or sketches on paper, or verbally tape-recorded, in regard to a future target stimulus. Targets can be photographic images, video clips, or geographic locations, randomly selected from a *target pool* after the participant completed his/her task (later referred to as post-tasking). Together with case studies of spontaneous precognition (see, e.g., Sheldrake, 2012) and dream precognition (Table 1, 1.6), all these subtypes have shown, in addition to statistical values, that intelligible and verifiable information about the future is retrievable.

A procedure that has been used to demonstrate the application of precognition to forecast binary event outcomes—e.g., whether a stock-market price will rise or fall within a defined time interval—is Associative Remote Viewing (Table 1, 1.7). It is a separate topic to discuss why monetary success is limited—in any case, the conclusion that this would obviously reflect a probabilistic future is not substantial because there are many different factors involved, related to the participants and the method itself.

Not listed under the term precognition in Table 1, since purely related the physiological autonomic nervous system, are *anticipatory effects*. They reveal that some physiological indicators (e.g., skin conductance measurements) respond distinguishably in advance to randomly selected future target stimuli depending on whether they represent, e.g., emotional or calm images. The meta-analysis by Mossbridge et al., (2012), containing 26 reports published between 1978 and 2010, indicated statistical significance (in the most conservative estimate, (95% CI = 0.15–0.27, $z = 6.9$, $p < 2.7 \times 10^{-12}$) while considering reporting bias and study quality. The authors stated in their discussion, "though the ES is small [effect size = 0.21], it is important to note that important scientific and health advances have been made by further examination of effects about half the size of this one".

When introducing this data, it is necessary to make clear that the expectation that psi should be equally reproducible, such as physical experiments, does not do justice to the nature of extrasensory perception. Although individual studies sometimes fail to be replicated, meta-analysis and long-term studies in their various forms stubbornly show a reproducible anomalous deviation of the normal distribution, by some researchers neutrally called "anomalous cognition."

The idea of using such experiments in a specifically adapted form to investigate whether precognition reveals a fixed or probabilistic future was rarely realized. Only a few isolated short-term experiments were reported, whose different experimental procedures and results do not even allow preliminary conclusions. For example, Radin (1988) considered from forced-choice precognition experiments the "probable-futures hypothesis" to be confirmed, whereas Targ and Targ (1986) concluded that the percipient saw the actual future in a free-response precognition experiment, which is the opposite result. The problem here is that the experimental conclusion can depend on the type of experiment chosen (this is a point to which I will return later) and the theoretical frame of reference that the researchers are willing to consider regarding the psi mechanism. The implication is that a clearly and extensively formulated mechanism for precognition should be the very basis, and the chosen experimental verification can always be the second step. Therefore, the current paper is motivated by the task of presenting a convincing hypothesis about how precognition works while at the same time answering the question of whether the future is probabilistic or not. In a separate section, experimental proposals for verification are provided that incorporate the premises outlined here.

Clarification of Problematic Terms: Determinism vs. Non-Probabilism

First, it is important to stress that there is a fundamental problem with the term determinism and its mean-

Table 1. Relevant Studies on Precognition

1.1	**Precognitive Forced-Choice (Honorton & Ferrari, 1989)**	
	Scope:	Meta-analysis of 309 studies by 62 investigators (50,000 participants) in the period 1935-1987
	Primary Objective:	Investigation of evidence for precognition in a large data pool of forced-choice type experiments
	Key-Findings:	A small but highly significant and robust precognition effect, which cannot plausibly be explained on the basis of selective publication bias; "Analyses of precognition effect sizes in relation to eight measures of research quality fail to support the hypothesis that the observed effect is driven to any appreciable extend by methodological flaws..."
	StatisticalEvidence:	combined $z = 11.41$, $p = 6.3 \times 10^{-25}$; mean $ES = 0.020$, mean z-score 0.65 over all studies
1.2	**Anomalous Anticipation of Random Future Events (Bem et al., 2022)**	
	Scope:	Meta-analysis of 90 experiments from 33 laboratories in 14 countries
	Primary Objective:	Discussing the reproducibility on "retroactive influence on cognition and affect" (Bem, 2011)
	Key-Findings	"p-curve analysis, a recently introduced statistical technique, estimates the true effect size of the experiments to be 0.20 for the complete database and 0.24 for the independent replications, virtually identical to the effect size of DJB's [Bem, 2011] original experiments (0.22)..."
	StatisticalEvidence:	$p = 1.2 \times 10^{-10}$, $z = 6.4$, $ES = 0.09$ (Hedges' g)
1.3	**Precognitive Remote Viewing (Dunne & Bisaha, 1979)**	
	Scope:	8 Experiments collected by 2 inexperienced participants
	Primary Objective:	Testing the ability of novice individuals to describe a remote location in a precognitive protocol
	Key-Findings:	Successful replication of the earlier Stanford experiment with precognitive remote viewing
	StatisticalEvidence:	$p < 0.008$ (one tailed) for the rank order judgements by eight independent judges
1.4	**Precognitive Remote Perception (Dunne & Jahn, 2003)**	
	Scope:	336 formal trials in approximately 10 years from PEAR Database
	Primary Objective:	Collecting long-term free-response ESP data with analytical refinements
	Key-Findings:	Though only about 75% of the data were conducted in a precognitive mode, no significant differences in the effect size (95% confidence interval) were found compared to the real-time and past-related mode; replication of initial precognitive remote viewing via large data pool
	StatisticalEvidence:	$p = 1 \times 10^{-10}$ (one tailed), composite z-score = 6.355, $ES = 0.347$
1.5	**Precognitive Ganzfeld (Roe, et al., 2020)**	
	Scope:	110 participants in three variations of experiments
	Primary Objective:	Confirmation of earlier findings that had suggested that novice participants could perform better than mean chance expectation at a remote viewing task when ganzfeld stimulation was used
	Key-Findings:	Replication of precognitive remote viewing with higher effect size and significance compared to the same procedure without ganzfeld stimulation
	StatisticalEvidence:	$p = 1.2 \times 10^{-5}$, $z = 4.22$, $ES = 0.4$
1.6	**Dream Precognition (Krippner et al., 2002/1971)**	
	Scope:	8 dream transcripts form a single talented research participant
	Primary Objective:	Extending ESP dream research specifically on precognitive dreams in a laboratory setting
	Key-Findings:	Statistical data supported earlier "anecdotal evidence" from case studies on precognitive dreams
	StatisticalEvidence:	$p = 0.00018$, $CR = 3.74$
1.7	**Associative Remote Viewing (ARV) to Predict the Financial Market (Müller et al., 2019)**	
	Scope:	48 predictions by 15 participants
	Primary Objective:	To determine the hit rate for predictions of the German stock index DAX and to hypothesize what might be influencing factors for the results
	Key-Findings:	ARV was confirmed as an applicable approach to predict a binary future outcome above chance level, replicating earlier findings (cited by the authors) beginning in the 1980s
	StatisticalEvidence:	$p = 2.3 \times 10^{-5}$, $z = 3.897$, $ES = 0.56$, hit rate 79.17%

ing. According to a widespread understanding, which is a classical one, a la Newton and Laplace, in a deterministic universe would be no coincidence; everything would be programmed like in a hypercomplex clockwork, and nothing can ever happen except what is bound to happen. Negatively emphasized, humans would be slaves in such machinery in which their fate is already programmed prenatal, and no one would have the free choice or "free will" to shape their own life. But, this view is based on an outdated definition since a fully mechanistic causality is a premature assumption that has been smuggled into the word determinism as a matter of course. In mathematical and philosophical papers was already argued that determinism does not require causality (D'Ariano et al., 2014; Romero, 2011). In general, it is appropriate to consider that determinism is characterized by a *lawlike* relationship since not all phenomena regarded as deterministic can be causally interpreted. While it is clear that determinism does not necessarily imply predictability (e.g., in Bohm's interpretation of quantum mechanics), the premise that knowledge of all causal relationships of a system is the prerequisite for unambiguous predictability is questionable. When considering predictability in the parapsychological sense, there is no reason to uphold such a concept that is based solely on computability. Instead, it will be shown that predictability in precognition is not based on causality. At the same time, the simple term determinism becomes misleading when derived from causality, which should be called *causal determinism* to make the discussion clearer[1].

Because I do not want to confuse the question of causality with the question of predictability, the terms probabilistic vs. non-probabilistic are preferred in this paper to characterize whether there are a number of different possible futures or only one that is certain to occur—reflected in precognitive perception. When the ambiguous term 'determinism' still appears in the following sections, this is because it was used in this way in a referenced source or to refer to the concept of causal determinism.

From the Formulation of the Problem to the Essential Point of View

It is acknowledged that physically inspired ESP models, including precognition, have been proposed by physicists (e.g., Costa de Beauregard, 1998; Lucadou, 1995; Marwaha & May, 2015), which are formally well thought out. However, it can be questioned whether they can reach the heart of the matter. I especially miss clear insights into the nature of time and the perceptual process of intelligible information transmission, which cannot be considered of secondary importance. Aside from this aspect, the hypothesis proposed here starts at the very beginning of the problem by questioning a basic point of view: Of course, an understanding of spacetime that is shaped by the logic of everyday experience compels us to believe in an uncertain future. Our experience and intuition tell us that the smallest "coincidence" can turn an expected future entirely around. When a supposed beginning of a causal chain of myriads of coincidences gradually disappears in ever wider ramifications in the past to nothing, this makes the assumption of a probabilistic and apparently unpredictable future so natural. In addition, many people believe that "free will" is not compatible with a fixed (non-probabilistic) future because it seems to imply that we can no longer control our own destiny. Here lies a further reason to defend a probabilistic nature of time.

But, regardless of whether each smallest distinguishable part of a causal event chain that leads to a specific event is considered fixed (then the final result would be causal-deterministic fixed) or at least some parts of a causal event chain are considered probable or random (then the final result would also be probable), human logic has one stubborn weakness: it is bound on a lawlike sequence of smaller events and decision branches along the course of time. This logic changes completely when considering a larger "reality box" in which a hidden nature of time, conceivable from a relativistic spacetime perspective and time-symmetric interpretations of quantum mechanics (QM) as well, are taken into account.

Brief Summary of Main Argumentation

Beginning with the special relativity theory, (1) an absolute simultaneity of events in spacetime was recognized wrong. (2) Space and time, though different things, are not anymore considered independent; instead, they appeared as already in the Minkowski light-cone diagram in a mathematical relationship to each other, as if merging into one 'block', forming spacetime. As a consequence of both, in this block of spacetime, sometimes called the *block universe*, past, present, and future events coexist in atemporal manner on the same footing. Such a block universe is not specific to relativity theory and was probably first mentioned by William James in the 19th century to describe a deterministic world (James, 1956). In physics, the term Minkowski light-cone is more common with the same implication. However, block universe is the preferred term as it was previously used by, e.g., Rietdijk (2007), Cramer (2016), and others to discuss or denote a deterministic conclusion.

It is not asserted that these coexisting tenses in the block universe view are equally real for us or that past

events are "since ever, for ever" "frozen in the block," as always appears when the philosophical term *eternalism* comes into the discussion. Nevertheless, as formulated clearly by Costa de Beauregard (2000, p. 285), the "non-existence of the future" falls with the advent of the relativity theory." The assumption that the future does not exist until time has progressed is not true in a special sense when the progression of time is not an absolute, simultaneous phenomenon. The actual controversy is the question of what exactly is meant by "existence" when the non-existence of the future should be reconsidered. Here, not the future events are referenced directly, but the mental content of a future observation of the event. If "mental" is believed to be reducible to the physical, any thinkable exchange between the present and the "already existent" future runs into the problem of forbidden superluminal backward-in-time signaling. Taylor (2014), who adopted rather the materialist view in which conscious awareness is considered to occur only as an epiphenomenon of the neural processes involved, used Bohm's concept of the implicate order as an approach in attempting to solve the issue of signal transmission. Here, a different approach is taken that refers explicitly to the nonphysical properties of the human mind within a bidirectional process between the unconscious and consciousness, representing an atemporal and temporal milieu, respectively, that allows to consider a connection between the present and an actual future perception which cannot be probabilistic at the same time. In the following sections, this assertion is reasoned in detail, beginning with the physical background. Lastly, it is argued that atemporality might also be attributed to quantum mechanical phenomena, which thus no longer contradict a non-probabilistic conclusion of the future.

DETAILED REASONING FOR THE NON-PROBABILISTIC CONCLUSION

Rietdijk[2] (1966) published a well-known paper in which he argued in favor of determinism on the basis of the *Relativity of Simultaneity,* which is a central aspect of the special theory of relativity. In his abstract is asserted: "...Only an extreme positivism: 'That which cannot yet be observed does not yet exist', can possibly withstand the conclusion concerned. Therefore, there is determinism, also in microphysics." (p. 341) Ignoring the fact that Rietdijk did not differentiate determinism and non-probabilism, the non-observability concession (on which many complex criticisms are reducible in essence) can be eliminated insofar when observation, in addition to other arguments given here, is replaced by precognitive perception of a future observation. This is the first new aspect while I otherwise share the same basis—the relativity of simultaneity—as a consequence of the non-existence of a universal time and the inapplicability of a privileged observer.

The meaning becomes clearer in Penrose's thought experiment[3], the *Andromeda paradox* (Penrose, 1989, pp. 260-261), which challenges the common-sense view of an uncertain future. It illustrates the relativity of simultaneity as a relativistic effect even for slow velocities if the distances become extraordinarily large: Suppose two people are walking past each other in the street, then each person is on a different connecting *now-line* in relation to the Andromeda galaxy. At this distance (light needs more than two and a half million years to reach Earth), the time shift to the common moment "now" can differ a couple of days to both people, with respect to Andromeda, only caused by the different direction of the velocity vector when walking past each other in the street. To give this theoretical speculation a more concrete and dramatic effect, Penrose imagined that a space fleet launched from Andromeda Galaxy with the intent to wipe out life on Earth. While for one person, the space fleet is already on its way, for the other, the very decision about this plan has not yet been made!

Now, the question arises of whether there was any uncertainty about the future at all or how to argue that the future was not already fixed for both individuals. Penrose is silent on that question, however, physics can only answer that the future information, if considered "existing" via the common now line, is in no way accessible (so this seems rather a philosophical subject). Physics forbids this because the simultaneity between separated spacetime points is not *Lorentz Invariant*. According to the usual point of view, the relativity of spacetime refers to clocks indicating whether more or less time has elapsed relatively between two distant spacetime events. One aspect is measurable in the well-known time dilatation at high velocities, allowing bodily time travel into the future. Physics permits this only "without a return ticket", and measurable effects need a high energy input. In the other direction, traveling bodily into the past, is impossible, and under the same paradigm, bringing information back in time from the future seems an impossible scenario as well. This will not be contradicted using the established paradigm of physics, but this is not the only paradigm that can be considered without violating the rules of physics.

Inclusion of a Perceptual Process Beyond the Physical Paradigm

It is out of the scope of this paper to present a rationale for considering the human mind (including the un-

conscious) not only as nonphysical in nature but also as not derivable from physical/biochemical processes alone. Surely, most scientists prefer the view of physicalism that an increasingly better understanding of nerve cell structures and functions can one day explain consciousness. One reason might be that it is difficult to consider something as real or existent, which is neither matter nor an energetic structure that can be objectively measured (to which physics refers). Another reason seems to be the consequence of the mind-body problem that has a long history and became known in *Cartesian Dualism* as one formulation of the problem. René Descartes, who defended this position, was not able to explain in scientific terminology how the mental, considered a reality of its own, can interact with the physical, considered another reality of its own. Four centuries later, quantum dualistic proposals to this problem were introduced by Beck and Eccles (1992) and differently by Stapp (2004; 2011a), however, without a broader recognition due to the lack of evidence for quantum mechanical processes in the brain and the unresolved controversy about whether or not consciousness is related to the quantum mechanical measurement process.

Nevertheless, there are alternatives to avoid physicalism that are less controversial. According to Atmaspacher (2014), "at least since Spinoza, there is a tradition of dual-aspect thinking in which both the physical and the mental are construed as aspects of an underlying reality, which is itself neutral with respect to the mind-matter distinction." Dual-aspect monism (or double-aspect theory) was later adopted in a similar form by well-known physicists and philosophers (e.g., Eddington, Nagel, Pauli, Wheeler). Libet (2004, p. 182) pointed out that "this theory seems untestable because there is no way of getting directly at the unitary substrate that allegedly exhibits this double aspect." On the other hand, Jung and Pauli's version, in particular, offers additional argumentative features in the given context, to which I will return at the end of this article. Libet (2004, p. 172) argued instead that his own proposal, the *Consciousness Mental Field* (CMF) theory, "makes crucial predictions that can, at least in principle, be tested experimentally." Outside the above categories, CMF also considers the mental domain as nonphysical and non-reductionistic.

Here, it is not essential to take a seemingly correct position among the referenced hypotheses and others not mentioned. Instead, it is sufficient to argue that the mental realm and the attention to "inner signals" is not necessarily subject to the laws of physics, as it is often tacitly presumed in physical inspired psi theories.

Relation to Relativistic Spacetime

Under the above consideration, the question is allowed: What speaks in favor of "mental time travel," in which information is received from the future with our nonphysical mind, for which physical laws are not responsible, but at the same time, physics could provide the basis for an explanation? To enlighten this question, I submit a similar thought experiment like the Andromeda paradox, which applies the relativity of simultaneity again and is valid in both directions of time: Now an astronaut, Alice, is just reaching in a spaceship the orbit of dwarf planet Pluto. It often seemed to happen that Alice shared a telepathic bond with her twin brother Bob, whom she had left behind on Earth. She calculates by using the formula for the Lorentz transformation, based on the distance and velocity vector related to the Earth, that the common now line between her and her brother indicates a three-second time shift on the Earth's timeline. Alice thinks to herself: "Now I can 'read' my brother's thoughts three seconds in the past—but on my return journey, moving toward Earth, I can perceive what my brother will think or perhaps see three seconds into the future. So, I can be connected to the actual future on Earth!"

The intention of this thought experiment is to show, in the paradigm of parapsychology, that it is incorrect to argue no inherent meaning can be assigned to the simultaneity of distant events. Though this view cannot yet directly argue for precognition in which neither relativistic quantities are effective nor telepathy is needed, the gap present in the "telepathic astronaut" can be closed. The first part of the solution lies in the assumption that the unconscious mind has a timeless quality, as previously seen in the coexistence of past, present, and future of the block universe model—without claiming that there is a direct connection between both. Support for this assumption is given by Maier et al. (2014) who concluded, based on their experiments and theoretical considerations, that the arrow of time has no direction during unconscious processing states. The second part to form a solution, which can finally explain the mechanism for precognitive perception and argue for a non-probabilistic future at the same time, follows in the next section.

Unconscious—Conscious Feedback Loop

Though a future event does not exist now, the "future is coming" and definitely will exist for the perceiver if observed by him/her in the future. In the case of *feedback-induced precognition*, the perceiver's future feedback time of the observation (of the event or a target) and the present pre-perception time can be coupled in a process beyond the physical domain, as will be explained in the following with reference to Figure 1.

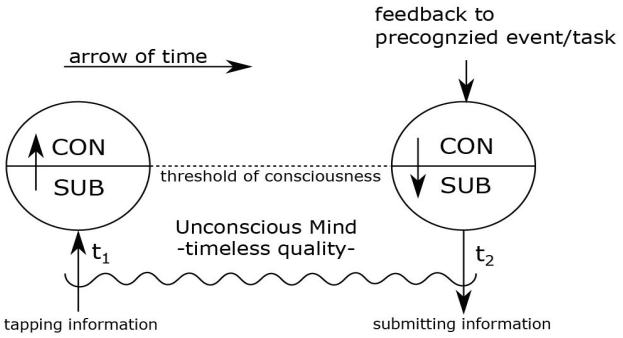

Figure 1. Feedback-Induced Precognition Model. Intelligible information transmission from t_2 to t_1 via crossing the bidirectional threshold between consciousness (CON) and unconscious (SUB).

As is known from basic psychological processes, the consciousness can pass (submit) information to the unconscious (as in the case of repression or information relocation that is not anymore conscious) and vice versa, the unconscious can pass information to the consciousness (as in case of intuitive thoughts or the re-emergence of repressed memories). In the case of precognition, a specific future perception or gained knowledge can establish a connection to the unconscious from where this information can be tapped by the conscious mind at a prior time—because of the timeless property of the unconscious—if triggered by an emotional stimulus.

To understand this model correctly, it is of crucial importance to recognize that the information is transferred only "vertically" across the threshold of consciousness, but neither horizontally along the timeline in the conscious (time-progressing) milieu nor horizontally in the unconscious (there is no distance in time). Accordingly, no information is transferred across spacetime in the usual sense. This is one major difference to quantum mechanical *observational theories*, as recommended by Houtkooper (2002), which simply refer to consciousness. It might be criticized to understand the unconscious process as "mental" since this can be considered an additionally unproven hypothesis; however, as Libet (2004, p. 100) already argued, "there are reasons for regarding the unconscious as a mental feature, as one that better describes the known attributes of unconscious functions."

Thus, under special conditions, the precognized state (t_1) is connected with a future mental state (t_2) via feedback in a closed loop. The future event at t_2 is already given a reality status when precognized at t_1, whereas this is not claimed with the same logic for all other future events outside the feedback loop, as this is generally not the case for the past. Note that the emphasis is not on a fixed future event per se, but on the registration of the event by a conscious observer at a future time that definitely takes place (if not, nothing can be said).

In summary, this allows the view that the perception of events is not longer limited to perception "now," as long as we are talking about the world line of the percipient toward his/her own future observation (feedback). Only for the conscious mind that is synchronized to physical events taking place along the arrow of time when "time goes by," the instantaneous moment is the only one in existence. The unconscious mind, on the other hand, resembles a real natural tunnel through consciously experienced spacetime.

LOGICAL CONSISTENCY AND ELIMINATION OF TIME PARADOXES

The basic model, according to Figure 1, is now supplemented with a "signal" terminology, which, however, still does not refer to external physical signals. The term signal is used here to indicate from where an action takes place, toward what direction with respect to the arrow of time, and as an indicator of information clarity, analogous to a signal/noise characteristic in electrical engineering. There can be a strong signal (caused) from the future if there is meaningful emotional feedback, and no signal if there is no feedback. A probable future is excluded because an uncertain signal is logically inconsistent to generate a closed time loop. Signaling can only occur if a closed loop is realized, similar to an electric current that requires a closed loop.

To perceive the actual future is relatively easy to accept for the experimental situation of the first type, termed *alpha-type,* in which the task of a free-response experiment is, for example, to describe an unknown everyday item in the closed box. At the feedback time, the percipient is always confronted with the only possible feedback—to what has been put before in the box. But, because this can also be understood as realtime perception (if the psi mechanism would allow direct access to the inside of the box), the correct experimental setup when arguing for precognition requires a post-tasking process in which the target is selected via a random process after the experiment has already been carried out. In some simplification, this is considered to be the same type as to predict future real-world events, termed the *beta-type.* Now, there seems to be a conflict between the precognitively received future and the actual future that may be changed or prevented through the acquired knowledge, and so could invalidate the precognized event based on feedback. But in addition to the initial argument above, this scenario is impossible because the precognitive re-

ceived information refers to the causes and to the effects in both directions of time simultaneously; i.e., the percipient is, so to say, "mentally bilocated" between present and future and can only pre-cognize what he/she later will recognize. Thereby, the transferred information backward-in-time is balanced to be logically consistent, like the behavior of liquid in communicating vessels is balanced by a connection that is effective in both directions.

Precognitive Perception vs. Influenceability

Next, it is essential to relate precognitive perception to influenceability of precognized events since both are in opposing dependency (like, e.g., absorption and reflection in physics). Logical inconsistencies are excluded since a high degree of accuracy or amount of future knowledge in precognitive perception can only take place on the condition that "the knower of a future event" stands outside the sphere of significant influence. This cannot be an on-off logic. If the influence is partially given (through our actions), a prediction must be correspondingly less accurate/higher interpretable or less extensive. At a critical point, the possibility of influence becomes significant enough that the future is no longer perceptible, and a potential perceiver would only produce "mental noise." This relation, reflecting the overriding principle that "a percipient can't kill his/her source" (a future observation), can be represented qualitatively in a diagram as Maximum Signal Relation (Figure 2). It visualizes, in compliance with external causality, how much information can pass the border of the unconscious to become part of consciousness without causing inconsistencies.

The left side in Figure 2 refers to uninfluenceable events (e.g., such as an earthquake), whereas the right far end refers to fully controllable event outcomes, i.e., free decisions which are not accessible for the acting

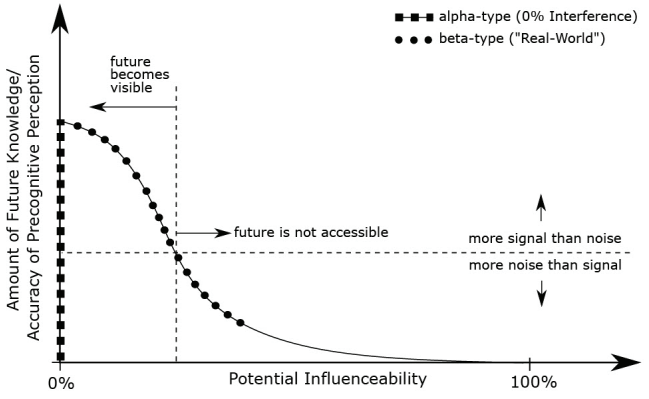

Figure 2. Maximum Signal Relation. Qualitative illustration of how much intelligible information is perceivable in dependence of the potential influenceability of the precognized event.

person by precognition (this is logically excluded by the feedback mechanism). Based on this logic, events beyond our personal sphere, especially those of global significance, would be more concretely perceived in precognition because their influenceability is very low or zero. This can include useful information gathering. For example, it may be advantageous for someone to experience precognitively that a certain company will become the leading manufacturer of hydrogen distribution in order to invest successfully in this company. This can happen without significant interference and, therefore, without causing logical paradoxes. In a personal situation, in cases of higher but still moderate influenceability, it might be possible to benefit from future knowledge if—in the context of the understandable part of the precognized information—the portion of the noisy/ambiguous information can be "exchanged" into a slight influence of the equivalent amount on the actual event by us. This would also result in a back influence (in the easier example of the stock company, simply because they have sold more shares). But this has still nothing to do with a probabilistic future we have now concretized or even changed. We can just become participators of events that would become reality as precognized. Our influence is already in there and cannot be greater than the inaccuracy of the description to preserve what has been perceived. Of course, there are also other mechanisms (part of the mental process) that limit accuracy additionally, which are not discussed here. Accordingly, Figure 2 illustrates a theoretical maximum—for this reason, termed the 'Maximum' Signal Relation.

Open Decision Paths Do Not Contradict a Non-Probabilistic Future

Someone might use a definition of a 'non-probabilistic future,' according to which there is no point in time at which several possibilities of the course of the world are open. This can easily be misunderstood because, at any time various decision paths are open, leading into different potential futures, until a decision has been made (not open decision paths could be only a requirement in a fully causalistic universe). This seems probabilistic, but as made clear from the outset, what counts is the final status of a factual perspective connected to future feedback related to the final result. Because this open, final decision is not precognitively accessible for the acting person, someone might interject that exactly this describes "probability clouds." However, these "clouds" can principally be cleared in accordance with Figure 2 if another person finds out the answer via feedback-induced precognition and is not in the sphere of influence of the acting person who has to make the decision. So, knowl-

edge can potentially be retrievable but not available to everyone under every circumstance.

Consideration of More Complex Factors

For example, in cases of dream precognition, the situation can become more complex than can be represented in Figure 2. The precognitive signal may be used by the dream mechanisms to pick up an important fragment of what someone will experience at a later time (i.e., a fixed event), but at the same time, unconscious intelligence (or the "dream composer") may add something, e.g., that someone saw himself/herself at a place where a catastrophe happens (since he/she considered to be there), but warned by the dream the person would decide to stay away from the location. Thus, it is possible to take personal advantage of a non-probabilistic considered event, and it does not matter for the correctness of the predicted event which decision the percipient takes.

The Meaning of Non-Artificial Processes

Finally, it is important to recognize the difference from an artificial process, in which a physical-based feedback or detector model (usually assuming a signal transmission across spacetime) is hypothesized. This can be illustrated by using the example of a fictitious physical device for receiving future camera signals, utilizing, e.g., advanced waves. Such a device would generally run into causal paradoxes and, therefore, not work in principle. In contrast, a human being incorporates "receiver and sender" as a participator of life who can only perceive future signals that are logically consistent in accordance with Figure 2. The previously required "inclusion of a perceptual process beyond the physical paradigm" makes this possible.

NECESSARY EXTENSIONS TO THE MODEL

This section serves to eliminate potential gaps in the argumentation from a broader perspective of psi research. At the same time, this is an indispensable precondition for selecting the appropriate test procedures that can reflect the proposed precognition mechanism and the non-probabilistic conclusion. In this regard, it is first of utmost importance to understand the putative contradiction that though various experiments and experiences suggest feedback as a prerequisite for successful psi perception (see e.g., Honorton & Ferrari, 1989; Puthoff et al., 1978, p. 13; Targ & Harary, 1985, p. 27), some were feedback-free (precognition included) and nevertheless yielded significant results. Two answers are given to explain this observation:

1. Time-Independent Telepathy

As introduced in Figure 1, the precognition of the future does not require a direct connection to the outside world because the information comes from the perceiver's own future experience. This makes the model simple, but so far, it is not conclusive in terms of the requirements that should be placed on the experimental research side. Consistency is achieved when "precognitive telepathy" (using the classic term; Rhine, 1953) is also taken into consideration. Then, the right "bubble" in Figure 1 represents a second mind/brain that, alternatively, can close the feedback loop at a future time without necessarily feedback to the perceiver. The analyst, who is also deeply involved during the analysis of the percipient data—after the experiment (at t_2), and the percipient (at t_1) can be timelessly coupled. The question of whether the perceiver actively picks up the information from the analyst's mind in future time, or whether the analyst "offers" the information to a passive perceiver by a backward-in-time influence loses its meaning in the atemporal perspective: It is just possible to say that the analyst can "infiltrate" the timeless unconscious–channel with his/her knowledge, which the perceiver can pick up in addition or instead to his/her own missing feedback signal. Two important sub-conclusions are derived from this (for a more detailed background, see Dahmen, 2023):

1.1 In the experimental situation, it is not appropriate to test the feedback mechanism by comparing precognition experiments with and without feedback to the perceiver. Besides the problem of distinguishing a possibly psychological need for feedback from future feedback experience as a source of information, there is also the problem that a retroactive influence by the analyst can replace feedback as a source of information for the perceiver, leading to incorrect interpretations. However, it can be statistically validated that the perceiver's description relates to a future experience of seeing the target (selected by a random process in the future) by the perceiver or the analyst (as I will describe later).

1.2 A *comparative analysis*, as it was used by Puthoff and Targ (1977) within rank-order analysis or as applied necessarily in ARV (see Table 1, 1.7), should be excluded because of the risk of a time-independent telepathic connection to the analyst who handles targets that are part of the comparative analysis in addition to the actual assigned target. Thus, the percipient may access this target material in addition, which may lead to an inconsistent description of the actual target or the description of one of the other targets that the an-

alyst has in mind during the comparative analysis. A direct evaluation of the degree of correspondence between the percipient's descriptive data and the actual assigned target is therefore mandatory and possible with, e.g., rating scales.

Note that I do not claim that the existence of telepathy is equally plausible to explain or to prove as precognition. In the first place, telepathy is considered a necessary precaution to account for all possible unknowns that may affect the interpretation of the results (see above). However, my understanding is that instead of the transmission of mental content that is always specific, subjective, and bound on individual experience, the telepathic interaction would work like addressing and activating a common intersection of a similar mental pattern latently present in both minds.

2. Forced-Choice vs. Free-Response Experiments

In parapsychological research, it is usually taken for granted or tacitly assumed that both types allow the same theoretical and experimental considerations. But, there are good reasons to assume that forced-choice experiments follow another mechanism. Factually, each choice is meaningless, and only in a sufficiently long statistic can an anomalous deviation from the normal distribution be tested, whereas in precognition, in which intelligible information is accumulated, the single result is evaluable. Regarding the former, instead of feedback on each choice, confirmation of the mental intention (the overall result) by the percipient, analyst, or experimenter might be more or fully relevant in the case of significant deviations from the normal distribution. This is exactly reflected in the "principle of a sufficient reason" (Stapp, 2011b). It is striking that Stapp's hypothesis, as a similar one described by Walker (2015/1974), both quantum mechanical observational theories, refer to forced-choice methodologies, and only in this context their explanations seem conclusive. This may explain why, especially in forced-choice experiments, success is sometimes indicated without feedback to the perceiver and the experimenter, while to the best of my knowledge, in free-response experiments, this is only reflected with low statistical evidence and without replication in the result from Targ et al., (1985), who applied a special procedure to exclude time-independent telepathy.

Precognition vs. Micro-Psychokinesis (PK)

It is of further importance to recognize that there are interpretational problems with forced-choice experiments. Since this type of experiment has been carried out, the question came up as to whether, for certain types of random generation, significant deviations from the normal distribution are the result of a mental psi influence on the random generation process. Especially when a quantum mechanical Random Number Generator (RNG) is used, the 'consciousness causes collapse interpretation' of QM cannot be ignored. It is, e.g., possible to hypothesize that the act of observation may not only trigger the collapse of the state vector to a random output. A concentrated mind focused on either "0" or "1" for a sufficiently long time might also be capable of producing significant statistical deviations from an expected uniform distribution, called (micro)-psychokinesis (PK). Again, the hypotheses from Stapp (2011b) and Walker (2015/1974) appear applicable. Regardless of this speculation, Helmut Schmidt, who was one of the researchers dedicated to such experiments (which are of the forced-choice type), concluded that precognition, PK, and realtime ESP are not clearly distinguishable (Schmidt, 2002, p. 189). Others (see e.g., May et al., 1995) suggested, based on their own experiments, that a force-like interpretation (i.e., PK) is more likely to be ruled out.

Whatever the right answer is, these interpretation problems do not arise in free-response precognition experiments, which tell us whether or not the outcome is potentially related to a future experience (potential, since a statistically validated reproducibility in addition to a proper evaluation is always needed).

Finally, it is briefly noted that Schmidt (1993) demonstrated under highly controlled conditions also that the deviation in a pre-recorded random distribution can correlate to the intention of a subsequent "influencer," attempting to shift the random output (the sequence of red and green light flashes) in a certain direction, even though the participants observe the sequence in playback mode. This retroactive form of micro-psychokinesis seems to be the equivalent to precognitive telepathy because not the brain is affected by another brain in the future; instead, the RNG appears now to be a kind of receptive device from a future influencer. How this can make sense and follow the non-probabilistic conclusion is suggested in the second last section, 'How Quantum Physics Fits Into the Picture.'

To summarize the here considered psi forms in a common figure, a future-centered perspective is beneficial (Figure 3). In terms of consistency, precognition (now retroactive influence on cognition), precognitive (now retroactive) telepathy, and retroactive-PK can be summarized as *mental retrocausation*. But the reader is reminded that the future-centered perspective, according to Figure 3, reflects only a physical logic and simplification, excluding the bidirectional process between consciousness and

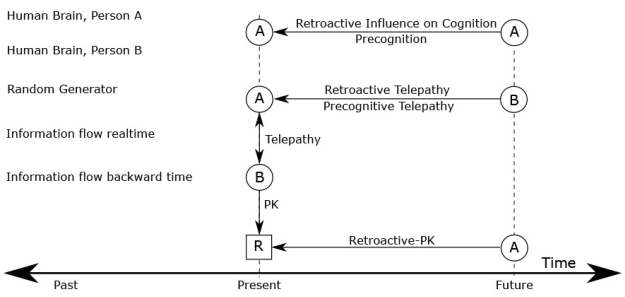

Figure 3. Future-centered perspective to summarize psi forms in a common scheme.

the unconscious. The functionally correct model to consider intelligible information transfer, therefore, still requires the "vertical information exchange," as illustrated in Figure 1.

EXPERIMENTAL TESTING

According to my description of the problem, the concept of observability and reality is extended by the cognition of Intelligible Information from the future via confirming feedback in a process that is called precognition. This requires free-response methodologies for testing, while forced choice-experiments do not meet these requirements and additionally pose problems that were described in the section 'Necessary Extensions to the Model.'

Before outlining two different experimental procedures which can complement each other to test the non-probabilistic future hypothesis in line with the proposed mechanisms, it is helpful to point out that indirect conclusions from known experimental procedures and results are already possible—they are just not available in a systematic organized experiment.

Indirect Conclusions from Known Experiments

Although the majority of free-response experiments were not conducted in a precognitive protocol (selecting the target after the experiment), they could be considered precognitive, induced by feedback, if it could not be argued at the same time that there might be only a psychological requirement for feedback. Nevertheless, even then, feedback-induced precognition can be justified under certain conditions as a mechanism, describing a time leap in consciousness to the actual future experience:

In contemporary free-response ESP experiments, e.g., remote viewing, digital target pools containing a large number of digital images are typically used. Each image file is either stored in this pool under a predefined neutral random number, or the computer program assigns a random number when one of the image files is selected by a random process. This random number is considered the "address" or reference by which a perceiver attempts to obtain target information. In such experiments, the computer is the physical system that contains potential physical information that can become actual physical information if a code is used that allows the computer program to reproduce a pattern of pixels on the screen. The human mind is capable of recognizing this as a picture with a certain meaning at the feedback time. Until this happens, the computer's hard drive is physically a configuration of clustered bit sequences arranged on randomly fragmented, magnetized sections, ultimately spin states of electrons. It is highly unreasonable to claim that the mind or any process in the brain can read information directly from this "entropy soup." Moreover, it is also well-known that the psi mechanism is insensitive to digital information. This *zero-information status* should allow no realtime information transmission from where the target is stored. It is only reasonable to assume that the task must be in someone's consciousness at some point in time. But, when a sufficiently large target pool is used, realtime telepathy is impossible (because no one can have an idea about the content encrypted in the randomly selected image file).

The conclusion is, first, receivable information must be in relation to later access when the "empty black box" is opened and the picture on the screen is created, from where the information is understandable to a human conscious observer. Second, this logic also requires that it does not matter whether the target is selected before (pre-tasking) or after the experiment (post-tasking). This view of the problem makes it reasonable to regard a future physiological perception of the target as necessary, at least in such kinds of experiments to explain positive results. The test procedures for a systematic study are as follows:

Proposal of Experiment 1

In a double-blind study of free-response experiments, photographs as targets are selected randomly from a large digital target pool. A second random process determines at the beginning of each run whether the assignment happens in a pre-or post-tasking mode, but in such a way that both types are counterbalanced at the end of a test series. A statistically significant result is predicted for the pre-tasking and post-tasking process, with no significant difference between them. For a specific random choice type with geographic locations instead photos, this was already indicated in the database by

Dunne & Jahn (2003). The current experimental proposal would substantiate the detailed conclusions made above.

Proposal of Experiment 2

An extended and systematic study of the type of experiment Targ & Targ (1986) have carried out, in which was tested whether the presence of a 50% likely target interferes with the ability to describe a 10% likely target in a free-response set up, should continue to show no interference, which could substantiate the assertion that the percipient describes always the actual future.

This second experimental proposal can be carried out in subgroups with 1.) digital target pools (containing digital images), 2.) sealed box target pools (containing analog photos or objects), and 3.) pools in which real geographic locations are addressed. In both experiments, the target pool should contain targets that differ from each other as much as possible (in content and emotional reaction potential) since this enhances the significance of the analysis and is (based on general experience) most attractive for the participants.

HOW QUANTUM THEORY FITS INTO THE PICTURE

Quantum mechanical randomness and the uncertainty relation have often been presented as a counter concept to the fixed future implication from the relativistic block view, which seemingly represents merely one outer edge area, becoming relevant at a large scale. This easily promotes the comfortable, supposedly modern view that the future is uncertain in any sense. However, in this specific context again, the idea of "non-computability = "uncertainty" is only conclusive if computability is a universal criterion for predictability, which cannot be claimed for precognition. It is not contradicted that a quantum mechanical state comes into being with the completion of the measurement, and beforehand, only probability statements are possible—by means of physics. But, this is at the same time not incompatible with the assertion that the future quantum state is already fixed in the sense of predictable by parapsychological means under certain conditions when associated with psi-sensitive targets like pictures (this requirement can be implemented in both of the suggested experiments).

A more far-reaching argument against the conventional view is concealed in the interpretation of quantum mechanical laws. In the last decades, a few physicists pointed out that random events in QM must not be really random events "out of the blue," instead, they can have constraints to future conditions. Rietdijk addressed in some of his work in regard to Heisenberg's uncertainty relation (e.g., Rietdijk, 2007) the view that retroactive influence is responsible for defining details within such margins. Aharonov & Tollaksen (2007, p. 3) concluded in their Time Symmetric description of QM (TSQM) using a two-state vector concept, "we are able to change the meaning of uncertainty from 'capriciousness' to exactly what is needed in order that the future can be relevant for the present, without violating causality..." CITATION AND PG So, we might see uncertainty to allow a choice in the future to affect the present— or provocatively put 'not to disturb what is bound to happen'. According to the two-state vector concept of QM, "time propagates forward from the past boundary condition and backward from the future boundary condition." (Aharonov et al., 2010, p. 32).

This applies to experimentally observable effects of *weak measurements* its "outcome anticipates a future choice, yet this anticipation becomes apparent only after the choice has been actually made." (Aharonov et al., 2016, p. 53). Though the interpretation that a future choice affects a past measurement's outcome is not claimed as superior to more conservative one-vector formulations of quantum mechanics (Aharonov et al., 2015), it offers unconventional answers. As soon as it becomes clear that backward-in-time causation can be logically completely intact, this cannot only explain the measurement problem more satisfactorily; it explains why it appears so incomprehensible from the present time perspective.

Another significant indication that a quantum system can respond to a future decision offers the delayed-choice experiment (referring to the free decision to measure at which slit the particle enters the detector or to measure the reference pattern, after the particle has already entered the slit(s) which was proposed by John Wheeler and experimentally carried out by Jacques, et al. (2007). Decades before, Wheeler stated in regard to his macroscopic equivalent thought experiment (referencing a quasar as light source and a galaxy as gravitational lens, billions of light years away from the quasar): "...we decide what the photon shall have done after it already done it." And he further emphasized, "Our decision today can determine the past of a particle that was emit long before there was life on Earth" (quoted in Kaiser, 2011, pp. 78-79). Possible loopholes to reject a retrocausal explanation are sometimes discussed, but to my knowledge, they have all failed to additionally consider the implications of retroactive-PK, as mentioned previously with reference to Schmidt (1993). Costa de Beauregard's models include retroactive-PK (see, e.g., Costa de Beauregard, 2000). Using his words, retroactive-PK never means reshaping the past, but it does mean shaping the past. "Shaping" refers to the future that influences the present within uncertainty margins, resulting in a small shift of the normal

distribution. This seems retroactive because the effect of the attempt to shift an outcome more to "0" or more to "1" correlated to a free choice in the future. It can be called non-probabilistic in the sense that the decision about which choice is finally used is fixed in the future by the already-given arguments related to any future event. The small effect sizes but clearly significant p-values in such PK-experiments are a consequence of compliance with external causality; they are not an argument for a probabilistic future.

A further viewpoint allows the *Transactional Interpretation* of John Cramer, applying time symmetry based on relativistic wave mechanics, inspired by the absorber theory of Feynman and Wheeler that proposed advanced waves running backward-in-time (Feynman & Leighton, 1985). In this interpretation, a future free choice is confirmed by an advanced wave originating from the future, whereas "the process itself is atemporal, and the only observables come from the overall superposition of all of the steps that form the final transaction, which is essentially an advanced + retarded standing wave across spacetime, connecting emitter and absorber" (Cramer, 2016, p. 64). This approach relates most clearly to atemporality. However, it excludes the observer and, therefore, also a psychophysical interaction, whereas the two-state vector concept is open for a future conscious causes collapse interoperation, even though Aharonov and colleagues do not consider consciousness. More clearly, the point of view by Costa de Beauregard (1976) is that the consciousness aspect can naturally appear in a quantum-relativistic and, at the same time, symmetric approach.

It is worth noting that Aharonov, Cohen, and Shushi (2016, p. 53) referred to an "*already existing future* [emphasis added] that does not exclude free will nor invoke paradoxes." So, they adopted the language of relativistic physics into time-symmetric quantum mechanics. As atemporality seems present in both theories, this is suggested as a common basis, and there is no need to dramatize their differences. Instead, this requires a rethink of the concept of time and causality and what this implies. Not all physicists have to agree on this because "no consistent interpretation of quantum mechanics can be tested experimentally" (Cramer, 2016, p. 181). It is only important to note that TSQM is consistent with all experimental results and theoretical predictions but additionally can give an answer to the "why question," which is all the more important in a larger frame of reference than physics currently draws.

Commonalities and Differences in the Context of Precognition

Aharonov and Tollaksen (2007, p. 48) stated in TSQM, "the destiny vector cannot be used to inform us in the present of the result of our future free choices." This is exactly the same as for precognition (Figure 2, 100% influenceability). It has been made clear that an open decision path, as seen from the present, is not a contradiction to a non-probabilistic future for someone who has to make a decision. Again, this logic is in full compliance with TSQM. As the authors stated: "Freedom-of-will and destiny can 'peacefully coexist' in a way consistent with the aphorism 'All is foreseen, yet choice is given.'" The point is that the atemporal perspective, from where the future "already exists," is superior to the present perspective but, however, not unrestricted inspectable. Their statement in the same paper: "Not knowing the future is a crucial requirement for the existence of free-will" is from the quantum perspective, generally correct, but too strong in the here given context. Tapping fractions of the future can be possible as an exception—only knowing too much about the future would make life impossible. It is important to consider this in order to recognize the limited nature of precognition, which is understood as the reflection of a non-probabilistic future.

IMPLICATIONS AND APPLICATIONS

Integration Into a Larger Picture

In a lecture given at Chapman University, Yakir Aharonov summarized a noteworthy part of his work as a theoretical quantum physicist to the audience by saying:

> ...Now we could carefully suppose that there will be a future physics, another revolution in physics in fact, in which time will appear in a different way—time will appear in such a way that, for example, the decision we make in the present is not only affected by the past, but it is also affected by the future...The whole logic of what a decision is—and what freedom is—is going to be changed. In which way is going to be changed, I don't know yet—because we don't have the revolution... (Institute for Quantum Studies, 2016, timestamp 48:28)

The question arises as to how this view on time and retrocausality, originating in experimental and theoretical physics, fits in the context of the present work which argues for a non-probabilistic future, and furthermore whether it is possible for psi research and physics to converge.

Atemporality appears first in the block universe view as a consequence of the relativity of time, and it appears

again in time-symmetric interpretations of quantum theory where it can explain how a measurement is affected by future boundary conditions (e.g., as in the delayed-choice experiment). Atemporality has been introduced here also as a property of the unconscious mind to explain the access of future information. A "timeless physics", as described by Barbour (1999), is not agreed to, but it might be reasonable to assume a hidden atemporal reality as the ultimate law that matters to the deepest fundamentals of physics and for unconscious mental processes as well. Using the Jung/Pauli version of dual-aspect monism (see Atmaspacher, 2014; Gieser, 2005), the physical and the psychical are two branches joining at its crossing point into the *unus mundus* ("one world") I would suggest as a possible "location" of this timeless structure. This transcends physics, but it is not necessary to call it philosophical or metaphysical. Note Pauli's statement in a correspondence with C.G. Jung: In his opinion, what Einstein thought was an incompleteness of wave mechanics within physics was actually an incompleteness of physics within life—and Bohr, the major figure besides Heisenberg, would have immediately agreed to this formulation of the problem. Later, Pauli justified this as the opposite pair of completeness vs. objectivity which cannot be valid simultaneously (Meier, 1992, p. 121). Is this not a physical conclusion, which calls, out of itself, for an extra-physical (i.e., nonphysical) perspective in addition? If so, I conclude that psi research and physics have a chance to converge as soon as physicists no longer insist that physics must fully describe psi.

What stands behind a non-probabilistic future—atemporality and arising from this retro-causality—could be a key element in solving some of the most fundamental questions in physics. The question of what was before the birth of the universe (or will be after a final end) appears in a different light and cosmic evolution may be explainable beyond conventional thinking. As an example, the physicist Paul Davies, who refers to Wheeler's "self-excited universe" (e.g., Kaiser, 2011, p. 79) was cited in a *New Scientist* article, suggesting that if retrocausality exists, "the presence of conscious observers later in history could exert an influence on those first moments shaping the laws of physics to be favourable for life. This may seem circular: life exists to make the universe suitable for life. If causality is forward and backwards, however, then consistency between the past and present is all that matters" (Barry, 2006).

Applicability to Other Psi Hypotheses

In the introduced model, precognition appears as the concrete and demonstrable manifestation of accessing the future, with which the concepts of observability and reality can be extended to derive a non-probabilistic future. However, the same model is also applicable to other hypotheses that still require a conclusive explanation.

Stanford and Thompson (1974) and, similarly, May, et al. (1995) suggested that unconsciously effective ESP can influence decisions for one's own benefit or desire. This is explainable according to Figure 1 when a future experience or retroactive telepathy (at t_2) can feed the unconscious intelligence with future knowledge that is not transmitted to the conscious mind but becomes manifest as gut feelings or "ideas out of the blue"—up to inner impulses that could lead to affective decisions (at t_1). This should be distinguished from the psychological concept of intuition, even though the distinction is often difficult to make. At least under artificial experimental conditions (see e.g., Bem, 2011 & Maier et al., 2014), there is some evidence for a retroactive future influence on affective decisions. While debatable, the special meaning of *unconscious precognition* would be that any conscious interference is strongly reduced, and this could generate a greater benefit—since, as already clarified, free conscious decisions and precognitive information about the final free decisions are mutually exclusive.

At the same time, the hypothesized precognition theory makes it obvious to assume that a direct realtime target access beyond the telepathic concept (clairvoyance) can be completely replaced by mental retrocausation since all provable ESP-related information is connected to a future access either by the perceiver or a subsequent analyst. Nevertheless, this should not be a definite argument against clairvoyance-type perception since there might be other mechanisms that are more difficult to understand.

Non-Probabilism Potentially Implies More but Not Less Freedom

The arguments in this paper are not based on a scenario as they are sometimes expressed in the metaphor of a Laplacian superintelligence having the capacity to compute the future based on completely causal deterministic physical laws from the past and present state. The "lack of uncertainty," as illustrated in the Andromeda paradox, does not depend on the model of "what makes events happen" (e.g., fully causal or non-causal [4]). Instead, it is only appropriate to recognize that the mind can "overtake" events in time. Consequently, there is no reason that the "already existing future," reflected in the block universe and the unconscious mind as well, curtails our "free will." Indisputably, our fate or destiny is to some extent the result of so-called free decisions; however, in

the context of genes, the time we were born into, our experiences, positive and negative accidents, etc. Regardless of more complex philosophical discussions, it is up to everyone whether they call this free, predetermined, or something in between. But, in case we can benefit from the knowledge about future events in the here introduced understanding, it is additionally appropriate to conclude that a non-probabilistic future, as the basis of the precognitive mechanism, could give us even more freedom under certain circumstances.

ENDNOTES

[1] Some further viewpoints in this regard are discussed by the Spanish philosopher Gustavo Bueno (see https://www.fgbueno.es/ing/gbm.htm).

[2] The same author (Rietdijk, 2007) later published a paper that referred to nonlocal determinism beyond the scope of local causality, in which psi phenomena, such as precognition, occur naturally in the context of the block universe view.

[3] To be formally correct, this describes a theoretical proposition inaccessible to experimental scientific knowledge or empirical scrutiny. However, the term thought experiment has been used in a similar or identical manner by many other authors.

[4] The term non-causal is here not necessarily used in the sense without any cause at all, but without "mechanistic causes": This can relate to human free decisions, which AI (artificial intelligence) cannot mimic and some researchers relate to QM. There might be also deeper causes, hidden in nonlocal causality. Synchronicity (see, e.g., Gieser, 2005) might be referred here as well, if events are connected acausal to a mental experience by a meaning, perhaps as an indication of a deeper hidden cause that exceeds the analytic, physical understanding.

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ESSAY

Decolonizing Possession: A Blueprint to Invisible Worlds

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HIGHLIGHTS

Psychiatry's traditional treatment of possession-like experiences, particularly through diagnoses like dissociative identity disorder, reproduces a colonial framework that fails to consider cultural and spiritual perspectives, whereas a more indigenous and animistic approach more fully accounts for the complexity of these experiences.

ABSTRACT

The experience of being possessed by an invisible and outside spirit seems archaic and outdated to many people today. However, the scientific and medical field of psychiatry contains diagnoses that classify this experience as a form of psychopathology, most notably Dissociative Identity Disorder (DID). Moreover, indigenous peoples and researchers have detailed many accounts of how the experience of possession makes sense within their cultural and local backdrop. In this essay, we employ the strategy of decolonization to demonstrate how psychiatry continues to exert colonial power to manage cases of possession. In so doing, we argue that psychiatry lacks a robust phenomenological and culturally sensitive understanding of spirituality. We also put forward an animistic framework more congruent with the possession experience by examining the influence of invisible worlds.

KEYWORDS

Decolonization, exceptional experiences, mental health, possession, psychiatry.

> Spirit possession refers to a supernatural force taking control of the human body. It is recognized [sic] across many cultures and is a phenomenon incorporated into various religious beliefs. (Pouchly, 2012, p. 67)

Possession experiences are most commonly known through cultural and religious traditions. More kept under wraps, however, is the reference to possession made by the medical field of psychiatry. Possession appears in the category of dissociative disorders that the *Diagnostic and Statistical Manual* (DSM-5-TR) of the American Psychiatric Association (2022) defines as "characterized by a disruption of and/or discontinuity in the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, and behavior" (p. 330). Most explicitly, as we later articulate, the diagnosis of Dissociative Identity Disorder (DID) captures the symptoms or features most closely associated with spiritual and religious notions of possession.

Letting the genie out of the bottle, we argue that possession experiences are not necessarily psychiatric. In fact, the power exerted through the medical and scientific discipline of psychiatry colonizes these experiences, making them more amenable to these very models. As such, in what follows, we use the strategy of decolonization (Smith et al., 2019), arising out of post-colonial stud-

ies, in order to advocate for reclaiming and safeguarding these contextually situated experiences. In this way, we argue that indigenous forms of spirituality, exemplified in various manifestations of shamanism, for instance, are not accounted for adequately by psychiatry. Noll (1993) echoes this when suggesting that DSM diagnoses, in cases of possession, superficially imprint the stamp of science on the territory of religion, thereby initiating "yet another skirmish in the centuries-old war between competing *Weltanschauungen* [worldviews]" (p. 251, emphasis in original). Beyond this impasse, we propose an alternative cosmological frame for thinking about possession cases, one that more animistically incorporates invisible worlds into its fold. Importantly, we aim not to antagonistically juxtapose or reduce the understanding of possession to merely two possibilities. Rather, the polemic against psychiatry is a necessary and critical intervention given its hegemony, cultural capital, and ethnocentrism (Cohen, 2016).

DECOLONIZING POSSESSION

Many recent attempts have been made to integrate the tenets of post-colonialism into the practices of the various mental health disciplines (Bhatia, 2020; Robcis, 2020). By bringing these critical and conceptual tools to bear on, for example, psychotherapy and psychiatry, scholars and practitioners are better able to consider how their approaches are limiting while simultaneously being more nuanced in their application of these practices. That is, practitioners and scholars are in a better position to understand how certain groups of people are excluded while others are privileged, how certain biases in knowledge are reproduced, and how maps of reality necessary overlook alternative territories. This process has broadly been called *decolonization* (Smith et al., 2019). A central tenet of decolonization is to critically examine the ways that colonizers pillage and install new material practices and values in the conquered community (Bashara, 2021) while also reclaiming or safeguarding those indigenous practices (Glissant, 1997). Bhatia (2020) writes specifically in terms of psychology that decolonization means shedding "light on how Euro-American scientific psychology has become the standard bearer of psychology around the world, whose stories get told, what knowledge is considered as legitimate, whose idea of development is considered ideal, and whose lives are considered central" (p. 258). In this way, colonialism has and continues to shape and mold the theories and practices of a specific Euro-American form of psychology and science. Notably, the work against this process, decolonization, should be ongoing as new ways and forms of coloniality always find their way into concepts, methods, and research.

Moreover, a decolonizing approach demonstrates how psychology and theories of culture, identity, and development are necessarily linked to the history of colonialism, orientalism, and Eurocentric biases (Bhatia, 2020). Importantly, this kind of coloniality carries forces of power that work to create such taken-for-granted notions as individuality and subjectivity, an argument that Hook (2007) marshals under the Foucauldian category of disciplinary power. The notions are generally put in the service of larger institutions and structures: economic, sociological, and others. The point is that basic psychological and psychiatric concepts mold, structure, and create how phenomena within alternative, or better, indigenous models of reality are permissible to understanding - typically through categorizing and ordering, allowing for control and intelligibility (Foucault, 1994).

Perhaps this disciplinary power is best exemplified in the DSM-5-TR published by the American Psychiatric Association (2022). This manual provides clinicians and other helping professionals with a scientifically informed nosology, allowing them to conceptualize and understand patients and clients through the criteria of symptoms. Such a procedure situates pathology through medicalization - a Eurocentric and biopolitical exercise of power on the self and body (see Haraway, 2013). That is, by understanding psychopathology as a medical disease, psychiatry employs models aimed at treating individual deficiencies - how the behavior or psychological state is distressful or dysfunctional for the patient (American Psychiatric Association, 2022). Hsu (2019) develops a reading of Fanon in order to critique the diagnostic umbrella of paraphilias to demonstrate how this is the case when writing that "the colonizing force of the DSM-V [is] its tendency to isolate the notions of mental disorder from its full range of cultural, socio-economic, and political context" (p. 55). The stripping away of these contexts, we could postulate others as well (e.g., spiritual, cosmological, etc.), and the ideological exercise of power by medicalization and pathologization reproduces inherent biases and further creates categories and procedures of how to understand and manage non-normative people.

The Western mental-health campaign to educate the world on psychopathology, according to Timimi (2014), hides or fails to acknowledge a diagnostic system that is "vulnerable to institutional racism" and subjugates "other standards of normality [that] will, at least to some extent, come to be viewed as 'primitive', 'superstitious' etc., and their populations will be viewed as needing to be (psycho)educated" (p. 212). These other normality standards are often more indigenous, stemming from a specific geographic location and having a unique heritage, history,

and tradition. Noll (1993) similarly foreshadowed that, in cases of possession, diagnoses would predominately be applied to non-white people, and this practice should be criticized "as a weapon of unconscious institutional racism" (p. 251).

As a more specific case in point, Keller (2002) points to how this very process of colonization has taken place. They write that the "Western scholar is likely to view [possession] as inhabiting an anachronistic space to which he or she can bring progressive models of interpretation" (p. 5). The seemingly extreme behavior exhibited by those who are possessed must, in other words, be tamed and enclosed within medically understandable models, which can then exert some form of control to cure the pathology. Moreover, according to post-colonial critique, Wetmore (2014) relates that the self-displacement occurring under forms of colonialism does psychological violence to those indigenous peoples by denying this specific anthropological expression of possession, dance, and ritual. Consequently, the violence embodied and enacted in possession cases then becomes directed outward at the colonizer and their system of control, psychiatry in this case, which imposes psychopharmaceutical and therapeutic docility.

Perhaps unsurprisingly, possession is more often represented through figures of women, the poor, and religious others - those who have stereotypically and unfairly been labeled as primitive, savage, third-world, and so on. Additionally, these representations "can give us information about marginalized persons and their struggles within and against the forces that have an impact upon their lives" (Keller, 2002, p. 4). From a decolonial perspective, dispelling these characterizations as shrewd forms of coloniality goes toward more rigorously and carefully understanding possession experiences within the backdrop of their multiplicitous contexts.

DISSOCIATIVE IDENTITY DISORDER (DID)

While possession cases can be diagnosed with various forms of psychopathology, such as schizophrenia or possession and trance disorder (Pietkiewicz et al., 2022), we aim to exemplify Dissociate Identity Disorder (DID) as relaying the nosology that most closely mimics anecdotal or anthropological cases of possession.[1] The DSM-5-TR says that the "defining feature of dissociative identity disorder is the presence of two or more distinct personality states or an experience of possession (Criterion A)" (American Psychiatric Association, 2022, p. 332). The manual goes on to differentiate between *possession-form dissociative identity disorder* and *non-possession-form dissociative identity disorder,* with the former conveying the experience of "being possessed by external identities (e.g., spirits, demons)" - in contrast, the latter only subtly displays "discontinuity of identity, and only a minority present to clinical attention with discernible alternation of identities" (American Psychiatric Association, 2022, p. 332).

Further expanding this distinction, the DSM describes examples of criteria or symptoms to look for when considering possession-form dissociative identity disorder manifesting behaviorally as,

> A "spirit," supernatural being, or an outside person has taken control, with the individual speaking or acting in a distinctly different manner. For example, an individual's behavior may give the appearance that her identity has been replaced by the "ghost" of a girl who died by suicide in the same community years before. (American Psychiatric Association, 2022, p. 333)

Notably, the formal diagnosis in the DSM does not make this distinction but instead subsumes these two nosologies under the umbrella of DID. The formal erasure of this difference is essential insofar as it is assumed that the majority of possession-form DID cases are the result of broader and more psychosocial factors, such as religious and cultural practices, that would thereby exclude this from psychiatric diagnosis (Criterion D). The DSM says as much when claiming that "the majority of possession states that occur around the world are usually part of a broadly accepted cultural or religious practice and therefore do not meet criteria for dissociative identity disorder" (American Psychiatric Association, 2022, p. 333). The attempt of the DSM to exclude cultural, religious, and spiritual factors that would influence the appearance of these symptoms, while necessary, does not do enough to guard against unnecessary pathologizing, and Criterion D is problematic for many reasons.

Take, for example, the case study examined by Delmonte and colleagues (2016). For 40 years, the researchers analyzed an individual within the Afro-Brazilian religious group Umbanda. They found that the patient had met the criteria for DID during the first stage of their life (childhood and early adulthood) and met three of the five criteria for DID in the second stage of their life (late 20s up to the present) (Delmonte et al., 2016). The researchers criticize this diagnosis on the grounds that it does not address the ambiguity of affect surrounding possession experiences. The researchers also argue that the DSM obfuscates and downplays the prevalence of anomalous experiences in the general population (Delmonte et al., 2016). In other words, once practitioners have ruled out

psychiatric diagnoses when conceptualizing these patients, adjudicating these possession experiences as a culture-bound syndrome (e.g., Criterion D in DID) misses the mark and colonizes these experiences since cases of possession are much more universal (Ross et al., 2013; Sar et al., 2014). In fact, "possession states have been described in almost all societies of the world" (Hanwella et al., 2012, p. 1), with the possessing agents, depending on their geographic and historical situatedness, ranging among spirits of deceased individuals, deities, animals, or devils.

Moreover, Stephenson (2015) points out the epistemological and diagnostic challenges that the readmittance of possession into the psychiatric discourse poses such that it reflects the internal contradictory nature of the DSM to contain nosological completeness and cultural inclusiveness. In particular, the researcher posits the French word *récupération* in order to denote how politically a powerful and dominant government or institution "harnesses anarchic elements in order to absorb and co-opt them, rendering them innocuous and conventional" (Stephenson, 2015, p. 267). The *récupération* of possession within psychiatric discourse merely pays lip service to cultural inclusiveness. Furthermore, possession-form DID presents the facade of being nosologically complete and skirts the question of the DSM being a valid scientific and effective diagnostic instrument (Stephenson, 2015).

PSYCHIATRY AND THE ERASURE OF SPIRITUALITY

The coloniality of psychiatry, as relayed above with particular emphasis on the DSM, does little to situate these experiences within their indigeneity. More specifically, the spiritual nature of ostensible cases of possession is substituted for biomedical and psychiatric etiologies. This substitution is crucial since, as Iseke (2013) reminds us, "decolonizing and spirituality are inextricably linked" (p. 36). Indeed, Cajete (1994) further suggests that a central aim of Indigenous education is the creation of knowledge about innate spirituality. Iseke (2013) continues to develop this line of argumentation in terms of how the ceremonies of First Societies, like the Sacred Stone Lodge or the Sweat Lodge, have been impacted by colonization insofar as they have been designated "as 'magic' or 'voodoo', or [how colonization] affects the mindsets of those who bring it into the ceremony" (p. 49). By contrast, entering the ceremony with believers and having the indigenous knowledge of how they work represents a decolonizing act in itself.

Furthermore, Bernard (2008), writing mainly concerning African spiritual traditions in the Caribbean, argues that "*emancipating spirit* is a process of stepping out of the routine of imitating sanctioned rituals within a self-alienating context and seeking an actualized self within an affirming and liberating environment" (p. 49, emphasis in original). The 'imitation of sanctioned rituals within a self-alienating context' echoes the colonial importation of psychiatric models to understand cases of possession. In this way, psychiatry can be seen as an ongoing function of how "colonists used Christianity and capitalism as means to justify the subjugation of Africans in the Caribbean" (Bernard, 2008, p. 50). The deliberate and colonial shift to psychiatric frameworks of possession stands in contrast to the Yoruba tradition, which believes in possession, trance behavior, and mourning as essential aspects of the spiritual experience.

In the Islamic tradition, there are numerous types of spiritual beings that populate the universe, including "*jinn* (spirits), *shaytaan* (satanic beings), *marrid* (demons), *bhut* (evil spirits) and *farista* (angels)" (Dein & Illaiee, 2013, p. 291, emphasis in original). Take, for instance, jinn, which are sometimes associated with spiritual possession and causing evil (Islam & Campbell, 2014); although their nature can generally be seen as good, evil, or neutrally benevolent (Dein & Illaiee, 2013). There is debate among Islamic scholars as to their capacity to influence the physical world. However, they are typically seen as "real creatures that form a world other than that of mankind, capable of causing physical and mental health to human beings" (Khalifa & Hardie, 2005, p. 351). Sometimes, jinn are believed to possess humans who live their lives sinfully, preying on those considered to be spiritually weak and vulnerable (Dein & Illaiee, 2013). They cause psychological illness and physical distress while co-inhabiting the body of their victim (Islam & Campbell, 2014).

Moreover, attributing the origin of mental illness to supernatural causes predates Islam and existed in pagan Arabia and Ancient Greece (Islam & Campbell, 2014). Islam and Campbell (2014) raise the question as to "why supernatural explanations have stubbornly persisted despite scientific evidence describing mental illness as a psychological or physical condition" (p. 239), going on to postulate this persistence being rooted in beliefs within the broader cultural context. Importantly, this persistence may also be seen as pushing back against the forces of colonization that would try and eradicate the 'invisible world' in favor of the visible.

The psychiatric erasure of spirituality is particularly curious, given consideration of recognized cases of both benevolent and malevolent possession found in the dominant belief systems of the West - including Christianity, Islam, and Judaism (Ventriglio et al., 2018). Ironically, psychiatry and spirituality share common goals in helping

to promote personal growth, reduce feelings of anxiety, and assist in discovering meaning in life. Breakey (2001) brings attention to the fact that in Western societies, "many of the health care institutions that are most prestigious today were founded originally by religious groups or by individuals as an expression of their religious faith" (p. 63). The historical relationship between religion and healthcare is interconnected and overlaps.

Somewhat pointedly, Sims (1994) reminds us that "there is no such thing as 'valueless' psychiatry" (p. 443) and highlights how the discipline has not adequately taken into account the phenomenological characteristics of what we call the spiritual. A more robust grasp of spirituality would include the subjective experiences of prayer, magic and rituals, and religious revelation. As a result, psychiatrists need to understand spirituality not only in terms of the knowledge of the transcendental but also the patient's everyday assumptions, certainties, doubts, and beliefs (Sims, 1994). Swinton (2001) echoes this importance when arguing that spirituality "is in fact of central importance to many people who are struggling with the pain and confusion of mental health problems" (p. 7) and should, therefore, be incorporated into caring strategies. Furthermore, Pouchly (2012) outlines the benefits of a collaborative approach between mental health clinicians and traditional healers that more holistically treats cases of spiritual possession.

HONORING POSSESSION EXPERIENCES

The research provides evidence of a strong connection and positive association between spirituality[2] and mental health (Brown et al., 2013; Koenig et al., 2012; Rosmarin et al., 2022). Moreover, the discourse of psychiatry and, by extension, the DSM has not done enough to integrate these findings, even if this dialogue shows future promise (Boehnlein, 2006). Sims (1999) notes that "psychiatrists often ignore the spiritual" (p. 99) for a variety of reasons, most notably because it is either considered unimportant or irrelevant.

Possession experiences heighten and problematize this discrepancy even further. That is, the often spiritual nature of possession experiences, the phenomenological descriptions of 'being invaded' or 'having a spirit inside' challenge many of the assumptions of the biopolitics of psychiatry.[3] For instance, management of these symptoms typically takes the form of medical, psychopharmaceutical, or psychotherapeutic interventions aimed to decrease distress and facilitate functioning while also diagnostically ordering and classifying these experiences along nosological lines (American Psychiatric Association, 2022). Contrast this with a more culturally sensitive and contextual approach, such as visiting a medicine person or shaman (as, for example, in various American First Societies; see Stewart, 1946) in order to participate in a ritual, which would produce similar or the same outcomes of symptom reduction and increased adaptability and functioning (Krippner, 1986).

Anthropologists use the term *shaman* to denote a special kind of medicine person or "witch doctor, who regularly enters non-ordinary states of consciousness to heal, obtain information by extrasensory means, or conduct rituals to influence weather or game animals" (Kalweit, 1989, p. 78). Shamanism spans culture and history and can be found in spiritually centered traditions and communities dating back to the Paleolithic era; it provides healing practices and spiritual teachings to these communities (Grof & Grof, 1989). Unlike the stigmatizing view of psychiatry regarding non-ordinary states of consciousness, which operates on the assumption that these are likely indicative of underlying mental illness, shamans embrace and utilize these states to perform healing rituals for the betterment of the community (Kalweit, 1989). In fact, many shamans begin by going through a "dramatic episode of an altered state of consciousness that traditional Western psychiatry sees as a manifestation of serious mental disease" (Kalweit, 1989, p. 78). This transition contains extreme emotions and unusual behavior, but such a process is necessary to develop shamanic abilities.

Beyond a shaman's ability to enter and exit non-ordinary states of consciousness, they can induce altered states of consciousness to assist in healing emotional, psychological, and spiritual ailments that are causing distress (Kalweit, 1989). In contrast with a practitioner devoted to the psychiatric medical model perceiving an altered state of consciousness as dysfunctional, shamanic communities view altered states of consciousness as a catalyst to healing for both the individual and the community. In short, rather than being perceived as a threat to individual and community health, the open-mindedness of shamanic traditions towards non-ordinary states of consciousness allows for greater insight into the depth of human experience (Kalweit, 1989). Furthermore, shamans often call upon spirits to aid with healing and treatment (Padmanabhan, 2017). While shamans in their own communities are treated as healers with spiritual abilities, when viewed from a Euro-American perspective, the behaviors and beliefs of the shamans would likely and unfortunately constitute psychiatric diagnosis and treatment. This speaks to the ideological and colonizing force of psychiatric power.

A critical difference between these two models - psychiatry and shamanism[4] - lies, in part, through their understanding of the etiology of possession. The psychiatric

approach understands the origin or cause of possessive states as a function of biomedical deficiency brought on, perhaps by trauma, a psychosocial stressor, genetics, or a combination thereof. Conversely, the more anthropological and indigenous approach sees the cause of the possession experience as often in line with the phenomenological description given therein, working in various ways to expel or appease the uninvited inhabitant. This sort of *congruence*, a word we borrow from the person-centered therapeutic approach of Carl Rogers (1961), perhaps lends credence, validity, and healing to the rapport between the healer and the client. Furthermore, in so doing, the use of situated cultural rites as a method of treatment pushes back against psychiatric domination and colonialization - the monolithic application of the DSM, for instance, to classify all types of psychological maladaptions.

Possession experiences would better be theorized under the broader category of exceptional experiences (ExEs). Belz and Fach (2015) define exceptional experiences in the following way,

> ExE are ***experiences*** that - from the point of view of those affected by them - are so ***exceptional*** that they seem incompatible with their explanations of reality or with the worldview of their social environment as far as their quality, process, and origin are concerned (p. 365, emphasis in original).

Characterizing possession cases as exceptional experiences runs counter to their psychiatric classification of them as psychopathologies or, given our exemplar, as DID. In fact, in one manner of speaking, possession cases are only exceptional insofar as they are divorced from their indigenous contexts and when they become imported into the biomedical discourse of psychiatry.[5]

Simmonds-Moore (2012) goes on to further delineate exceptional experiences by dividing them into two categories: (1) healthy exceptional experiences, which are experiences that, although mysterious in nature, involve intention and meaning-making; (2) unhealthy exceptional experiences mark those experiences missing an aspect of control, an unwanted experience, therein possibly leading to distress. Indeed, while the popular and even scholastic notion of possession places it in the latter category (Pietkiewicz et al., 2021, 2022), possession experiences are not always unhealthy (Igreja, 2018; Scrutton, 2016). As such, clinicians and researchers would do well to keep this double nature in mind and see possessional experiences through a dimensional rather than categorical model such that they fall on a spectrum. This would be similar, in some ways, to the historical trend of the DSM to conceptualize disorders dimensionally (see Widiger & Crego, 2018), as opposed to a categorical designation of either healthy or unhealthy. The dimensional approach permits greater nuance when classifying.

INVISIBLE WORLDS

Psychiatry and, by extension, the other helping professions have all, to a great or lesser degree, attempted to make sense of possession experiences in light of a Eurocentric, and more specifically biomedical and psychiatric, ways of understanding the world. Patients who claim to be possessed are diagnosed with schizophrenia, dissociative identity disorder, possession, and trance disorder, and other similar diagnoses (Pietkiewicz et al., 2022). Yet, we argue that this coloniality operates not only at the diagnostic and psychiatric level but, more broadly and perhaps significantly, to a cosmological degree - the colonization of possession obfuscates, intentionally or not, what we might call somewhat axiomatically *the invisible world of possession*. That is, possession mobilizes a challenge to the visible materiality of the biomedical and psychiatric worldview. As Keller (2002) submits, in no uncertain terms,

> The key to the problem is not that possession studies are sexist or racist but that a social scientific method is unable to take seriously what the witnesses to the possession say is the case - that the power that overcomes them comes from an ancestor, deity, or spirit (p. 3).

While we indeed take post-colonial critique seriously in rightfully recognizing the way that diagnosing cases of possession unfairly targets Indigenous peoples, women, the poor, and those religious others (Keller, 2002); nonetheless, the key point made by the above quotation suggests a spookier and expansive framework for reality, one that normative models fail to consider such that the world is interspersed with invisible entities and spirits of all kinds. This is a cosmological framework maintained by the somewhat divisive term of animism[6] Or, perhaps better, what Braidotti (2013) calls vital materialism. Likewise, Hunter (2023) parses this cosmology as panpsychism, which challenges the centrality of complex brains generating consciousness and invites us to look at matter differently such that it "possess[es] both a subjective dimension and a much greater degree of agency than it has often been given credit for" (p. 75).

As conceived today, animism envisions the world through relation, entanglement, and complexity. According to Taylor (2012), new animism maintains "the teeming

complexity of nature... [that] is pervaded by Spirit and/or mind or consciousness, multiple intelligences, incessant conversation, and relationships of many kinds" (p. 109). Given this position, it follows that if scientists cannot subject certain phenomena to the rigors of experimentation, including observation and control, such does not preclude their existence. In fact, it is more likely that entire worlds remain unseen and, therefore, are not amenable to more orthodox scientific investigation or psychiatric intervention. The move away from monolithic and colonial ontology opens up the possibility of the *pluriverse*, a term that Hunter (2023) puts forward, building on the work of the anthropologists Cadena and Blaser (2018). The pluriverse means that we live in a world of many worlds, overlapping and entangled with each other, and we are co-creating these relationally and ecologically with other non-human beings.

As a specific case in point, Krippner (1986) relates the three major syncretic traditions of Brazilian spiritism, the Candomble, Kardecismo, and Umbanda, as espousing three beliefs that they all hold in common: "(1) humans have a physical body and a spiritual body; (2) discarnate spirits are in constant contact with the physical world; (3) humans can learn how to incorporate spirit guides for the purposes of healing" (p. 177). The researcher outlines these beliefs in relation to how these traditions understood the etiology, diagnosis, and treatment of Multiple Personality Disorder (MPD), the older version of the more contemporary diagnosis of DID. Furthermore, practitioners who treat possession cases in these cultures recognize the *perispirit*, or spiritual body, as an essential part of reality - in fact, as a necessary component of their program of treatment and worldview of health and illness. According to Krippner (1986), more scientific and Eurocentric models would conceptualize the perispirit as the electromagnetic field that surrounds and intermixes with all living organisms. Within these traditions, in order to treat the afflicted, interventions need to be directed at the perispirit, and "spirit entities themselves must be contacted, something that medication, electroconvulsive therapy, and conventional psychotherapy do not attempt" (Krippner, 1986, p. 186). As such, the practitioner is engaging in *ontological osmosis* (Hunter, 2023), working along the ecological overlaps among and between these various worlds.

Echoing this as an essential figure to the new animism movement and other complementary philosophies such as posthumanism, Guattari reminds us that "[the] body does not contain individuated organs: it is itself traversed by souls, by spirits, which belong to the set of collective assemblages" (as cited in Lazzarato, 2014, p. 79). These collective assemblages are not strictly material in the scientific sense, such that they include many other and invisible realms of meaning and understanding, including the cultural, mediatic, historical, and personal. One of the central aims of Guattari (2011) is to understand how these different systems of reference, these other worlds, in some sense, overlap to produce or create experience.

Glowczewksi (2020), in their book *Indigenising Anthropology with Guattari and Deleuze,* refers to this conception as a shamanic ontology taking as a given that "we can be inhabited or traversed by exteriorities," which "arise from other types of materiality which assume that spirit is not just interior to a body but multiplied across visible and invisible spaces" (p. 343). Emphasis should be placed on the processual and becoming nature of how persons and others are comprised of assemblages. According to Hetrick (2014), the term *assemblage* denotes "the usual English rendering of the French *agencement*, which refers to the processes of arranging and organising [sic] heterogeneous elements" (p. 54, emphasis in original). The notion of *machinic animism* represents a break with post-Enlightenment thinking that separates and reduces the whole into its parts, e.g., subject and object, nature and culture, matter and soul, and so forth. Machinic animism seeks to understand the whole, comprised of various assemblages, not in an archaic way but by maintaining a forward-looking understanding of development and technology (Hetrick, 2014). These assemblages consist of heterogeneous elements "that relate by 'contagion' or 'unnatural participation', which come together [not] as an organic totality" (Hetrick, 2014, p. 56). Notably, the *mechanic* quality of assemblages means that they are first defined by their "functional or pragmatic capacity to affect or be affected by other assemblages rather than any 'truth' value" and that they "favour [sic] relations - and thus the capacities to affect and be affected that they enable - above individual elements" (Hetrick, 2014, pp. 56-57). This latter point speaks to the processual and becoming nature of assemblages in that relations are external to their elements, containing a logic that allows for their continuous emergence.

Relating this to Aboriginal Australians, Glowczewksi (2020) argues that the decolonizing gesture of seeing persons as assemblages permits an understanding that,

> Every birth of a human is related to the incarnation of a localized [sic] spirit of the Earth; throughout their entire lives, Aboriginal men and women actualize [sic] in themselves other spirits that are shared with different totems, or Dreamings, *Jukurrpa* as the Warlpiri and their desert neighbors [sic] say (p. 344, emphasis in original).

The colonial tragedy, in this instance, is the destruction of sacred sites, which help incubate virtual relations or ways of becoming for both humans and non-humans. The eradication of these relations and possible different assemblages emphasizes visible and material reality at the expense of virtual and animistic worlds that remain unseen. In other words, the challenge for us is to preserve these invisible worlds that admit non-human intelligences, which we typically may not see but make their presence known, thereby factoring into our conceptions of mental health, agency, and reality.

Tracing such transversal relations moves the frame away from the human, offering an alternative to *anthropocentrism* (Braidotti, 2013), the privileging of a human way of being, and opens towards processes of becoming that do not always require treatment, intervention, or medication. As a process of becoming, in the case of possession, mental health professionals and researchers would be less anthropocentric and colonizing in their approach to view possession as an assemblage, which includes non-human agents and comprises networked parts that are immanent in their relations with each other (Deleuze & Guattari, 1987). Importantly, possession as an assemblage leads us to take seriously invisible entities or spirits existing as virtual relations or intensities that necessarily factor into symptomology. In other words, a client or patient can receive psychiatric treatment for possession. However, the coloniality of psychiatry often fails to consider the phenomenon in its multifaceted components, including those invisible aspects, the spiritual, cultural, historical, and so on, that are just as real as the materiality of the body.

As Braidotti (2013) maintains, "the idea of the body as an incorporeal complex assemblage of virtualities... posits the ontological priority of difference and its self-transforming force" (p. 99). In other words, the body is interspersed and enmeshed with invisible but nonetheless materially actionable entities comprising various assemblages. Guattari (2011) used the distinction between *signifying semiotics* and *asignifying semiotics* to detail how various assemblages, both visible and invisible, are able to influence and create change in materiality. Signifying semiotics convey the most traditional notion of creating sense and meaning-making, which appear as gestural, ritualistic, corporeal, enunciative, musical, etc., ways of signing. They comprise the raw material for building machinic assemblages and other signifying systems (Genosko, 2002, 2014). Asignifying semiotics, by contrast, actually put signifying semiologies into play and escape the hierarchical and correspondence overcoding of more normative systems therein allowing for spaces of freedom and creativity beyond that of typical sense (Guattari, 2013); alternatively, also permitting what Lazzarato (2014) refers to as *machinic enslavement*, which "captures and activates the pre-subjective and trans-subjective elements" (Hetrick, 2014, p. 62) of sense-making in order to control. Put simply, machinic enslavement is the capturing and conscription of subjectivity towards ends that are not of its own desire.

The nature of asignifying semiotics is that they bypass linguistic sense and "are capable of entering into direct contact with their referents in the framework of diagrammatic interaction" (Guattari & Rolnik, 2007, p. 463). Asignifying semiologies are not always invisible since examples of them include musical notations, mathematics, computer syntax, and so on. Nevertheless, they often operate clandestinely as unarticulated machinic flows that "plug into the body directly through pre-conscious affects, perceptions, desires, and emotions" (Hetrick, 2014, p. 64). Hence, these non-corporeal elements are able to exert profound changes and alterations in the more normative and smooth functioning of signifying semiologies.

We argue that possession cases represent just such an asignifying rupture with normative ways of making sense, thereby marshaling machinic animism that emphasizes pragmatic treatment with subjectivity being part of a relational assemblage (Hetrick, 2014). This view stands in stark contrast to the typical psychiatric one, which medicalizes and classifies (American Psychiatric Association, 2022) subjectivity along specific diagnostic parameters perpetuating the discourse of psychiatry (Stephenson, 2015) or its signifying semiology (Guattari, 2011). *Our position is to advocate for the decolonization of the foreign territories invaded by psychiatry with specific regard to the very real, albeit invisible worlds, that possession experiences feature*. We do not deny the scientific and biomedical acumen of psychiatry, the DSM, or classifying and treating DID from these perspectives (see Kluft, 2006; Moline, 2013) since the discipline fits historically and contextually within its own specific tradition - namely, one that is decidedly American and Eurocentric. However, colonizing more Indigenous and animistic frames for understanding possession enacts epistemological, anthropological, and other forms of violence that unnecessarily occlude the experience while simultaneously exercising psychiatric power.

DISCUSSION

In this article, we have advanced the thesis that post-colonial theory and the interventive process of decolonization provide more inclusive and expansive ways of understanding the experience of possession. The use of Dissociative Identity Disorder (DID) was used to demon-

strate the lingering remnants of possession found in the DSM-5-TR, suggesting an internal tension to account for the cultural elements of possession while also attempting to provide an exhaustive nosology. This tension results, in part, from the failure of psychiatry to adequately understand the nature of spirituality and incorporate a more profound understanding into its field. As a result, clinicians and researchers should honor the spiritual, phenomenological, and anthropological correlates of possession cases, those that seem to defy psychiatric incorporation, by seeing them, we have suggested, as exceptional experiences. These kinds of exceptional experiences are better articulated through a more immersive cosmological framework than the one offered by biomedicine or psychiatry; namely, through a form of animism, referred to here as mechanic animism, that conceptually accounts for the interpenetration of multiple worlds, invisible and material, factoring into the possession experience.

Below, we enumerate the central points and limitations of this essay while discussing the implications of this approach. We also outline avenues of future research that would bring into dialogue post-colonial theory, exceptional experiences, and cases of possession:

1. The material violence that settler colonialism has and continues to enact on Indigenous peoples and land cannot be overstated. In forceful language, Smith and colleagues (2019) write that "to say that decolonization is not a metaphor is to resist using decolonization as a trendy term" (p. 13). Indeed, to take seriously the process of decolonization means crucially allowing indigenous social thought to lead the way where scholars will focus "on the possibilities afforded by attending to Indigenous writings, worldviews, teachings, approaches to relationship, ethics, history, and futurities" (Smith et al., 2019, p. 13). Such an approach stands in sharp contradistinction to the "settler academy" (Smith et al., 2019, p. 13), which continues the work of colonialism by failing to acknowledge the import of indigenous scholarship. In various ways, we have attempted to develop a reading of possession that is faithful to the extant scholarship while also bringing forward instances of criticism toward the predominant psychiatric model. One way we have done this is through the argument that psychiatry lacks a richer understanding of spirituality, one that would admit invisible, non-human entities into its worldview.

2. As a case in point, we have intentionally used the term *animism* to denote this alternative framework and, more importantly, to align our approach with more indigenous belief systems. In this way, our aim has been, in part, to reclaim animism as a viable cosmological frame and to push back against the pejorative and colonialist connotations that the term has typically entailed in the history of anthropology, for example (Taylor, 2012).

3. The importance of land for post-colonial theory and indigenous studies is both central and crucial (Smith et al., 2019). Indeed, scholarship aimed at decolonization must have a firm grounding in the influence of environment and ecology on thinking and belief systems. We have not done enough in the current essay to address this and suggest that future research could pay more analytic attention to local geographies and how situated spirits and beliefs appear therein, detailing the salience this would have for understanding possession. In other words, to pose this as a series of questions: What is the connection between local lands and the invisible non-human entities that reside there? How is it that local ecologies anchor certain types of possession experiences? What is the relationship between caring strategies, interventions, or rituals used to engage with possession in a localized ecology? How is their efficaciousness related to the land?

4. We also acknowledge that we have left many implications for this animistic worldview underdeveloped in the current essay and invite future researchers to expand on these. The distinction between healthy and unhealthy exceptional experiences alludes to one such avenue (Simmonds-Moore, 2012). For instance, the term machinic enslavement (Lazzarato, 2014) refers to the way that subjectivity can become captured and put into the service of nefarious ends. We wonder, with possession cases, the extent to which this happens. In other words, what pre-subjective factors no longer remain under the agency of the person in charge? Moreover, how does the machinic enslavement of possession mirror or not the kind of subjection instituted by more prominent ideologies and institutions such as capitalism or psychiatry? We suggest that such an analysis would shed light on cases of possession and how agency, embodiment, control, and freedom operate today.

Continued dialogue between post-colonial theory and the study of exceptional experiences shows great promise. Both fields have a vested interest in taking back space or territory, wherein they are typically viewed with suspicion or as outsiders. Indeed, the prospect of interdisciplinary engagement should excite scholars and researchers in each of these fields since a collaborative approach contains the promise of developing a more rigorous and multilayered understanding of both indigenous practices

and exceptional experiences. The challenge posed to us by possession cases is to ensure that we do not reproduce a similar form of coloniality like psychiatry by appropriating these experiences within our own limited models.

ENDNOTES

I. Importantly, the etiology and validity of DID are not agreed upon, and scientific studies show conflicting findings regarding the origin of this psychopathology. For instance, Boysen and VanBergen (2013) reviewed the literature on DID simulation (studies that examined the differences between people who simulated the disorder and those who actually had the psychopathology) and found that interidentity transfer of information occurred at similar rates in both groups suggesting malingering or imitation to be a factor. In addition, Spanos (1994) reviewed the experimental, cross-cultural, historical, and clinical literature on DID and found that, from a sociocognitive lens, the multiplicity found therein to be socially constructed, changing to meet fluid sociohistorical and relational expectations.

II We note the definitional challenge and trouble created by terms such as spirituality, religion, and mental health - in particular, the distinction between spirituality and religiosity can be especially difficult to parse. Indeed, the possibility of operationalizing a concept such as spirituality depends on the context of the research study, methodology, and other related factors (e.g., Zwingmann et al., 2011). In Noll's (1993) classic article on possession and psychiatry, the author notes similar challenges when trying to operationalize exorcism and ritual, speaking to, perhaps, the reductionism intrinsic to operationalization in general. As a result, we follow the lead of Koenig and colleagues (2012) in using a definition of spirituality that is inclusive and encompasses both the secular and religious senses of the term. The researchers provide the following definition: "spirituality is distinguished from all other things - humanism, values, morals, and mental health - by its connection to that which is sacred, the *transcendent*... spirituality includes both a search for the transcendent and the discovery of the transcendent" (Koenig et al., 2012, p. 46, emphasis in original). Emphasizing the transcendent core of spirituality highlights its salience and power necessarily beyond the control and purview of the human and, in this way, is helpful for a critical approach like decolonization.

III Biopolitics is a field of study that has a major taproot in the work of the French philosopher and historian Michel Foucault (1978, 1994, 1995). As a field, biopolitics analyzes the way that sanctioned discourses and institutions create specific behaviors and forms of subjectivity - how, in other words, peoples and communities become disciplined and learn to self-police, often in acquiescence to forms that are not in their best interest. For instance, in analyzing the history of madness and mental illness through the lens of Foucauldian biopolitics, Leoni (2013) writes that "at the end of the eighteenth century, Foucault concludes, no liberation of the mentally ill took place, but, rather, what emerged was an objectification of the concept of their freedom" (p. 87). This historical lesson, no doubt, holds true for modern psychiatric power in that "the goal of the psychiatrist is the control of a force, not the identification of a mistake" (Leoni, 2013, pp. 90-91). Psychiatric power is exercised in order to regulate a force "not so much that of healing and restoring mental health, but rather that of managing an uncertain condition which fluctuates between pathology and non-pathology" (Leoni, 2013, p. 91). Indeed, this kind of relegation, control, or subjection, when applied to possession cases, imports the phenomenon into the disciplinary matrix of psychiatry, whose aim is to control subjectivity along biomedical and therapeutic lines as opposed to, for example, facilitating spiritual or anthropological methods devised for healing and intervention.

IV We are mindful that the contrast between shamanism and psychiatry is cursory here for the purposes of erecting a more indigenous foil that would capture key differences conceptualizing altered states of consciousness, mental health, and spirituality. Nonetheless, we suggest that shamanism, as presented in its various anthropological manifestations, represents a decolonizing practice against psychiatric power (see Allen, 2002; Lee & Kirmayer, 2023).

V The suggestion of what counts as an exceptional experience or the paranormal is always in relation to more global, sanctioned, and institutionalized discourses speaks to the political nature of these phenomena. In other words, normative and hegemonic forces must exert pressure in order to render the anomalous as such in the first place. Such an analysis is perhaps best promoted by critical approaches to exceptional experience or critical parapsychology (see Glazier, 2023).

VI The term was originally used to distinguish between the belief systems of people seen as inferior versus those superior understandings of the world typically held by European powers (Taylor, 2012). As a consequence, we use the term animism with reservation in the sense that this form of coloniality still can rear its head even today, usually through an unreserved form of "scientific rationalism" (Taylor, 2012, p. 109). Nonetheless, we also use animism intentionally as a way to fight back against these pejorative connotations and reclaim this worldview (for more on reclaiming and reappropriation in relation to parapsychology, see Glazier, 2022). There exist complementary philosophical positions to what we are denoting by animism, albeit with important differences. These include panpsychism (Brüntrup, 2017), vital materialism (Braidotti, 2013), and even new materialism (Toohey et al., 2020).

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ESSAY

Our Daily Bread: The Origin of Modern Bread Wheat

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HIGHLIGHTS

The emergence of modern bread wheat as a 'fusion hybrid' may not have been a natural occurrence, but rather the result of sophisticated human intervention, as evidenced by an ancient Egyptian document that challenges the notion of primitive hunter-gatherer populations.

ABSTRACT

Modern bread wheat, *Triticum aestivum*, is a hybrid hexaploid that emerged in the Middle East region about 9000 years ago, usually considered to be the result of natural hybridization and multiple allopolyploid speciation. Contrariwise, the abrupt, late appearance of a singular cultivar with traits favoring human utilization suggests the possibility of a directed process, and this paper identifies an ancient Coptic [Egyptian] record specifically detailing the origin of the cultivated [polyploid] wheat plant by human intervention possibly facilitated by radiation.

KEYWORDS

Bread-wheat, Durum, Emmer, hexaploidy, polyploidy, Triticum.

INTRODUCTION

Several economically important crops exhibit multiple sets of chromosomes, known as polyploidy, which confers the advantages of genetic stability and enhanced productivity. Tetraploid crops (2 x 2n) include Durum wheat, cotton, peanut, and Brussels sprouts, while less common hexaploids (3 x 2n) include bread wheat and Kiwifruit. Bread wheat is unusual as a hexaploid *per se*, and for occurring suddenly without a clear development history.

The principles involved in polyploidy have been reviewed by Dar et al. (2017). A primary mechanism is non-reduction of the chromosome number in meiosis, resulting in a 'fusion-hybrid' of diploid (2n) parent gametes - which may occur by chance or may be induced by chemical agents or facilitated by radiation. Polyploids are usually self-fertile and are reproductively isolated, unable to hybridize viably with their parents. Polyploid traits may be advantageous or disadvantageous, and it remains unclear how a small number of reproductively isolated plants attained improved fitness and achieved natural evolutionary success – sometimes rapidly.

Modern bread wheat, *Triticum aestivum*, is hexaploid with three diploid genomes (3 x 2n) designated A, B, and D. It is believed to be derived from *T. monococcum* (A) and an unknown [extinct?] source 'B', which combined to form tetraploid emmer (AABB), which much later hybridized with *Aegilops tauschii* (D) to form the hexaploid (AABBDD). The phylogenetic relationships and development of modern wheat have been reviewed by Matsuoka, (2011), who attempted to show an evolutionary continu-

um initiated from tetraploid Emmer wheat, followed by natural introgression via hybridization to alloploid speciation of the hexaploidy (sic).

The origin of wheat cultivars has been traced to the 'Fertile Crescent' of the Middle East, where ancestral diploid wheat (AA) emerged about 1 million years ago; tetraploid Emmer wheat (AABB) emerged about 0.5 million years ago and was domesticated from ca. 10,000 years ago; and hexaploid bread wheat is recorded [abruptly] from ca 8-9000 years ago.

Present-day durum wheat (*T. turgidum subsp. durum*) may also be derived from domesticated emmer. In the accepted orthodox scenario, tetraploid Emmer wheat (AABB) spread across the region by human cultivation, from ca 9,000 BP, where it hybridized with wild populations of diploid *Aegilops tauschii* (DD), forming the hexaploid *T. aestivum* (AABBDD) - '*probably* by multiple allopolyploid speciation' (Matsuoka, 2011), for which the earliest known record is 8600-7800 BP in SE Turkey.

Notwithstanding wide acceptance of the orthodox scenario, several important questions remain unanswered - foremost of which is the lack of evidence of natural hybridization of tetraploid emmer with diploid *Aegilops*. Field studies have shown that cultivated emmer (*T. turgidum*) and wild *Aegilops* grew together in areas of Iran where natural hybridization 'could' have occurred. Shewry, 2009, asserted that hybridization 'probably occurred' and novel useful forms were selected by farmers from wild populations. However, no wild (intermediate) form of *T. aestivum* is actually known, and no natural hybrid of *T. turgidum* and *Ae. tauschii* has ever been reported (Matsuoka, 2011). Evidence of the fundamental hybridization platform for the proposed speciation mechanism is missing, but despite this critical anomaly, Matsuoka concluded that hybrid swarms 'can occur' and [natural] introgression between *T. turgidum* and *Ae. tauschii* 'probably' occurred more frequently than previously thought. Several anomalies or inconsistencies remain unresolved, notably:

Emmer and *Aegilops* co-existed for several hundred thousand years, then suddenly hybridized only ca. 10,000 years BP. Emmer is a self-fertile tetraploid that does not naturally hybridize with its parents or related species. There is no evidence of a wild population pool of natural hybrids.Bread wheat *T. aestivum* appeared as a sudden singular event with a range of characteristics favorable for human consumption – but unfavorable for survival in the wild.

THE EVOLUTIONARY TIME SEQUENCE

Ancestral diploid wheat (*T. monococcum*) emerged about 1 million years ago, and tetraploid emmer (*T. turgidum) a*bout 0.5 million years ago - over which period It co-existed with *Ae. tauschii*, which had a wide natural range. Then, from ca. 10,000 BP, archaeological records suggest that Emmer was domesticated and rapidly spread by human intervention, with the earliest known records from Syria in 9800-9300 BP and from Fayum in Egypt ca. 7000 BP (Bard, 1999). Domesticated hexaploid *T. aestivum* followed closely in 8600-7800 BP in SE Turkey. Despite the accepted orthodox scenario of gradual natural hybridization and speciation, the data actually suggests Emmer and *Aegilops* co-existed for several hundred thousand years *without* any natural hybridization - then abruptly, almost simultaneously on an evolutionary timescale, Emmer was domesticated and hybrid hexaploid *T. aestivum* emerged as a spontaneous singular event. The time sequence alone is 'unnaturally' abrupt, suggesting possible human intervention.

THE EVOLUTIONARY FITNESS OF HYBRID TRAITS

If hybridization (fusion) of Emmer and *Aegilops* occurred naturally and gradually, the process could be expected to generate a range of traits – advantageous or disadvantageous to evolutionary success. There could be competing and contradictory indications between natural evolutionary advantages versus 'improvements' for human utilization. For example, indeterminate maturity and seed-shedding would favor natural seed survival and dispersal, whereas determinate maturity and seed retention facilitate human harvest. Likewise, hard seeds with strong husks might favor natural seed survival and dispersal, but the opposite is the case for ease of human utilization. Shewry, 2009, noted experiments at Rothamsted, UK, in which domestic wheat barely survived beyond three years in a 'wild' uncultivated field.

The abrupt singular emergence of hexaploid *T. aestivum* with traits dominantly suitable for human utilisation, strongly suggests a process involving [sophisticated] human intervention – in both the initiation and selection phases.

RECORD OF POSSIBLE HUMAN INTERVENTION

Against this background, a written 'legendary' record of possible human intervention in the development of bread wheat has emerged. Not just in passive selection but directly in the initiation phase and in cultivation. The record is in a collection of manuscripts held by the British Museum, obtained from Coptic [Christian] monasteries in Egypt and thought to date broadly from the 10th to 11th century CE. A particular manuscript (Brit Mus Oriental

MS No 7026; Budge, 1913) contains an account attributed to St John Chrysostom (309-427 CE), Archbishop of Constantinople - in which Christ supposedly instructed an angel to reveal certain mysteries. The story – in translation – is heavily overlaid with the imagery of early evangelical Christianity, but nonetheless provides a plain account of the origin of 'the wheat plant'. It is a curiously innocent account – you couldn't make it up! The manuscript relates in part –

> ...'Lord, I wish that thou wouldst inform me concerning the matter of the wheat plant,
> and tell me where, before the earth had been cultivated, it was found that man might
> live upon it.'
> After Adam was banished from the Garden, he was hungered and could not find food
> and cried out in grief to the Lord, who pleaded on his behalf to God the Father ... who
> responded, 'I will give unto thee some of my own flesh which is invisible. And the Father
> took a portion of his own body, and he made it into a grain of wheat, and he brought
> forth the seal of light, and he sealed the grain of wheat in the middle thereof.'
> Then [archangel] Michael went to Adam and '... gave unto him the grain that had been
> sealed with light, and he taught him how to sow and reap it'.

Wallis Budge (1857-1934) was a one-time Director of Egyptian and Assyrian Antiquities at the British Museum and a renowned scholar of Egyptian and Near Eastern literature. The anecdote, in translation, is heavily embroidered with Christian evangelism, but it conveys a sense of innocent authenticity. It is an oddly specific subject and contains curiously obscure technical details. A grain of [wild] wheat was sealed up with a portion of 'invisible light'. The manuscript was written in 'native dialect' by Coptic priests in Egypt but apparently originated from Constantinople in modern Turkey. It is dated before any modern knowledge of crop development, and even Budge's translation is prior to modern appreciation of genetics and certainly before any understanding of polyploidy or radiation. It would be difficult to accuse Budge of anything other than a naïve literal translation – at that time, he could not have had any appreciation of the significance of the detail. According to this account, the wheat plant was made suitable for human cultivation by 'sealing it up with a portion of invisible light', and men were actively taught how to sow and reap it.

DISCUSSION

Re-consideration of the apparently sudden emergence of tetraploid Emmer and hexaploid bread wheat from ca. 10,000 BP onward in the Middle East region – (a) highlights several difficulties with the natural evolution scenario, and (b) supports the possibility of human mediation, indicated here by an explicit 'legendary' record using 'invisible light'.

In the accepted view, the sudden domestication of Emmer and the emergence of hexaploid *T. aestivum* occurred spontaneously, naturally, then was fostered by naïve farmer selection and husbandry of wild populations - notwithstanding that there is no evidence at all of the intermediate hybrids or of landrace populations of *T. aestivum* and experiments show that it does not survive in the wild. A further difficulty with this view is the probable mismatched timing sequence of human development and crop development. Husbandry of Emmer wheat and putative selection of bread wheat must have required a reasonable degree of sophistication - but several studies have reported that the regional indigenous population of that era remained in a sparse primitive hunter-gatherer state until around 8000 BCE. Spencer (1993) reported that there was no evidence of human activity in the Nile Valley in the period 11-8,000 BCE; while Hole, (1987), recorded no dated archaeological evidence [of settlement] across Mesopotamia from 10-8,000 BCE, and Frankfort, (1968), wrote that the population of lower Mesopotamia remained in a pre-historic state until the middle of the 4th millennium BCE, with no sign of the impending transition to civilization. On the other hand, sudden technological advance is broadly coincident with the abrupt immigration of the Sumerians into the region, centered on Ur near Basra in modern Iraq. The Sumerians, whose origin is also enigmatic, were culturally and ethnically distinct from the indigenous populations, and are firmly recorded to have introduced a wide range of cultural and technological innovations, including in agriculture. Coincidentally, emmer wheat (and barley) appeared abruptly in the Fayum in Egypt from ca 5000 BCE (Bard, 1999).

On the other hand, while domestication of Emmer could be attributed to normal progressive crop husbandry, the sudden emergence of technologically advanced hexaploid wheat implies a different degree of intervention – or extreme serendipity. The suggested possibility of radiation-induced mutation (by 'invisible light') has three potential explanations: One, It is fictitious and fallacious. Two, it could be attributed to serendipitous occurrence – where wheat happened to be stored in or exposed to something that was naturally radioactive, such as certain granite stone. In that scenario a radiation-induced muta-

tion could happen by chance – requiring only to be recognised and fostered. Or Three, it could be attributed to the deliberate, active use of some radiation source – implying an incongruous level of technological knowledge.

The available English translation of the Coptic account attributes human intervention specifically to [actively] 'sealing up' grain together with 'invisible light' - where Budge's naïve rendition of 'invisible light' could be interpreted in modern terms as a form of radiation. The concept of 'unseen radiation' was essentially unknown in Budge's era, where X-rays were just discovered by Roentgen in 1895, and the natural radiation of radium was not identified by Curie until 1898. However, the occurrence of 'invisible emanations' *was* widely documented elsewhere in ancient Egyptian literature. Standard published translations of classic Egyptian texts commonly describe emanations from the 'sun god' as an invisible 'efflux'. Birch described the effect as ... *water of fire [like] a foul flux emanating from Osiris* (Birch, 1867), while more modern translations rendered it as ... *[the] efflux which issued from putrefaction [decay] of Osiris.* (Faulkner, 1969). Several instances of unusually high and localized radiation have been confirmed in ancient Egyptian mastaba tombs (Bigu et al, 2000; Salama et al, 2018); and other accounts have suggested active knowledge of radiation implicit in Ancient Egyptian literary references to the invisible 'efflux' of 'light food' in portions of 2-3-5, and to the storage of noxious 'excrements' (wastes) in underground storage vaults – called the *per d'jet*, house of millions of years. (Fellowes, 2024).

Altogether, the pattern of events supports the possibility that hexaploid bread wheat, *T. aestivum*, was developed via human intervention – both initiated by a form of radiation and followed by agronomic tuition on how to sow and reap. The possible involvement of radiation could be fallacious, serendipitous, or conscious. Deliberate use is supported, to a degree, by the innocence of the legendary account, and is consistent with other evidence of radiation in ancient Egypt.

IMPLICATIONS AND APPLICATIONS

There are logical and evidentiary difficulties with mainstream accounts of sudden evolution of hexaploid bread wheat. Evidence here indicates conscious human intervention in both initiation and cultivation, possibly utilising radiation – which is at variance with accepted views.

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Journal of Scientific Exploration
Anomalistics and Frontier Science

BOOK AND MULTIMEDIA REVIEW

Meaningful Coincidences: How and Why Synchronicity and Serendipity Happens

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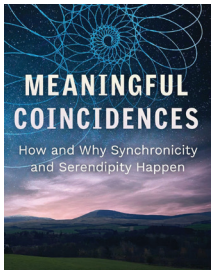

Beitman, B. (2022). *Meaningful Coincidences: How and Why Synchronicity and Serendipity Happen.* Park Street Press.

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I first became acquainted with Bernard Beitman's books on coincidence when I discovered *Connecting with Coincidences* (Beitman, 2016) a few years back. That was when I started my own serious research on synchronicity with the aim in mind of uniting psi and synchronicity (Storm, 2025). As an aside, long before that (in my late teens, perhaps?), I had decided that psi should be treated as synchronicity (as an acausal connecting principle which yields a meaningful outcome), and I based that notion on Jung's (1951/1969) own words: "the innumerable cases of meaningful coincidence that have been observed not only by me but by many others, and recorded in large collections ... include everything that goes by the name clairvoyance, telepathy, etc." (para. 983). More on the psi/synchronicity dichotomy shortly.

According to Jung, two or more events constitute synchronicity when a *meaningful* connection—a meaningful association—can be made between the events, which can be separated by great distances and/or time intervals, thus suggesting telepathy, clairvoyance, precognition, and even psychokinesis. Some kind of similarity criterion is required to make the association. Naturally, since the connection is acausal (neither event causes the other), the occurrence is often seen as paranormal.

In *Meaningful Coincidences*, Beitman sees meaningful coincidence as a multi-factorial phenomenon. While I personally use the term 'meaningful coincidence' to mean psi and synchronicity specifically, Beitman gives meaningful coincidence a wider context, seeing it as including 'serendipity' (i.e., an accidental but fortuitous event), 'seriality' (i.e., an objective series of related events), and his very own 'simulpathity' (i.e., a shared emotional experience; pp. 13-21). Situational contingencies seem to change the parameters of our experience and force these terms upon us, but in some sense, they are all the same thing (or at least *only similar*). For Beitman, there is only one main end-point—the experiences are there for us to learn from and to bring about change. Beitman lists a number of other benefits that can emerge from meaningful coincidence, including aids to decision-making, decision reformation, and need-serving.

Ultimately, however, 'change' in ourselves seems to mark the truest benefit of meaningful coincidence (particularly as synchronicity)—to achieve a transformation of personality in some way, which Jung saw as the embodiment of the individuation process, "having for its goal the development of the individual personality" (Jung, 1921/1971, para. 757). Of course, to assert objectively that healing, or transformation, or individuation, etc., do actually transpire, or are underway, after a given synchronistic experience requires adequate knowledge of the circumstances (especially if the experience is not our own), which is not always available. It does appear, though, that experients are capable of making judgements about their own experiences, and they can and do discern meaningfulness (see Beitman & Shaw, 2009; Coleman & Beitman, 2009).

Thereby, coincidence can be used *scientifically* in one's life (i.e., by method), the aim being to harness it to build better relationships, improve one's health, and even attract money. The way to do that is a little more complicated than the simplistic and unrealistic procedures advanced in Byrne's (2006) *The Secret*.

Beitman's *Meaningful Coincidences* is really a follow-up to *Connecting with Coincidences*—it certainly picks up where the latter leaves off. While I find commonalities in both books, *Meaningful Coincidences* does go a step further: Given that Beitman has had five or six years to gather more material and think more about meaningful coincidences, I can say that it is more of an examination of the psychological and philosophical implications of synchronicity, serendipity, and so on. Beitman explores the deeper truths about our lives from a coincidental perspective, inevitably seeing the various coincidence forms as indicators of a broader connection of ourselves with the world.

But I must come back to the relationship between psi and synchronicity, and for good reason. Years earlier, so did Beitman. In a co-authored paper he recognised the psi/synchronicity overlap: For example, "knowing who is calling before picking up the phone can be considered a telepathic experience ... [but] context ... can make it synchronistic" (Beitman et al., 2010, p. 457). Therefore, the authors differentiate synchronicity from psi on the basis of information validation. They suggest this can be done by considering the *verifiability* and *meaningfulness* of a given anomalous event: While the psi event is easy enough to verify, synchronicity "gains its relevance by rendering an ambiguous experience personally *meaningful*" (p. 457). Context is critical. So, although parapsychologists seem to overlook the meaning in a psi event, Beitman sees that one is inevitably drawn to conclude that meaning makes psi a synchronistic phenomenon. Specifically, Beitman ties coincidences to, and sees parallels with, Rex Stanford's Psi-Mediated Instrumental Response model, as one mechanism by which synchronicity might work. He describes meaningful coincidence as working like "human GPS [Global Positioning System]" (p. 80). But we must concede (or be reminded, or be informed) that while such a form of GPS may be seen as psi, it is only a descriptive term, not an understood mechanism, yet that has not stopped psi from becoming reified. For similar comments, see Ballard (1986), who called out the difference between a "nominal definition" (i.e., "an assignment of meaning") and a "real definition" (that which is, or can be, "affirmed to exist"; p. 146).

Nevertheless, Beitman appeals to human GPS as a possible mechanism in the intriguing case of a troubled young person who wanted to escape "all the suffering in the world" (p. 81). The youth took 'his' father's loaded gun intending to kill 'himself' (Beitman doesn't specify the person's sex), and drove to a secluded spot by a lake to do it. While tearfully contemplating his situation, a car pulled up. It was his brother who took the gun away from his distraught sibling. The youth recalled:

> I was breathless; I was totally shocked. All I could do was ask him how on earth he knew I was feeling this way; how did he know I had this gun, and, most importantly, how did he find me? He said he had no answers. He didn't have any idea why he got into his car; he didn't know where he was driving, nor how he got there, or what he was supposed to do when he arrived (p. 81).

Beitman describes this psi incident as a case of *simulpathity* and acknowledges that the psi factor may have been at work. But in parapsychology, psi is considered a causal phenomenon (an ability), and meaningful coincidence is not (or at least it isn't when it is synchronicity), so we have to decide whether or not simulpathity is a 'causal' exception, and if it is, whether it may still be a meaningful coincidence. The other problem (just raised) is that parapsychologists are far from explaining psi as a mechanism, even though they have made some advances in characterizing the phenomenon and made a range of formal (albeit general) statements about what *seems* to transpire when 'psi happens'.

In reconsidering the above case, it might be just as reasonable to propose that an archetypal factor underpinned the two siblings' experience. I tend to think that the archetype *per se* is just a simple way of identifying a complex psychophysical and neurophysiological system of functions that align and work together for an outcome, just as we understand of the instincts. The Playfair and Sheldrake examples that Beitman presents (pp. 30-31) are cases in point as far as this reviewer is concerned. Going further, I would argue that we have a considerable body of literature that points to a new approach to understanding these nonlocal inter-personal encounters, and I find it well-embodied in the concept of *inter-brain neural synchronization* (IBNS; Valencia & Froese, 2020). To go further, as indeed Valencia and Froese do, we may yet find that the concomitant idea of "extended consciousness" (p. 1) is a key component of IBNS, which seems supported by the mainstream neuro-scientific research reviewed by the two authors. If we are after a psi or synchronistic mechanism for these anomalous forms of 'communication', IBNS may help us, but it is still anybody's guess what underpins *synchronization* and *extended consciousness* in IBNS, whether they may be unified under a single

construct, and whether it even detracts from a scientific point of view to think of these processes as acausal.

In the meantime, parapsychologists tend to take statistical approaches to confirm that psi phenomena do not occur by mere chance. If they do occur by chance, we needn't take them as real effects, but that's because *meaningfulness* never enters into it. However, any event, no matter how casual and innocuous, may be synchronicity if it is *meaningful*. Yet that wouldn't make it psi by parapsychological rules—it has to pass the statistical test, literally. Beitman spends a whole chapter on statistics, pointing out (for example) the lack of relevance to synchronicity of the Law of Very [Truly] Large Numbers and other 'laws', concluding

> We need to go beyond these "laws" and randomness to explain coincidences and how they shape our reality. Probability is a characteristic of all synchronicities but not the only possible explanation (p. 86).

Earlier, Beitman (2017) had already come to the crux of the matter:

> Every coincidence has at least theoretically a probability.... So, that's a quality of a coincidence to have a probability [but] it's not necessarily an explanation ...

In conversation with Beitman, Browne makes a further clarification:

> if something has a low probability of happening, it can still be chance and not synchronicity, and a 'synchronicity' can have a much higher chance of happening and can be synchronistic, and its synchronistic quality is far more significant than its chance factor (Browne, as cited in Beitman, 2017).

I see a place for both, statistics and meaningfulness, in synchronicity, and I suggest we treat both in their own way as serving different purposes. Wisdom comes in knowing how to gainfully employ which and in what situation. Having said that, I also see no reason why synchronicity cannot be tested in a large-scale statistical framework just as psi is.

Beitman has referred to himself as a "coincidence expert" (https://www.coincider.com/). That's a privilege well-earned because he writes largely from many decades of personal experience, giving anecdotal accounts from his own life as well as the lives of others. Readers will appreciate the opening chapters that define and explain coincidences, and in later chapters, Beitman gainfully interprets and points out the significance of coincidences—he offers readers the means by which they, too, can draw out the meanings of these experiences. But I am more drawn to the 'whys and wherefores' of synchronicity—I have made it a life's passion. The more compelling material in *Meaningful Coincidences* opens the door to more questions, the answers to which one hopes will not only broaden our understanding of meaningful coincidences, but I suggest will also put a perspective on psi that makes fewer demands on our credulity. Just for that reason alone, Beitman's *Meaningful Coincidences* is a worthwhile read.

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BOOK AND MULTIMEDIA REVIEW

Against the Odds: Major Donald E. Keyhoe and His Battle to End UFO Secrecy

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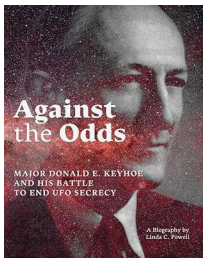

Powell, L. C. (2023). *Against the odds: Major Donald E. Keyhoe and his battle to end UFO secrecy*. Anomalist Books.

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The history of encounters with strange craft appearing in our skies can be organized according to the names we have given these apparitions over the years. In 1947, when a private pilot spied a string of silvery "saucers" flying past him, a reporter dubbed them "flying saucers." It didn't take long for that term to be officially tossed aside by the Army Air Forces in 1947 and replaced by the more technical and more respectable term "Unidentified Flying Objects." This term stuck around until recent decades, when semi-professional UFO chasers took it upon themselves to come up with a new, more inclusive name for Unidentified Aerial Phenomenon, or UAPs.

In *Against the Odds*, Linda Powell tells the story of little-known UFO researcher Donald E. Keyhoe, a man whose influence extended to every one of these phases of the UFO saga. From the moment pilot Kenneth Arnold sighted a chain of flying saucers wending their way around the Cascade Mountains of the Pacific Northwest, Keyhoe's journey of discovery was inevitable. In Powell's telling, Keyhoe's embryonic interest in the flying saucer phenomenon was triggered in no small part by the Arnold sighting and the resulting media frenzy.

Keyhoe was no stranger to publicity. In 1927, as a young Marine Corps naval pilot with an injury that ended his active duty, Keyhoe was chosen to accompany aviation superstar Charles Lindberg on a cross-country barnstorming tour meant to introduce America to the possibilities of commercial aviation. Keyhoe served as Lindbergh's advance man, flying ahead to the next stop on the itinerary and making preparations with local officials to prepare for the hero's arrival. As this story was new to me, I dove into Powell's impeccably detailed research and found my interest in Keyhoe's fascinating career growing with every page.

To me, one of the distinguishing features of Powell's reporting is that she pays almost as much attention to minor, peripheral characters as she does to the principals. In so doing, she creates a vivid narrative that makes the read an ongoing pleasure.

A few words about Powell's research. She has gathered together an amazing mountain of information on Keyhoe's career, and she knows how to use that research to tell a gripping, engaging story. I can speak from experience of the difficulties and challenges of writing about events—in this case, UFO events—that have been written about and picked apart over and over again for decades. It's not easy coming up with a new slant on an old tale, but Powell manages to dramatize the most famous, most intriguing UFO cases Kehoe studied with a freshness and immediacy that few other UFO journalists have been able to capture.

When I began writing about the UFO phenomenon several years ago, I quickly realized that I could split UFO books into two major groups. First were the books written by UFO researchers and devotees; their books were vastly spectacular and entertain-

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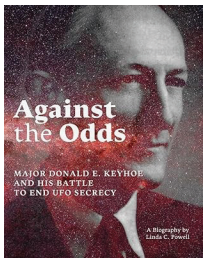

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In *Against the Odds*, Linda Powell tells the story of little-known UFO researcher Donald E. Keyhoe, a man whose influence extended to every one of these phases of the UFO saga. From the moment pilot Kenneth Arnold sighted a chain of flying saucers wending their way around the Cascade Mountains of the Pacific Northwest, Keyhoe's journey of discovery was inevitable. In Powell's telling, Keyhoe's embryonic interest in the flying saucer phenomenon was triggered in no small part by the Arnold sighting and the resulting media frenzy.

Keyhoe was no stranger to publicity. In 1927, as a young Marine Corps naval pilot with an injury that ended his active duty, Keyhoe was chosen to accompany aviation superstar Charles Lindberg on a cross-country barnstorming tour meant to introduce America to the possibilities of commercial aviation. Keyhoe served as Lindbergh's advance man, flying ahead to the next stop on the itinerary and making preparations with local officials to prepare for the hero's arrival. As this story was new to me, I dove into Powell's impeccably detailed research and found my interest in Keyhoe's fascinating career growing with every page.

To me, one of the distinguishing features of Powell's reporting is that she pays almost as much attention to minor, peripheral characters as she does to the principals. In so doing, she creates a vivid narrative that makes the read an ongoing pleasure.

A few words about Powell's research. She has gathered together an amazing mountain of information on Keyhoe's career, and she knows how to use that research to tell a gripping, engaging story. I can speak from experience of the difficulties and challenges of writing about events—in this case, UFO events—that have been written about and picked apart over and over again for decades. It's not easy coming up with a new slant on an old tale, but Powell manages to dramatize the most famous, most intriguing UFO cases Keyhoe studied with a freshness and immediacy that few other UFO journalists have been able to capture.

When I began writing about the UFO phenomenon several years ago, I quickly realized that I could split UFO books into two major groups. First were the books written by UFO researchers and devotees; their books were vastly spectacular and entertain-

ing but clearly not written by professional writers, and so sometimes came off as confusing or tedious. Second were the books written by professional journalists who set out to write "serious," "no-nonsense" examinations of the phenomenon, but because they were so concerned with being taken seriously, they ended up draining the UFO experience from its bizarre, wacky, absurd energy (which is, I believe, what attracts many of us to the phenomenon in the first place). Those books all have their own unique value, but the best UFO books I found were the ones—like those written by my favorites, John Keel and John Fuller—that took the best features of those two approaches and blended them into captivating, sometimes terrifying, but always serious, unflinching narratives. Keyhoe recognized this early on, and so has Powell.

Throughout the 1950s, UFOs were making headlines around the country and around the world, Keyhoe was a successful writer of both fiction and non-fiction, with bylines in numerous national publications. Because so much of his writing dealt with topics related to aviation, he was a natural choice to author a major story about UFOs in a well-known national magazine. When *True*, a popular monthly for men, decided to run a serious, no-nonsense story about the phenomenon, they turned to Keyhoe, who, at that time, Powell points out, was a UFO agnostic.

That quickly changed, and with a meteoric impact. When Keyhoe's blockbuster story appeared in *True* it caused a national uproar and swelled the ranks of UFO "believers." *True* sold so many copies that month that a publisher commissioned Keyhoe to expand his article into a book. Keyhoe's book, titled *Flying Saucers Are Real*, quickly sold 500,000 copies, and determined the trajectory of his career.

And here's where Powell's narrative really takes flight, if you'll pardon the pun. Now a nationally recognized UFO expert—the first of his kind, really—Keyhoe found that he was entering a strange new reality, one that Powell depicts with impressive precision. As he delved into the strange world of flying saucers, Keyhoe started to experience a strong and bewildering resistance—even hostility—from his former commanders and colleagues in the military. To Keyhoe, there could be only one explanation for the strong headwinds he was encountering: the military must be hiding something!

Keyhoe couldn't have known at the time, but his newfound interest in UFOs soon gave birth to a dizzying array of belief systems and conspiracy theories, some of which he spawned himself.

In 1950, Keyhoe founded the National Investigation Committee for Aerial Phenomenon, or NICAP, to do what the Air Force wouldn't, or couldn't do: investigate and explain the UFOs. As Powell portrays it, the founding of NICAP was a perfectly inevitable result of Keyhoe's growing suspicions that the government was holding back evidence, and that the UFOs were extraterrestrial in nature.

Powell's history of NICAP is a real tour de force, as she documents the ups and downs of the organization, the rivalries and schisms, and the clashing personalities that seem to be an endlessly repeating feature of almost every UFO organization. Powell masterfully weaves the story together with generous excerpts from the letters and documents of Keyhoe and his NICAP colleagues, who all shared the goal of bringing UFOs out of the shadows but often differed on the best way to accomplish this. In addition to internal tensions, NICAP was also bedeviled by a competing UFO research group called the Aerial Phenomenon Research Organization, or APRO, a sometime friend and sometime foe of NICAP, a rivalry that Powell recounts in excruciating detail.

NICAP's efforts were further complicated by the emergence of the "Contactees," a community of seemingly ordinary people who wrote books and gave speeches about befriending aliens who would take them on voyages to distant planets and share cosmic wisdom with them. Powell's account of NICAP's struggles to draw public attention away from the Contactees is quite astonishing, and I found myself chuckling more than once at Keyhoe's frustrating attempts to keep NICAP above the fray.

As if those struggles weren't enough, Powell goes into great detail documenting NICAP's seemingly endless cashflow crises. Despite NICAP's lofty stature in the world of UFO research, membership seemed to be in perpetual decline, as revenues dried up and little progress seemed to be made in solving the UFO mystery.

If all of this sounds familiar, it may be because the field of UFO research today often seems to be in shambles, rife with competing factions and modern-day Contactee equivalents emerging to cloud the issues and discredit each other. After reading Powell's book, I have new hope that it doesn't always have to be this way. Donald Keyhoe may not have solved the UFO mystery in its entirety, but in Powell's telling, he led us all one step closer to understanding the mysteries of the cosmos, and he showed us the power of struggling *Against The Odds*.

Journal of Scientific Exploration
Anomalistics and Frontier Science

BOOK AND MULTIMEDIA REVIEW

Unsettled (Updated and Expanded Edition): What Climate Science Tells Us, What it Doesn't, and Why it Matters

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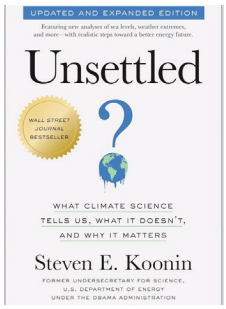

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AUTHOR DISCLOSURES

I had reviewed the first (2021) edition of this book very favorably (Bauer, 2021); a sentence from that review is among the 14 plaudits in the mentioned reviews at Amazon.com, where more than 5,000 readers rate it 4.7/5; at Goodreads, 3,300 ratings average 4.27/5. By December 2023, more than 200,000 copies of this book had been sold (Koonin, 2024, p. xix).

On the other hand, several reviews in mainstream journals were quite critical.

I remain firmly opinionated that Koonin has it largely right, that the general obsessive description of human-caused climate change as an existential threat is unwarranted; and this expanded and revised version of the book strengthens that case.

CONTENT OVERVIEW

The IPCC Sixth Assessment Report (AR6) appeared after Koonin's first edition had been published. The additional three years of data have confirmed Koonin in his initial judgments.

One crucial point to bear in mind is that the executive summaries in IPCC reports often make statements not supported by the technical parts of the same reports, and indeed, are in contradiction to some of the technical data. This edition illustrates that with specific examples (Koonin, 2024, pp. xiii-xvi). Many people may find this hard to believe, yet it is a not-uncommon feature with issues of public policy where mainstream authorities apparently find it necessary to try to swamp and ignore dissenting minority voices. More than a decade ago, I provided detailed accounts of how the executive summaries of reports from UNAIDS and the World Bank misreported and misinterpreted the data published by their own organizations regarding HIV and AIDS; I also cited similar critiques from as far back as 1996 regarding reports about global warming and climate change (Bauer, 2012). Official reports are not scientific publications; in particular, there is no neutral, unbiased peer review of executive summaries.

The new edition emphasizes in particular the enormous problems—ethical as well as economic—of building an energy-supply system that is reliable, affordable, and low in unwanted emissions (Koonin, 2024, p. xix); bearing in mind that global energy demand is likely to increase by approximately 50% by mid-century as more countries develop their economies and populations grow (p. xxi).

The chief detailed updates are sections at the end of chapters 5, 6, 8, and 11-13; chapter 15 is entirely new.

Chapter 5, "Hyping the Heat," states that "some part" (emphasis added) of the apparent 0.6°C satellite-measured global warming over the last 45 years "can be attributed to human-caused greenhouse gases" (Koonin, 2024, pp. 114-117). However, heat

waves during that time have been no more common than earlier in the 20th century and much less frequent than in the 1930s.

Chapter 6 cites AR6 for a lack of any observed increase or trend in extreme weather events, with uncertainty about long-term trends in the severity of hurricanes (Koonin, 2024, pp. 134-137).

Chapter 8 argues that the NOAA-predicted sea rise by 2050 ignores the observed variability of sea levels in the past. It repeats the claim that the rate of loss of Greenland ice has been no greater in recent decades than during several cycles in the 20th century. The very fact of cycles, shown in Figure 8.10, suggests "that natural cycles in the North Atlantic were playing an important, if not dominant, role" (Koonin, 2024, pp. 178-182).

Chapter 9 begins by citing an entirely misleading statement from AR6 that, with "(very high confidence)" (emphasis in original), "in all regions, increases in extreme heat events have resulted in human mortality and morbidity" (Koonin, 2024, pp. 199-200). However, actual data show that more people died from extreme cold than from extreme heat. As the globe warmed, there was "a large decrease in deaths from extreme cold that more than outweighed the smaller increase in heat-related deaths" (Koonin, 2024, citing a 2021 publication in *Lancet Planetary Health*).

A longer section (Koonin, 2024, pp. 200-204) discusses the economic impacts of climate change, noting that "the human condition improved spectacularly" since the beginning of the 20th century despite considerable global warming.

Chapter 11 describes Koonin's disappointment with the low quality of negative reviews of his book. He identifies errors in Gary Yohe's review in *Scientific American*, which I had independently judged misleading and unreliable. Koonin also cites ad hominem statements in a later multi-authored review, also in *Scientific American*, to which the journal refused to publish his detailed rebuttal.

Koonin has discovered what has long been known to those of us interested in unpopular topics: The mainstream simply will not engage in substantive discussion. That's why we sorely need something like a Science Court (Bauer, 2017).

I was reminded of the classic article by Bernard Barber (1961), "Resistance by Scientists to Scientific Discovery," which describes "a pattern in which all scientists may sometimes and perhaps often participate, now on the side of the resisters, now on that of the resisted." Koonin finds himself attacked unfairly now, but three decades ago, he was among the physicists who dismissed and denigrated the work of electrochemists Fleischmann and Pons, whose evidence suggested nuclear reactions at room temperature—a phenomenon that has since been observed by many researchers worldwide (LENR-CANR, n.d.).

Chapter 12, "The Path and Price for NetZero," argues that the 2021 report from the International Energy Agency, *NetZero by 2050*, recommends actions that are doubtfully feasible technically and would actually "create a global system supplying about 8% less energy than today" (Koonin, 2024, p. 249) at a cost of about 4% of global GDP. The McKenzie International Consulting Group reached a similar conclusion (p. 250).

Chapter 13 details the problems of creating an electric grid that is affordable, reliable, and "clean." The major difficulty is that "clean" solar and wind are completely unreliable and require massive energy storage solutions, which are costly and dependent on materials that themselves require significant energy to produce.

Chapter 15, "Easy on the Energy Transition," argues that immediate drastic action is not needed and that the energy needs of the 80% of the world's population currently experiencing "energy poverty" must be considered.

The book cites Sri Lanka's banning of chemical fertilizers as an example of ill-considered virtue-signaling. The ban led to an economic crisis, starvation, riots, and a change in government (Koonin, 2024, pp. 284-285). Similarly, Denmark plans to tax farmers for livestock emissions starting in 2030 (Karas, 2024).

PROS, CONS, AND THE BOOK'S CONTRIBUTIONS TO THE LITERATURE

I continue to believe that this is the best and most neutral source of opinions and facts about global warming and climate change.

RECOMMENDATION

Everyone should read this book.

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Journal of Scientific Exploration
Anomalistics and Frontier Science

OBITUARY

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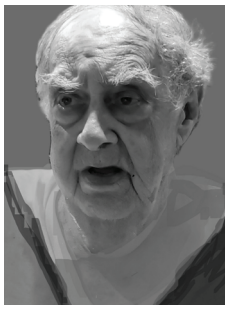

Peyton David Moncrief Jr. (1941 - 2025)

https://doi.org/10.31275/20253677

David Moncrief was an independent scholar with a very wide range of interests. He passed away on February 9, 2025, at the of age of 83. He had been raised in DeWitt, Arkansas, lived for a time in Little Rock, and spent the remainder of his life in Memphis, Tennessee.

Among David's strong interests were evolution and human behavior, particularly chronobiology (reactions and adaptations by living entities to timings and regularities in the environment), and also astrology. He favored the possibility that the human species had separated from the primate branch as a result of mutations that led to *neoteny*: the carrying into adulthood of traits that otherwise characterize only the early childhood years. He was also favorable to the concept, promoted by (among others) Arthur Squires (2014), that homosexuality might have played a beneficial role in group-selective evolution.

Moncrief's efforts were the main source of book reviews in the *Journal of Scientific Exploration* for something like three decades.

I had published the first-ever book review of Shapiro (1988) in the *Journal* in 1988. I believed, and continue to, that a book-review section may be the most widely appreciated part of a journal for a group like the Society for Scientific Exploration, whose members have a huge variety of diverse interests. I urged the then-Editor of the Journal to create a specific book-review section; and should have expected that I would then be called on to be the section's editor, even though I still had a full-time teaching job. I became Book-Review Editor in 1992, but just about all the intellectual detail work was done by David Moncrief. Soon after the Book-Review section had been inaugurated, I began to get frequent phone calls from David, suggesting books that should be reviewed and, more importantly, suggestions for people who would be appropriate reviewers for those books. Given the very wide range of topics pertinent to Scientific Exploration, that ability to suggest capable book reviewers bespeaks how well and widely read and knowledgeable David Moncrief was.

David's name as Associate Book Review Editor first appeared in the *Journal* in 1998. When I retired from my University position and became Editor-in-Chief of the *Journal* in 2000, I persuaded David to become the Book-Review Editor; something I have frequently described in full honesty as the best thing I ever did as Editor. David not only solicited substantial essay reviews of important books; he was scrupulous about obtaining more than one review if the subject of a book had aroused strongly opposing comments from interested and competent individuals. David also expanded the Book-Review section to include "Further Books of Note" and "Articles of Interest."

David remained Book Review Editor for several years after I had resigned in 2007, and he was brought back in 2022 by the current Editor-in-Chief James Houran. I do

hope that the *Journal* will find someone to edit a substantial Book Review section in the future; but no matter how well that work may go, David Moncrief will always have been quite irreplaceable.

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Ralph Adolphs
President of the Jury

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