JOURNAL OF SCIENTIFIC EXPLORATION
A Publication of the Society for Scientific Exploration

(ISSN 0892-3310) published quarterly, and continuously since 1987

Editorial Office: Journal@ScientificExploration.org

Manuscript Submission: http://journalofscientificexploration.org/index.php/jse/

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JOURNAL OF SCIENTIFIC EXPLORATION
A Publication of the Society for Scientific Exploration

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The *Journal of Scientific Exploration* is indexed in Scopus, Elsevier Abstracts, and the Directory of Open Access Journals (DOAJ).

https://doi.org/10.31275/20212287 for this whole issue PDF, JSE 35:3, Fall 2021.

JOURNAL OF SCIENTIFIC EXPLORATION
A Publication of the Society for Scientific Exploration

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EDITORIAL

More Sloppy Reasoning about Survival

Stephen E. Braude

https://doi.org/10.31275/20212251

In my writings on the evidence for postmortem survival I've made no secret of the fact that I consider much of the literature on the subject to be very shabby, usually because the authors are empirically myopic or inferentially challenged. That is, writers on survival notoriously ignore or treat very superficially relevant areas of research having their own extensive literatures (e.g., on dissociation, savantism, prodigies, gifted underachievers, and language mastery), and too often they seem unable to formulate valid arguments. In 2003 I explored these deficiencies in great detail (Braude, 2003). Here, I'd like simply to comment on a particular class of confusions and a recent eruption of nonsequiturs.

Because the errors I'm about to discuss have been described in detail before, not just by me, but at least as long ago as 1961 (Ducasse, 1961), I find it particularly disheartening to see veteran researchers continuing to make the same old mistakes. And there's one argument in particular that periodically rears its ugly head. It goes like this:

> The evidence for clairvoyance, telepathy, and precognition all show that consciousness can acquire information that is not available to the body's sensory system. Similarly, the evidence for psychokinesis shows that consciousness can influence physical events in ways that are not possible for the human motor system. *Therefore, consciousness can operate independently of the body.* And that's a sufficient condition for survival to be a possibility.

I've recently encountered this line of reasoning from several sources, and I'm puzzled by its appeal. In particular, I'm struck by the

glaring nonsequitur italicized in the passage above. The problem is this. When we identify examples of ESP or PK, either in the lab or in life, we attribute those achievements, as we should, to *embodied* human beings whose mentality is intimately tied to the integrity of the brain and other bodily organs. That's not to say that mentality *necessarily* depends on bodily processes. That's the main question in survival research, and I'm prepared to leave that as an open question. In fact, as the philosopher J. M. E. McTaggart noted,

> Even if the brain is essential to thought while we have bodies, it would not follow that when we ceased to have brains we could not think without them. . . . It might be that the present inability of the self to think except in connexion with the body was a limitation which was imposed by the presence of the body, and which vanished with it. (McTaggart, 1930, p. 106)

And along the same lines,

> It may be just the existence of the body which makes . . . other ways [of getting data] impossible at present. If a man is shut up in a house, the transparency of the windows is an essential condition of his seeing the sky. But it would not be prudent to infer that, if he walked out of the house, he could not see the sky because there was no longer any glass through which he might see it. (McTaggart, 1930, p. 105)

We can supplement McTaggart's point with a contemporary analogy. Consider the case of portable electronic devices that can operate either on battery power or through a connection to AC lines. Typically, the powerline connections allow the portable device to perform functions it might not be able to perform on its own, or to perform functions better than it can perform on its own. But perhaps more important, powerline connections also impose *constraints* on the portable device's function, constraints which it lacked as a stand-alone device. Of course, they make the device less portable. But they also render the portable device vulnerable to processes (e.g., power surges or fluctuations) which can alter or impair its performance and even disable it. For example, some audio equipment sounds better on its battery power than when connected to AC lines. So perhaps like the

portable device's connection to a wall outlet, physical embodiment would simply be one possible medium for human cognitive expression. And like running on battery power, disembodied existence might be another.

So when we consider the evidence for antemortem ESP and PK, we must concede that those psi experiences, along with the rest of our mental states, are *mediated* by the body. The parapsychological evidence is simply not evidence of mental *independence* from the body.

We can perhaps see this even more clearly in connection with out-of-body experiences (OBEs), because OBEs offer an even greater temptation to confuse mind–body distinctness with mind–body independence. OBE *externalists* maintain that a nonphysical element of being (the mind or a secondary or subtle body, and vehicle for consciousness) literally travels to and exists at locations outside the OBEr's physical body. That appears to be dramatically illustrated in so-called *reciprocal* cases, in which people report seeing the OBEr at the site that person is ostensibly visiting. Accordingly, some claim that OBEs demonstrate a profound distinction between mind and body, and they erroneously conclude that human beings aren't simply physical systems, and (even more suspiciously) that our characteristic mental activity can continue after bodily death.

The mistake here is painfully elementary. The *most* that can be said for externalism is that it's *compatible* with the survival hypothesis. But of course, that result is clearly underwhelming. Externalism might be compatible with survival even if there are good reasons for concluding that the survival hypothesis is *false*. For example, Mark Woodhouse (who actually argues for externalism) comments,

> Externalism does not entail anything about survival of bodily death, except that it does not rule it out. It is a tremendous conceptual jump from, say, a 30-minute OBE to immortality. (Woodhouse, 1994, p. 14)

Harvey Irwin concurs. He writes,

> Even if OBE research should support the existence of a nonphysical element of being, it might not bear directly upon the issue of whether this element is immortal. (Irwin, 1985, p. 25)

Echoing C. J. Ducasse (Ducasse, 1961, p. 164), he continues,

> it should not be assumed that during life the nonphysical element animates the body. In fact the reverse may be the case, so that destruction of the body occasions the death of the nonphysical element. (Irwin, 1985, pp. 25–26)

Therefore, to show that externalism actually *supports* (or more strongly, entails) a survival hypothesis, more needs to be said. We must ask: Why *exactly* would the distinctness of mind from body lead us to accept the survival hypothesis? As Woodhouse, Irwin, and others have noted, it's not enough simply to claim that mind and body are distinct. What matters is the *way* they differ.

Ducasse saw this clearly. He noted that externalists typically embrace the *animistic* view that the physical body is causally dependent on the thing that leaves the body during OBEs. They'd say that under normal circumstances, the secondary (or astral) body animates the physical body by being infused throughout the physical body (or co-located with it). And during OBEs the secondary body animates the physical body in a different way, either through its connection with a "silver cord" (according to some accounts), or by means of an invisible and currently unidentified connection. But, Ducasse noted, it

> could equally be that the animation is in the converse direction, i.e., that death of the body entails death of the conscious "double" whether the latter be at the time dislocated from or collocated with the former. (Ducasse, 1961, p. 164)

Ducasse is clearly correct. Mind may be causally dependent on body even if mind and body are distinct. But then it's clear that the link between mind–body distinctness and mind–body independence is tenuous at best. To make this point even more vividly, consider the relation of an object to its shadow. First, the object and its shadow occupy different locations in space, just as the mind and physical body purportedly occupy different locations during OBEs. Moreover, shadows are causally efficacious; they can have effects on the world around them. For example, shadows will lower the ambient temperature and affect light meter readings at their locations. Similarly, externalists claim that,

in reciprocal OBEs and in the intriguing Osis–McCormick experiment with Alex Tanous (Osis & McCormick, 1980), the traveling mind affects the world at remote locations. In reciprocal cases observers at the remote locations report seeing the OBEr, and in the Osis–McCormick experiment Tanous apparently activated a strain-gauge at the location he ostensibly "visited." But then, even if externalists are correct that during OBEs the mind exists apart from the physical body and can affect the world at that place, that won't advance the case for survival. After all, since a shadow will cease to exist when the object casting the shadow ceases to exist, for all we know the mind may be similarly dependent on the body. The question for the externalist at this point must therefore be: Is there any reason for thinking that the mind is more independent of the body than the body's shadow? As far as I can see, nothing in the literature on OBEs provides such a reason.

Some externalists adopt a strong substance-dualist variant of the externalist position. For example, Robert Almeder writes,

> Obviously, if people can literally leave their bodies, then human personality is something distinct from the body itself. The person who leaves her or his body and then returns to it must be something more than just the very complex organism whose properties are revealed by physical science. Such a person would need to be some sort of nonphysical being that lives *in* the body. (Almeder, 1992, p. 163)

And later,

> the evidence [for veridical OBEs] strongly warrants our endorsing some form of mind–body dualism that eschews a pure reduction of human personality to bodily existence as we know it. . . . [W]e have in these best cases enough in the way of "proof" to justify a rational belief in some form of postmortem personal survival. (Almeder, 1992, p. 194)

Now we've already seen that mind and body may be distinct even if they're not independent. Almeder adds to this a related implausibility—namely, that mind–body distinctness supports adopting a form of Cartesian (or substance) dualism, according to which mind and body are distinct kinds of *things*, rather than (say) different levels of

description, neither of which reduces to the other without residue. Part of the problem here is that there are almost as many forms of dualism as there are flavors of ice cream. And many philosophers take mind and body to be different while at the same time holding that mind can't exist without the body. In fact, some of those are nonreductive physicalists: They claim that the only "stuff" in nature is physical, but at the same time they deny that the mental reduces to the physical. Instead, they subscribe to a kind of substance-monism according to which the world comprises fundamentally physical things, even though our *descriptions* of mental events can't be translated fully into physical terms. Thus, they subscribe to a kind of *property-dualism* rather than a strong substance-dualism. And it shows again that one can take mind and body to be distinct while rejecting the survival hypothesis.

For example, epiphenomenalists argue that mental events are merely byproducts of physical events. Although they differ from physical events, mental events are entirely causally dependent on underlying physical processes, and in fact mental events have no causal powers of their own. For example, although it seems as if our volitions cause our actions, the apparent efficacy of our volitions is misleading. Both our actions and our volitions are caused by underlying physical events. Volitions, according to this view, are merely symptoms of that underlying causal network and (as it were) signals of the physical events that follow. So epiphenomenalists are happy to accept that the relation of body to mind is analogous to the relation between a thing and its shadow.

We should also observe an important point about the connection between externalism and mind–body dualism. As we've seen, some find it tempting to suppose that externalism presupposes (or at least supports) a strong *substance* dualism, according to which mind and body are radically different kinds of *entities*. That seems to be Almeder's view, and it's why he contends that the "person who leaves her or his body and then returns to it . . . would need to be some sort of nonphysical being that lives *in* the body." Now historically, at least, substance dualists have maintained that one crucial difference between mind-stuff and body-stuff is that the latter is extended in space whereas the former is nonextended. Thereafter, opinions diverge. For example, Descartes claimed (notoriously) that, despite this difference, mind and

body interact by means of efficient causality (i.e., like billiard balls). However, his follower, Malebranche, endorsed the parallelist view that mind–body interaction was merely apparent causality, with true causal connections being traceable only to God.

But these differences needn't concern us here. What matters is that, contrary to what some think, externalism presupposes (or implies) neither classic Cartesian dualism nor any of its successors. Even if we grant that during veridical OBEs the mind, or some aspect of oneself (or one's consciousness), severs its normal connection with the body, nothing follows about what sort of stuff this separated thing might be. Actually, for reasons I explain below, it may follow that whatever leaves the body is not an unextended Cartesian mind. But apart from that, externalism doesn't commit one to any particular view as to what kind of substance the mind (or the relevant aspect of consciousness) is. Externalists need only claim that this thing has certain *functional* properties—for example, the ability to mediate the OBEr's apparent perceptions of remote locations. It can remain an open question whether this thing is nonphysical or possibly a kind of material stuff not currently identified by science. That simply acknowledges a reasonable point widely accepted within the philosophy of mind: namely, that even if minds and bodies are not radically different types of *hardware*, they may still differ functionally. But if this is correct and externalism doesn't have to posit a mind-stuff that differs radically from body-stuff, then the inference from externalism to survival (made by Almeder and others) is weakened considerably.

Ironically, though, externalism seems *incompatible* with any dualism (such as Descartes's) according to which mind is nonspatial. For the Cartesian dualist, mind may be associated somehow with a body, and even interact causally with a body. However, mind is not contained *in* the body, because that requires having a location in space. According to the Cartesian dualist, the mind is nowhere in particular, or nowhere at all. Perhaps if Descartes had been familiar with the trendy terms of current physics, he would have said that mind is nonlocal. At any rate, the problem is this. Externalism holds that during OBEs a person's mental activity detaches from the body and travels somehow to a location different from that of the body. But since only something in space can be *at* a location, this thing can't be what many substance

dualists say the mind is: an unextended nonphysical thing.

Of course, animists can avoid this last problem by positing secondary or subtle bodies that have some spatial properties. It's curious, then, that Almeder shows so little interest in that theoretical option. It might help flesh out his claim (pun intended) that minds (or perhaps *persons*) are both nonphysical and localizable.

But let's now set aside the issue of what flavor of dualism is suggested by OBEs. There's another major reason why survivalists are ill-advised to argue for their case by appealing to OBEs. If OBEs provide evidence for any kind of survival of bodily death, strictly speaking, it would be evidence only of short-term survival. OBEs provide no justification for assuming that mental activity could persist independently of the body for periods significantly longer than an OBE. Analogies are easy to come by. For example, a person's last breath may linger briefly after bodily death. But it will dissipate quickly, and certainly it won't persist indefinitely. Similarly, my farts can leave my body; they're distinct from my body; and they can affect the world outside my body. But they're also entirely causally dependent for their existence on my body. Now of course, farts can linger for a while after coming into existence. But despite an enormous database of human farts, we have no reason to anticipate the production of a fart everlasting, even if that remains an empirical possibility. So it seems that even under the most charitable of readings, the evidence from OBEs shows too little. It gives us no reason to believe that the mind is more substantial, resilient, and self-sustaining than a fart.

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Journal of Scientific Exploration, Vol. 35, No. 3, pp. 485–541, 2021 0892-3310/21

RESEARCH ARTICLE

A Preliminary Survey of the Eastern Harbor, Alexandria, Egypt, Including a Comparison of Side Scan Sonar and Remote Viewing

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Submitted April 20, 2020; Accepted April 16, 2021; Published September 30, 2021

https://doi.org/10.31275/20211815

Abstract—This paper reports a preliminary survey of one of humanity's most historic harbors, Alexandria, Egypt. It constitutes one phase of a broader joint land/sea examination of the largest and most famous city to bear Alexander the Great's name. The research overall had two goals: 1) To resolve locational uncertainties concerning the city's past configuration, particularly its Ptolemaic antecedents; and, 2) to compare electronic remote sensing survey technologies with Remote Viewing generally, and the applications methodology developed by the Mobius Group, specifically. In the area of the Eastern Harbor, the aim of the research was: 1) The location of the ancient shoreline; the location and predictive description of several sites including: the island of Antirrhodus and the Emporium / Poseidium / Timonium complex; a palace complex associated with Cleopatra; and, a further elaboration, both in terms of location and predictive description, of the Pharos lighthouse area. 2) A comparison of remote viewing and side scan sonar data after each approach had surveyed the same area. This paper describes the probable location of the Emporium, the Poseidium, and the Timonium, the palace complex of Cleopatra, the island of Antirrhodus, a site at the tip of Fort Sisila (known previously as Point Lochias), new discoveries pertaining to the lighthouse, and an associated temple. The most important discovery though is the identification and location of the ancient seawall which extends some 65 meters farther out into the harbor than was previously suspected, and whose location resolves a key piece in the puzzle of the ancient city's layout. The discoveries reported were principally the result of Remote Viewing. Except for one clear "hit," side scan sonar proved unproductive because of the large amount of particulate in the water.

INTRODUCTION

In 331 BCE, Alexander of Macedonia stopped at a small fishing village on Egypt's Mediterranean coast and marked out the boundaries of what would become the greatest city to bear his name. From the first, its destiny was tied to the sea (Arrian, 1942, p. 468). Its founder appreciated this and fixed its location believing, as Arrian reports, that because of the sea, "the site was the best possible for the foundation of a city and the city would prosper" (Arrian, 1942, p. 467). To achieve his ends, one of Alexander's highest priorities was the creation of what has come to be known as The Eastern Harbor.

How sound was Alexander's judgment? From its Western and Eastern harbors, Alexandria soon supplied the world with grain, with glass, and with precious metals. Strabo of Amasya in Pontius, whose *Geography* describes the city three centuries after its founding, provides us with an assessment from antiquity: ". . . the only place in all Egypt which is by nature situated with reference both to commerce by sea, on account of the good harbors, and to commerce by land, because the river [Nile] easily conveys and brings together everything . . . [Alexandria] is the greatest trading center of the inhabited world" (Strabo, 1949, p. 53).

Fraser, writing two thousand years later, offered a modern assessment of that period that is little different: "Alexandria in the late Ptolemaic period was the unrivaled center of world trade" (Fraser, Vol. 1, 1972, pp. 133–188).[1]

Today, although Alexandria is Egypt's second-largest city, the Eastern Harbor is no longer a great port. Yet, as this paper describes, diving in those waters was entering into an ancient past that held answers to myriad unsolved archaeological riddles. The detritus of almost two-and-a-half millennia of commerce has accumulated on the harbor's sea floor. Due to subsidence of the shoreline, to depths as great as eight meters, a considerable number of the ancient city's most famous buildings—structures associated with the now mythic figures of Cleopatra, Mark Antony, and Caesar—now lie submerged.[2] What was also important, in 1979 when we did this work, is that they lay relatively undisturbed, unlike the archaeological chaos to be found on the shore, where earth-moving and construction has been constantly ongoing since 1882, when the modern city emerged.[3]

Figure 1. The Eastern Harbor as it appeared when the Mobius Expedition began.

In November of 1978, the Mobius Group began designing a project using remote viewing to guide archaeological fieldwork in Alexandria. As the paper describes, the project began in Los Angeles, California, and it was there, long before anyone involved had gone to Alexandria, that the first remote viewing probe was carried out, and the data, and the master map it produced, helped in developing a set of hypotheses concerning both location and reconstructive data. That led to planning a preliminary survey of the harbor, an area, as one looks outward toward the sea, limited on the west by a man-made peninsula known as the Heptastadium, associated since antiquity with the Lighthouse of Pharos and, on its eastern bound, by a smaller, natural, although much altered peninsula known today as Fort Sisila and, previously, as Point Lochias (see Figure 1 and Figure 3).

This harbor research constituted one segment of a broader joint land/sea examination of Alexandria. The research overall had two goals:

1) To resolve locational uncertainties concerning the city's past configuration, particularly its Ptolemaic antecedents; and,

2) To compare data derived from electronic remote sensing technologies both marine and terrestrial such as side scan sonar and ground-penetrating radar, with a triple-blind technique for accessing nonlocally sourced information known as remote viewing. And to do this using the applications consensus methodology developed by the Mobius Group. (In this paper, remote sensing means electronic instrument sensing.)

In the area of the Eastern Harbor, the aim of the research was:

1) The location of the ancient shoreline; the location and predictive description of several sites including: the island of Antirrhodus and the Emporium / Poseidium / Timonium complex; a palace complex associated with Cleopatra; and, a further elaboration, both in terms of location and predictive description, of the Pharos lighthouse area, one of the seven wonders of the ancient world.

2) A comparison of Remote Viewing and side scan sonar data after each approach had surveyed the same area.

LITERATURE REVIEW

Strabo, who visited the city in 24 BCE, in the first decade of Roman rule, gives the best description of Alexandria and its harbors at their height. He says that while Dinocrates was the primary architect, he followed a well-tested urban plan developed by Hippodemus of Mieltus, and previously used in Priene and Herculaneum (Fakharani, 1974). Alexander apparently had admired it because it made for an urban environment with good air and traffic flow patterns and produced a city with a sense of graciousness. Arrian tells us that Alexander himself outlined the city's walls (Arrian, 1942, Vol. 2, pp. i, ii).

Ancient Alexandria was roughly rectangular in shape. Strabo calls it "an outspread chlamys"—the cloaklike garment favored by Greek travelers and soldiers (Strabo, 1949, p. 33). He says it was built along the sea and spread out 30 stadia (1 stade = 185 m) in length (5.55 km) and seven to eight in width (1.29–1.48 km), with indentations on the long sides caused by the harbors on the north, and Lake Mareotis on the south (Strabo, 1949, p. 33). The key to the city's layout was its two major

streets, which intersected at right angles, and were "particularly wide, being more than a plethron (30 m) in width" (Strabo, 1949, p. 33). This planned urban community must have been very beautiful, particularly along the sea frontage, which was filled with shaded groves and mansions, intermingling with public buildings. Unfortunately, almost all of this city has been lost, either beneath subsequent constructions, or because of subsidence, and so visually the city described in the literature of antiquity exists today mostly in the writings themselves.

When we began our research, although there was a fairly extensive modern literature on Alexandria, the scholarly writing addressing its archaeology and geography was much smaller than one would have expected for a city of its prominence in the ancient world. And much of what did exist dated to before World War II. Only the University of Warsaw had an active continuous archaeological presence, one they had maintained for the previous 20 years, and the totality of all previous marine archaeological work consisted of hobby-ist divers and of a few dives carried out around Kait Bey in 1962 by the Egyptian Navy (which resulted in the raising of a 7-meter–long broken statue of a female figure),[4] and six dives in the same area, in 1968, by a joint UNESCO/English team as reported by Frost (1975).[5]

It is also worth noting that *all* of this previous underwater work stemmed not from anything in the literature but from a Customs House official and amateur scuba enthusiast, Kemal Abu al Saadat, the most knowledgeable antiquities diver in Alexandria, who had reported to local archaeologists what he had seen.

Three main themes weave their way through the modern archaeological and geographical record that does exist:

1. **Cycles of habitation:** Mobius researchers were startled to discover *living* individuals who remembered much of the city, particularly east of the Eastern Harbor, as virtually a desert.[6] Unlike Rome, the metropolis with which it is often compared, Alexandria has not enjoyed continuous inhabitation since its beginnings, and the hallmark of Alexandrian literature is a recurring cycle of downfalls and resurgences that have occurred, as a march of very different cultures have sequentially put their stamp upon the city.

The literature makes it clear that this almost constant churning has left such confusion that one of the most vexing questions has

been exactly where and with what orientation the two main streets of the original city were to be found (Fraser, 1972, Vol. 1, p. 10). Modern authorities have achieved a rough consensus that the east–west street is approximately paralleled by the present day Sharia El Houriya (in common usage, Rue Houriya; Fraser, 1972, Vol. 1, p. 31). The location of the north–south street is less clear. Fraser, who has studied the question as thoroughly as anyone, concluded in 1961, that the entire issue was so muddled as to admit to no definitive answer (Fraser, 1972, Vol. 1, p. 31).

2. **Subsidence:** Throughout its recorded history Alexandria has been (rather more in the past than now) a geologically active area. Beginning with Strabo and coming forward in time, almost every writer who has dealt with Alexandria's topography includes discussions of seismic activity and its possible effects on the undeniable and very substantial subsidence of the coast. Jondet, as in the case of most of the issues pertaining directly to the ports of Alexandria, seems to be the best source (Jondet, 1916, 1922), although Saint-Genis, the Napoleonic era Harbor Master, makes many valuable contributions in this regard (Saint-Genis, 1817).

In addition to seismic activity, the reasons offered for the subsidence of Africa's Mediterranean littoral range from the weight of silt coming from the Nile mouth at nearby Rosetta, to a shift in the African plates. Subsidence is such a critical issue because the two most important centers of the pre-Islamic city, the Royal and Administrative Quarters, were to be found along the shore (Saint-Genis, 1817). But where was the ancient shoreline?

When we arrived in Alexandria, there was not a single diving archaeologist in the city. As a result, coastal subsidence evidence for the location of the ancient harbor shoreline was limited to just a few particularly prominent features visible looking down from the surface. There was an ongoing discussion as to where the ancient seawall was located, because that would affect the geography of the entire Ptolemaic city. Because of a third factor, this fundamental question had not been answered.

3. **Reconstruction:** Beginning with the Khedival government in the midnineteenth century, an entirely new and almost completely artificial shoreline has been constructed, as a substantial part of the existing literature describes.[7] As a result, as Fraser has it, "It is true we

know that certain buildings, public places, and so on were planned or built or recorded as having been planned or built, by certain historian figures, but the evidence is so disconnected and at times so unreliable, that no complete picture emerges…." (Fraser, 1972, Vol. 1, p. 36).

ELECTRONIC REMOTE SENSING & REMOTE VIEWING IN ARCHAEOLOGY

Side Scan Sonar

In this instance the correct remote sensing technology to survey the harbor electronically, to compare with the remote viewing data, was side scan sonar. It emits recurrent flashes of acoustic energy into a body of water and then records the echoes that produces. It can provide location, but only limited descriptive data.

In the Eastern Harbor, the side scan survey was accomplished by Professor Harold Edgerton, Chairman of the Radio Strobe Laboratory, Massachusetts Institute of Technology. Edgerton is considered the father of this kind of survey. He worked using an EG&G Model 259 side scan sonar, and Mark 1B System Tow-Fish, both specially modified to Edgerton's specifications by EG&G[8] (see Figure 2).

Figure 2. Harold Edgerton carrying out the side scan sonar survey.

Remote Viewing

Remote viewing and electronic remote sensing, while radically different technologies, have one thing in common: Both have the ability to pinpoint under triple-blind conditions the location of a previously unknown as to its location, but possibly known to exist, archaeological site. In this respect they are each variations of an information acquisition technology.

Nonlocal perception is a technique for acquiring information that can be objectively verified, accessed through a nonphysiologically based nonlocal aspect of consciousness. Remote viewing is the formalized protocol for doing this. There are several variations as to how it is done, all developed by three research centers: Mobius, the research group that carried out the expedition described in this paper, Stanford Research Institute (SRI), which did largely classified research for military and intelligence agencies, and the Princeton University Engineering Anomalies Research Group (PEAR). They worked largely independent of one another but in a complementary way (Schwartz, 2017). All three had presented and published papers at the time of this research, demonstrating under the most rigorous conditions the reality of nonlocal perception using remote viewing in both laboratory and practical applications (Targ & Puthoff, 1974; Puthoff & Targ, 1976).

With remote viewing in archaeological applications, it is possible to get accurate locational information and also highly detailed descriptive information concerning what is to be found at that location. In double- or triple-blind meticulously randomized remote viewing sessions, individuals have demonstrated they can reliably describe persons, places, or events from which they are shielded by virtue of space, time, and "blindness" protocols.

They do so in much the same way an eyewitness would recount the memory of something they had witnessed. All their senses report; that is, viewers can answer questions that involve smells, sounds, colors, shapes, textures, even tastes. The mechanism of this perception is unknown. But that it can be used in archaeology is demonstrated by this paper.

The task of the researcher is to structure the interview session in such a way that normal sensory cues are absent, and that intellectual

access is eliminated. The researcher in an applied remote viewing experiment such as this is blind to the correct information; indeed, by definition, everyone is, that is why the questions are being asked.

Although this process may seem unusual, in fact researchers are essentially faced with a novel presentation of a familiar engineering problem: extracting from a weak information channel. In the case of side scan sonar, the "noise" is particulate matter in the water, schools of fish, and the like. In remote viewing the information channel is not a signal in the electromagnetic sense. It is more like doing a Google search. In this analogy, the search term is intentioned, focused awareness on a task. Just as the quality of the side scan instrument makes a difference, so the key to successful remote viewing is the ability to attain, and sustain intentioned focused awareness, so that one can perceive the weak nonlocal information buried in the noise of the sense impressions of the body's neuroanatomy, and the cognition it provokes. In this instance, normal sensory awareness and prior knowledge constitute the "noise."

Meditators generally do better at attaining and sustaining intentioned focused awareness, which is the key to opening to nonlocal perception, than nonmeditators, which may be why meditation is taught in Japanese dojos, and in Tibetan and Christian monasteries.

The use of nonlocal perception in archaeology entered the literature over a century ago with Frederick Bligh Bond's successful exploration and reconstruction of Glastonbury Cathedral in England (Schwartz, 1978b, pp. 1–56, 354–355 [Bibliography]). It has continued periodically (albeit infrequently) down through the years. Examples are ethnographer Stanislaw Poniatowski's work in Poland (pp. 57–107, 354–355 [Bibliography]), Scott-Elliot's in England (pp. 108–127, 355–356 [Bibliography]), Pluznikov in the (then) Soviet Union (pp. 127–135, 355–356 [Bibliography]) in Schwartz (1978b); and Weiant's with the Smithsonian at Tres Zapotes (Schwartz, 1978a, pp. 222–238; Weiant, 1943, 1960); and Reid's work at Ontario Iroquois sites (which used George McMullen, R3, who was a viewer in this Alexandrian project; Schwartz, no date, pp. 211–221). All of this exploration, other than that of Mobius', used variations of nonlocal perception techniques and all depended on the input from a single practitioner.

In 1976, the author began developing a consensual remote

viewing methodology, using multiple respondents independently and individually responding to the same questions—in controlled conditions of intellectual and sensory blindness, which led to an expert evaluation of every concept advanced by viewers. From this information the hypotheses that guided the fieldwork were developed.

The first use of this consensual methodology in underwater archaeology is to be found in the Mobius report on a 1977 experiment series utilizing the research submersible *Taurus I* (Schwartz, 1979). Known as Project Deep Quest, the program was conducted by Mobius in conjunction with The Institute for Marine and Coastal Studies of the University of Southern California, and Hyco Ltd., builder of the *Taurus*. Archaeologically, Deep Quest demonstrated that remote viewers could locate on a map from distances away of up to 4,800 kilometers, a previously unknown wreck at 92+ meters of depth, that no previous survey had ever located. Remote viewing was also successfully able to provide specifics, including drawings, as to what would be found at the selected site; the cause of the ship's sinking; and the approximate period in the past when the ship's sinking occurred. All points were corroborated by fieldwork, literature review, and expert analysis (Schwartz, 1979).

In addition to the archaeological aspect, Deep Quest had another purpose: To answer a question then widely held—was nonlocal perception electromagnetic in nature? To carry out this part of Deep Quest, the author invited researchers from SRI to participate. That experiment showed that nonlocal perception was not electromagnetic in nature (Schwartz, 1978a).

From a remote viewing perspective, the question of the seawall's location provided an ideal triple-blind protocol. Everyone agreed there was an ancient seawall. But everyone also agreed that no one knew exactly where it was located. And the same was true of the areas selected by the remote viewers before the fieldwork began. Cleopatra had a palace somewhere on the harbor coast, as did Marc Antony. The Lighthouse of Pharos, one of the seven wonders of the ancient world, was known to exist but was unfound. And all of these things had been predicted in the Map Probe phase.

Comparison of Electronic Remote Sensing and Remote Viewing Data

Mobius remote viewing archaeological projects are designed with a second research aspect: Comparing electronic remote sensing with nonlocal perception remote viewing: This was one of the research objectives of the Alexandria Project. In addition to comparing the data, we also sought to develop a complementary approach that would use both survey techniques in order to provide researchers with the highest quality fieldwork guidance. This team approach was designed to help improve the information-to-noise ratio previously described. The remote viewers functionally are the survey instruments, and using more than one on the same site is the equivalent of having multiple electronic sensors—side scan sonar, proton precession magnetometer (as examples)—survey an area and then collectively define what is there. Thus, as the paper reports, had we relied entirely on electronic remote sensing, the paper would be very different. Thus, *the "best case" scenario relying exclusively on electronic remote sensing can be considered the "worst case" for the combined methodology.*

MOBIUS GROUP METHODOLOGY

Mobius conducted its Remote Viewing in the following way:

Phase One Methodology

1) The Remote Viewing team was selected, and each individual Respondent was given an anonymous alphanumeric designator, i.e., R1. This was done to minimize the possible impact of various conceivable researcher biases, by depersonalizing the source of the data.

2) Sessions were done either in person at Mobius' Los Angeles, California, location, or else numbered manila envelopes were sent to distant viewers, each envelope containing one question, except one that contained a map. In this first phase, because we had been told by the Egyptian government that no diving was permitted in the Eastern Harbor, our focus was entirely on terrestrial sites. The viewers answered the questions in the envelopes and made their locations on a standard U.S. Army Map Service chart (1:10,000) that had been specially prepared by having the typical multiple colors—which might provide false "cueing"—eliminated and many place names removed. This was done

Figure 3. The Master Composite Map from Probe One. Note the lack of color and deletion of most place names. Also note where the individual locations overlap. These were called Consensus Zones and given priority in fieldwork.

by producing a Mylar master which was then "blueprinted," producing a simple line map of uniform color. This packet was sent to 11 Respondents.

3) The data-gathering Remote Viewing sessions took place. Some were conducted as interviews in person, others were conducted through the mail. Each question began with a location request. The viewer marked their response on their chart, followed by a request for descriptive material concerning what would be found at the site chosen, e.g., "If you could locate a construction, ruin, or artifact associated with the famous woman in history known as Cleopatra where would you look and if you could describe what you believe is there, what would it look like?" (Question #1, Probe II, October, 17, 1979). The form of the question was designed so that nothing "cued" any particular descriptive response or site selection.

4) A composite map including all the information contained on the individual maps was then developed. Where the individual location marks from the various Respondents overlapped, Consensus Zones were created. In the Fieldwork Phase, these zones would later be given first priority, although all marked areas would be explored. To our surprise, in answer to some of the questions, particularly those involving Cleopatra and Marc Antony, viewers marked an area in the sea (see Figure 3). This suggested massive subsidence and a seawall

much farther out than anything the literature suggested.

5) All nonlocal perception remote viewing interviews, whether done in-person, or submitted via mail, were audiotaped. Once collected, these tapes were transcribed.

6) Copies of all paperwork or tapes were made, and the originals were then notarized and turned over to an independent third party. (In this case all original documentation was in the hands of a bank officer in Los Angeles and stored in the bank's vault.) This produced an unimpeachable date-coded chain establishing a clear chronology of events (see Figure 4).

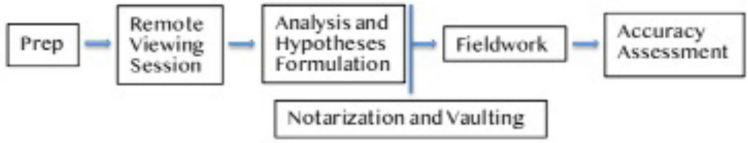


Figure 4. Chronology of study events.

7) Working from the photocopies of the original probe responses, the Remote Viewing Research Team then analyzed the proffered Remote Viewing material seeking, in the words and drawings, patterns of commonality, or something so odd that it stood out. These patterns are not imposed but arise from the material itself. For instance, did more than one viewer choose the same site? Did one of the group provide a drawing of a particular structure at that site that was similar to another viewer's drawing? How similar were the descriptions? From this, and the Composite Map, a set of hypotheses was developed to guide the subsequent fieldwork.

8) With this phase of the analysis completed, the research concurrently done by the Archives and Records Team was integrated with the Remote Viewing data. This made it possible to establish what was previously known, which proffered Remote Sensing material coincided with known information, and which was novel. For example, if someone located a ship and described an anchor, the observation might be correct, but it would not be unexpected. If, on the other hand, they described the cargo as containing plates with particular markings, which they drew, such an observation would not be expected, and would have a low a priori probability.

9) Since no map is detailed enough to take a location down to a level sufficient for precise excavation, two Remote Viewers went to Egypt to provide on-site guidance. Each was individually taken into the Alexandria and, without access to the maps, asked to locate a particular consensus zone. If that was successfully accomplished, they were asked to locate down to feet and, sometimes, inches, the site within the zone. Additional information relating to artifact positioning within the site, the outline of walls and other structural aspects, subsurface or underwater conditions (silting, currents, and the like) were solicited. Drawings were sought, as well as a reference to scale.

10) All of this was videorecorded and/or filmed on a real-time basis; the tapes were then transcribed and the transcriptions, original tapes, and original drawings, as with the previous data acquired in the U.S., were notarized, photocopied, and the original sent back, *prior* to fieldwork, for storage control by the bank officer.

11) From this second order of material, in photocopy form, additional analysis was undertaken. This was then folded into the first analysis and again compared with whatever had been gleaned from the ethno-historic, geographical, and archaeological record. This analysis, when integrated with the first, produced the hypotheses under which the subsequent fieldwork was to be conducted, as well as defining what was uniquely potentially nonlocal.

12) Prior to the remote viewing fieldwork, electronic remote sensing of the mapped area was carried out using side scan sonar.

13) Divers were put into the water at the site selected by remote viewing to survey the site.

14) Once this fieldwork was completed, a final analysis comparing predictions from both electronic sensing and Remote Viewing surveys with actual fieldwork results was developed. It was from this that the final evaluation as to the accuracy of the Remote Sensing material was determined.

Phase Two Methodology

15) A second Map Probe utilizing nine Remote Viewer Respondents was carried out focusing (as the first Map Probe did not) specifically on the Eastern Harbor and nearby coastal waters.

16) Analysis of the individual maps, and related descriptive

material was begun prior to leaving the U.S. and completed after arrival in Egypt. A second Composite Map based on the individual maps was also compiled (see Figure 13).

17) A three-week diving program was conducted by Mobius, aided by Egyptian divers.

18) A final analysis of results was conducted, and this paper prepared.

PERSONNEL

To carry out this research program, seven teams were assembled, each having responsibility for one aspect of the research. The specialty teams were:

1) The Historical/Archaeological Team: Mustafa el Abbadi, historian, Chairman, Department of Classical Civilizations, Faculty of Arts, the University of Alexandria; Daoud Aboud Daoud, archaeologist, Professor of Archaeology, Department of Classical Civilizations, Faculty of Arts, the University of Alexandria, and Secretary of the Archaeological Society of Alexandria; Mohamed Hassan, archaeologist, Antiquities Inspector and Staff Archaeologist, Greco–Roman Museum; and Mieczyslaw Rodziewicz, archaeologist, Director, The University of Warsaw Archaeological Mission in Alexandria.

2) The Electronic Remote Sensing Team: Harold E. Edgerton, electrical engineer, Radio Strobe Laboratory, Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology; and Captain Mohamed Rashad, Armed Forces of Egypt Naval (AREN), naval hydrographic engineer, Naval Headquarters, Alexandria.

3) The Remote Viewing Research Team: Stephan A. Schwartz, parapsychologist, Mobius; Beverly Humphrey, parapsychologist, SRI; and Kathi Peoples, Mobius staff support.

4) The Remote Viewer Respondents: Most viewers who participated in the first Map Probe took part in the second. They ranged in age from early thirties to midsixties, and came from several countries, with educational backgrounds ranging from grade school to multiple advanced degrees. When not working with Mobius, the Remote Viewers individually have successful careers in fields as diverse as aeronautical engineering, automobile repair, fine arts, and writing.

Viewers were selected on the basis of their success in past research—mostly laboratory experiments with statistical outcomes—although the majority had participated in the Deep Quest ship location experiment.

Only one had any experience with archaeology, or even knew an archaeologist. This Respondent, George McMullen, R3, had worked for some years with Professor J. Norman Emerson of the University of Toronto's Department of Anthropology, and his student Reid (Emerson, 1975, pp. 23–25; Schwartz, 1978b, pp. 356–357 [Bibliography]).[9]

None of the viewers had ever been to Alexandria; none knew anything of its early history, although they were, of course, familiar, in the general way people are, with the historical personalities such as Caesar, Alexander the Great, Mark Antony, and Cleopatra.

All Remote Viewers were "blind" to the questions before these were presented to them; indeed, did not even know the project was to take place in Egypt. In any case, even had they been working archaeologists it would not have mattered much because the questions, for which the project sought answers, were well-established mysteries over which there had been much conjecture, but no resolution.

The two Respondents taken to Egypt were McMullen, R3, and Hella Hammid, R5.

5) The Dive Team: Commander Mohamed Khaled, AREN; a changing group of enlisted navy divers; Stephan A. Schwartz; and Kathi Peoples.

6) The Archives and Records Team: Catherine Dees, historian; Kay Croissant, historian; Karen Winters, field log; David Keith, illustrator; and Jacqueline Kendall, staff support.

7) The Photography Team: Glenn Winters, land film; Bradley Boatman, land film. Gordon Waterman, underwater film; Dyanna Taylor, underwater film and still photography; Karen Winters, land still photography; and Kathi Peoples, underwater still photography.

8) The Audio Team: Sunny Meyers, audio film; Osama Salama, audio film; Stephan Schwartz, interviews; Beverly Humphrey, interviews.

The Photography and Audio Teams were established so that there would exist an unimpeachable real-time, audio–visual record of every aspect of the experiment.

ELECTRONIC REMOTE SENSING SURVEY

Prior to conducting the side scan sonar electronic remote sensing survey, indeed prior to our departure from the United States, several Respondents had indicated possible sites in the waters in and around the Eastern Harbor and had marked them on their maps (see Figure 3).

Additional information was volunteered once we were on site, both before the work in the harbor was even thought possible (because of government restrictions) and, subsequently, but before Edgerton arrived in Egypt and fieldwork began.

We considered this volunteered underwater material to be particularly significant because no questions specifically directed toward underwater sites had been included in the initial Alexandrian probe. Experience has shown that one should pay particular attention to remote viewing data volunteered outside the scope of the questionnaire.[10] Three areas of particular interest emerged in this manner (see Figure 5: ceramic target, sonar record 8:46, and the barge wreck).

A side scan survey was designed to cover all the volunteered Remote Viewing sites as well as non-RV selected areas, chosen by Edgerton, based on his best judgment, which were to act as controls. This work began on May 8, 1979, and continued for the next four days, hampered almost continuously by the extreme amount of particulate matter suspended in the water. The results were disappointing, as Edgerton's very short report makes clear:

EASTERN HARBOR SIDE SCAN SURVEY
By Harold Edgerton

> This report covers the use of an EG&G side scan sonar at the Eastern Harbor of Alexandria as requested by Stephan Schwartz, Research Director of the Mobius Group, Los Angeles, California. I left Boston on May 1, 1979, taking with me an EG&G type 259 side scan sonar which is especially useful for the underwater search areas where artifacts protrude from the sea's bottom.
>
> A map of the Eastern Harbor of Alexandria [see Figure 5] with dotted lines indicates some of the survey paths where navigation was made by Mohamed Rashad of the Egyptian Hydrographic Service. He used two sextants that read onshore points.
>
> One sonar trace, taken on May 13 from 8:46 a.m. to 8:50 a.m., corresponds with the course shown on the above chart of Eastern

Harbor [see Figure 6]. Attention is directed to the location of the "ceramic" target which is 65 meters from the present seawall, on the east side of the harbor.

A second trace [see Figure 7] from the side scan record shows a vertical view of the same "ceramic" target since the course of the survey ship went directly over the target.

I measured the height above the sea bottom of this target to be 1.2 meters."

Why was the side scan survey so disappointing? Perhaps because of the heavy particulate in the water.

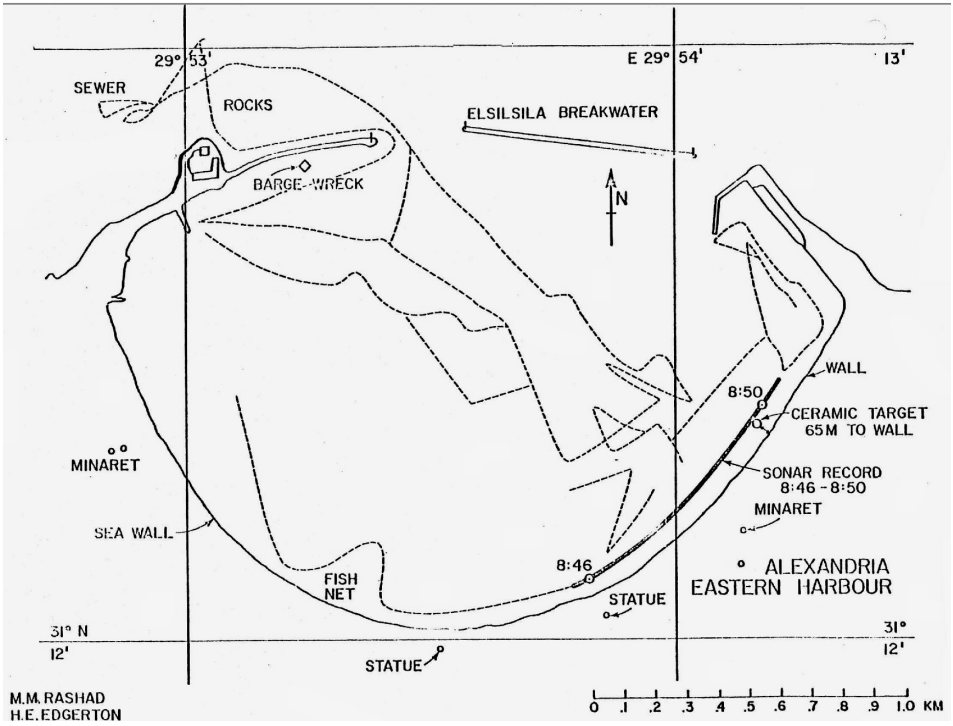


Figure 5. The side scan survey was done in such a way that it covered the sites selected by Remote Viewing, as well as non-RV selected areas, chosen by Edgerton, based on his best judgment, which were designed to act as controls. Nothing was discovered except in the RV-selected areas, and most RV sites produced no side scan "hits."

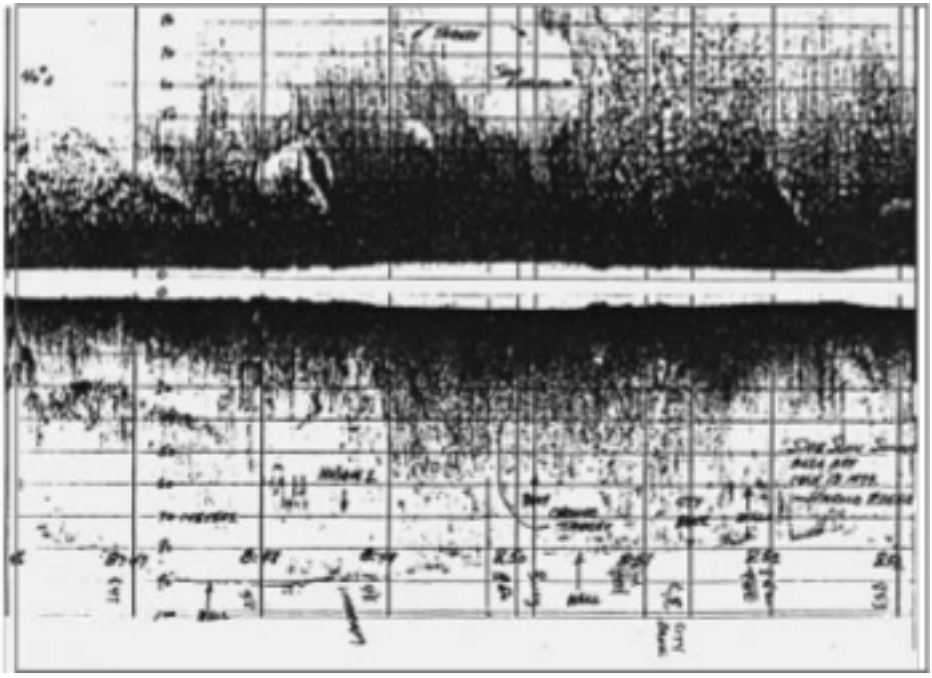


Figure 6. The side scan sonar track from 8:46 to 8:50 a.m. on the morning of May 13, 1979, showing the "ceramic" target at the site Remote Viewers felt would mark the ancient seawall. It is approximately 65 meters from an existing corniche wall and suggests that the Greco–Roman city has subsided far more than was previously appreciated.

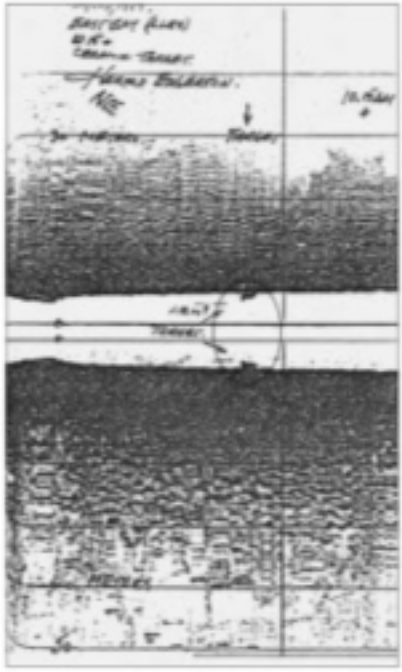


Figure 7. Side scan trace showing "ceramic" target.

PHASE ONE FIELDWORK

During the side scan survey, we made several initial dives on sites identified by side scan electronic sensing or by Remote Viewing.

A note of caution about the precision of our locations: It proved very difficult to shoot a transit on a diver or a buoy from the shore, so some variance, measured in a few meters, must be understood. For ease of comparison between the various data sources, the sites covered by the first phase of fieldwork are presented with the following structure:

Literature Review
Side Scan Sonar
Remote Viewing
Field Observations
Summary

Central Harbor, Site 8—The 8:46 Site

Literature Review. A massive pillar was discovered at this site, and we began a search for some mention of such a large column in the classical literature sources but found nothing that could be directly correlated. Henry H. Gorringe, a former naval officer hired to bring back one of the Cleopatra obelisks to New York, does make a reference to what we think is the same column, although it adds little and is so vague about exact location as to be useless for that purpose: ". . . about one hundred yards from the beach. [A measurement made from somewhere on the shore prior to construction of the present corniche.] There is a broken column sticking up from the bottom of the sea, nearly equal in diameter to Pompey's pillar" (Gorringe, 1882).

Side Scan. The "8:46" site was described by Edgerton and nicely outlined on the trace, demonstrating that the side scan not only tested as operating correctly, but also demonstrated that it was functioning properly (see Figure 6).

Remote Viewing. Site location volunteered by Respondent R3 with the description of a large column.

Field Observations. 8:46 proved to be a large Aswan granite column lying on its side. The dimensions of the column (about 4 meters long by 2.5 meters in diameter). No other pillar even approaching its

dimensions was found in the vicinity. One diver reported that he could feel a base to the pillar, and the trace suggests this (not the column that may have been what the sonar registered), but we could not see it since it lay beneath a thick layer of sand and broken shells.

Nearby, perhaps 9 to 10 m away, and unrelated to the sonar hit, evidence of what we now believe is the ancient seawall was discovered.

The diver who first located it said it seemed "almost like ceramic" and that the fragment ran parallel to the corniche.[11]

Diving the next day resolved this odd description: The discovery was not, in fact, ceramic, but rather brick and stone "welded" by time and overlaid by marine growth.

Summary. This site was the one clear side scan "hit" (Figure 6 and Figure 7), although there is confusion as to whether it was the base or the column that triggered the sonar trace. The Archaeological/Historical Team felt the column must be commemorative rather than structural, particularly since nothing else remotely like it was found at the site. We think this is the same column described by Gorringe, and the fact that it is no longer visible from the surface provides some measure of the change in the quality of the harbor over time. Beyond the find itself, the placement of the column was significant, because it supported the location of the ancient seawall as being much farther out to sea than was previously thought. As for what we now believe to be a seawall fragment: At the time, this small section was not large enough to lead to any conclusion.

Central Harbor, Site 8

Literature Review. Since this site figures prominently in the next phase of fieldwork, the description and the corresponding correlations with various literature sources will be presented below.

Side Scan. Site Surveyed. No contact data.

Remote Viewing. Respondent R11 selected this site by Remote Viewing from his home in Los Angeles, as he answered the first Map Probe questionnaire. The Respondent provided no specifics relating to the site or its contents except that, "it was an important site".[12]

Field Observations. The floor of the harbor was literally strewn with columns and bases, all of Aswan red granite, and all of which were clearly in situ, since the columns all point in one direction and

many had fallen so as to break into obviously associated fragments. The site itself was on a slight rise or mole, although silt deposition over the centuries had reduced the differential between this area and the surrounding sea floor.

Summary. Site 8 (see Figure 13), was the most visually interesting of the sites located in the harbor proper during the Phase One Fieldwork. From the very first dive in this area, it was clear that this was a major site. Even at this early stage, both Daod and Abbadi (who were present in the dive boat when the divers surfaced and reported; Figure 8) felt that the type and configuration of the ruins corresponded closely with Mark Antony's Timonium.[13]

Figure 8. The first author and Kathi Peoples reporting what they have seen to the archaeology team in the boat above them, while the film crew records the exchange.

Central Harbor, Site 4

Literature Review. Nothing specific to the site.

Side Scan. Surveyed, no contact data.

Remote Viewing. Volunteered site. Remote Viewing data from R3 while at his Canadian home during the first Map Probe. Site associated with the ancient seawall, which R3 felt extended in antiquity considerably farther out into the sea than is presently the case (see Figure 13 and Figure 28).

Field Observations. Divers found what seemed to be another section of the seawall. The discovery of this site, also approximately 65 meters farther out into the sea from the present-day corniche, provided further support that we had, indeed, located the ancient seawall.

Summary. The decision was made to reexplore this site in Phase Two.

Fort Silsila / Point Lochias, Site 5

Literature Review. Strabo describes this site by saying: "Lochias with a royal palace upon it" (Strabo, 1949, p. 9). Such word pictures seem clear at a distance when reading them but, when one considers them while on site, one realizes the words are subject to more than one interpretation. Even Fraser seems to get confused when describing the area around Lochias. The problem is further complicated because the eastern peninsula of the harbor which Strabo saw, writing his famous history sometime between 27 BCE and 14 CE, was a very different geographic configuration than the one that Saint-Genis saw in the 18th century, or that Mahmoud-Bey saw in the 19th century (Mahmoud-Bey, 1872),[14] and quite different from the one we see in modern Alexandria today (see Figure 9).

Side Scan. Site surveyed. No contact data.

Remote Viewing. Volunteered Site. Respondent R11 selected Site 5 along Fort Silsila's western flank, and provided a general description of important buildings (see Figure 13 and Figure 26).

Field Observations. The present-day Lochias is a relatively uniform low-lying finger of land whose perimeter is lined with large concrete blocks. It is now virtually concreted over and used as a military installation. In times past it was both much wider and more irregular than it is today (Fraser, 1972, Vol. 1, p. 23). There has also

Figure 9. Modern day Lochias.

been considerable subsidence of the land, which only complicates an already-confusing picture. Because of the military security regulations, only two dives, one with one diver and the second the next day with two divers, were permitted, slightly inside the security perimeter in and around Site 5. The first diver reported a 300-square-meter floor of blocks or mosaic approximately 20 centimeters square. A buoy was dropped to facilitate location the next day, but when we made our second dive we encountered what was to prove a continuing source of frustration. Although the buoy was in place, the currents in the bay had shifted and the site was now covered with sediment. Divers reaching down through approximately 20 centimeters of sand could feel the blocks beneath their fingers.

Summary. At the time we were diving security regulations prohibited foreigners from approaching to within closer than 300 meters from the peninsular shoreline (AREN, no date).[15] We decided to pursue a waiver of the restriction for the next phase since unbidden Remote Viewing had indicated a site within the restricted area, and diver exploration had already discovered the floor.

Western Side of the Harbor, Sites 1 and 2

Literature Review. Nothing specific to site.
Side Scan. Area not surveyed.

Remote Viewing. The sites were selected but little specific descriptive material was provided.

Field Observations. Two divers checked this site, but it proved too dangerous to examine closely. This is the part of the harbor where pleasure and fishing boats are moored, and the boatmen all through the day moved their boats in and out of the harbor directly over where divers would be. They were unfamiliar with diving, had no sense of divers being in the water, and did not appear to recognize the divers' flag. During the short dives, however, we saw what seemed to be remnants of some construction, and we brought up some broken amphorae (see Figure 25), a kind of clay vessel usually a few feet long, used in antiquity to carry cargo like oil or grain.

Summary. This site should not be attempted until some way of protecting the divers from boat props can be set up.

Kait Bey—Pharos, Site 7

Literature Review. (See Phase Two Fieldwork.) We learned in Alexandria from local archaeologists that four years earlier an archaeologist, Honor Frost, had been permitted to do a very limited number of dives in the harbor and that the Archaeological Society had a copy of the manuscript. The day before we were scheduled to dive at Kait Bey, we read it and found that Frost had dived at Kait Bey. She was not able to spend enough time to do more than say there seemed to be a number of structural antiquities in the area, and she had seen a statue on its side (Frost, 1975). The Frost report described a number of structural antiquities in this area, such as statues. Since the remote viewing data we had already developed significantly matched her report, we made this site a higher priority for further exploration. Much of this matched the remote viewing data we had but had not yet dived on to confirm. Getting this confirmation about the accuracy of the remote viewing made this site a particularly high priority for us.

Side Scan. Site surveyed. Because of the large stone blocks used in the breakwater construction, it was impossible for the sonar survey to differentiate any possible antiquities from the modern breakwater installation (see Figure 10).

Remote Viewing. Two months before coming to Egypt, George McMullen, R3, voluntarily provided considerable information concern-

Figure 10. The Kait Bey Fort as seen from the sea entering the harbor. The Pharos Lighthouse site discoveries are clustered around the base of this promontory. Note the modern breakwater blocks.

ing the Kait Bey peninsula and the lighthouse, which he found very interesting. He had drawn it as it may have appeared during several periods of its history.[16] During late March of 1979, when Mobius was concentrating on the land phase of its work in Alexandria, McMullen began again to volunteer information about the lighthouse, and that remote viewing data, coupled with descriptions from other viewers, is what convinced us to mount the diving expedition covered in this report.

After the first quick exploratory dive, an on-site session was conducted with McMullen on May 12, 1979. This produced both a detailed drawing of the lighthouse, and the observation that the building was constructed of "red granite".[17] Of particular interest was his description of "round stone things" (Figure 20),[18] which could not be directly correlated with any objects described in ancient sources, nor anything seen on the single dive. This is a good example of a Remote Viewing observation with a low a priori probability. Additionally, things in the first Map Probe also prompted us to search an area approximately 20 meters away.

Field Observations. In this phase of the fieldwork, because of both the sea state and yet-to-be-resolved permissions, we were able to do have only one diver do one 20-minute dive. On the western side of Kait Bey, the diver reported what seemed likely to be a sewer outlet and, on the eastern side of Kait Bey, what appeared to be building remnants. At the site 20 meters out to sea, he found a wall remnant that may be the channel and dam mentioned by Jondet (Jondet, 1916, pp. 48–50).

Summary. The Remote Viewing data suggested there was much to be discovered at this site, and even that one dive made it obvious that this site would be a high priority for the Phase Two Fieldwork.

Phase One Fieldwork Conclusions

With the exception of the 8:46 Site, where the commemorative pillar was found, the side scan sonar phase of our survey was generally disappointing. It was equally evident that Remote Viewing proved to be a very efficient search technology. In the absence of side scan contact data, sites that could have taken days or even weeks to find using grid search techniques were found in minutes. Regardless of how sites were located, it was immediately obvious to everyone that the Eastern Harbor held a promise of archaeologically significant finds more than equal to our most auspicious expectations.

PHASE TWO FIELDWORK

The success of the initial phase of fieldwork led us to conduct a second Map Probe (see Figure 13) using the protocol already described. Questionnaires and a new chart were sent out on October 17, 1979, to nine Respondents. This probe was specifically focused on underwater sites. The charts and questionnaires were all returned on or before October 23, 1979. It was immediately evident that the results were unusually consensual, and overlapped with sites from the first Map Probe (see Figure 5). After analysis, three main areas: Sites 7, 4/8, and 5/9 comprised our first priority. Two additional areas, Sites 10 and 11 (see Figure 5, Figure 13) were targeted for examination as a second order of priority. Sites 1, 2, and 6 made up a third tier of work.

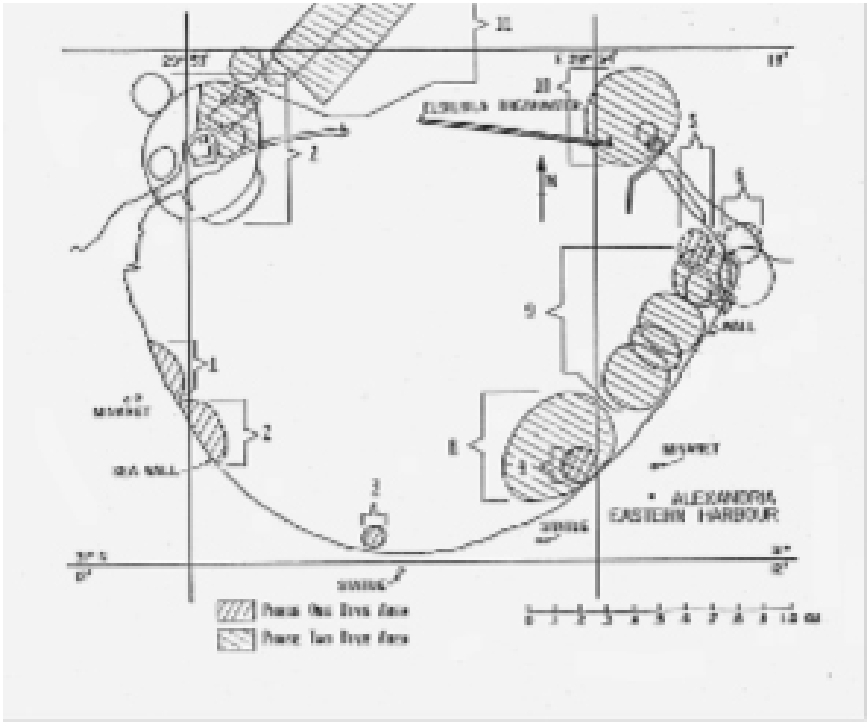


Figure 13. The dive chart was derived from both the first and second probe Composite Maps. Each circle was originally drawn by an individual Remote Viewer. The sites were first surveyed using side scan sonar and then explored by divers during one or both phases of fieldwork.

Pharos, Site 7

Literature Review. Strabo describes the Lighthouse as ". . . at the extremity of the isle which is a rock washed all around by the sea and has upon it a tower that is admirably constructed of *Leucos lithos*"—which has sometimes been translated to mean "white marble" (Strabo, 1949, p. 25). This sounds rather simple but it is not. To begin with the area now known as Kait Bey was, in fact, originally two islands with a double arch connecting them that allowed ships to pass between the harbors (Frost, 1975, p. 27). No clear picture of what this looked like survives (see Figure 11, Figure 12). Some authorities feel the lighthouse may have been built not where the Medieval Kait Bey Fort is now located, but upon a small islet, known as Diamond Rock, which now appears to be

Figure 11. An early depiction of the Lighthouse of Pharos.

Figure 12. A modern reconstruction of the Lighthouse of Pharos circa 280 BC.

unrelated to the main mass at the end of the Heptastadium, although as Jondet and Saint-Genis argue, it may once have been connected as part of a larger plateau, sections of which have now sunk (Saint-Genis, 1817, pp. 17–29). Fraser, however, argues against Diamond Rock being the lighthouse site (Fraser, 1972, Vol. 2, p. 44, cf 98).

Further confusing the issue is the question of what Strabo meant by *Leucos lithos*. We feel marble would not have been the material chosen during the time of Ptolemy Philadelphus (circa 280 BCE), when the bulk of the lighthouse's construction was carried out (Saint-Genis, 1817, p. 23). Marble is vulnerable to the sea air's corrosive effects and, even more compellingly, there is no proximate source. Historically, marble was sufficiently scarce and expensive that Alexandrian statues often had just their faces carved from it, so it is hard to imagine even the wealthy Ptolemies underwriting the cost of the tons of marble required to even sheath so large a structure.[19]

Frost presents an alternative hypothesis with which we subscribe: The building may have been covered by white or light-colored plaster (Frost, 1975, p. 128). This is certainly within the known parameters of Ptolemaic architecture (Frost, 1975, p. 128). The idea also finds an historical basis in a story told by Lucian, in which Sostratus (who may or may not have been the architect of the lighthouse) (Strabo, 1949, p. 25) wrote a dedication using his own name and then plastered it over, painting on this new surface a second dedication to the king. As the years progressed this superficial plaster covering wore away (one must admire Sostratus' acute sense of timing, revealing, safely after his monarch's death, the dedication to Sostratus which lay beneath; Fraser, 1972, Vol. 1, pp. 19–20).

It is significant that throughout the six dives made by Frost, she ". . . saw no white marble though we did find black marble in the sea" (Frost, 1975, p. 128). Frost's initial 1968 UNESCO-sponsored English effort found Aswan granite to be the principal ancient construction material remaining at this underwater site, and this accords well with the granite construction materials found at land sites (Frost, 1975, p. 128). This proved to be the case with our own diving experiences.

The literature suggests that much of the lighthouse fell into the sea beginning in 956 CE when 15 cubits (~6.4–8.5 m) toppled from the top of the lighthouse (Frost, 1975, p. 128). An earthquake in 1303 appears to have done even worse damage as mentioned in Ibn Battuta's 1326 report (Ibn Battuta, 1929). In 1349, when Ibn Battuta visited again, he found the structure in so ruinous a condition that it was impossible to enter or climb up to the doorway (Ibn Battuta, 1929). Shortly thereafter, it appears to have disappeared entirely from the Alexandrian skyline,

since eyewitness accounts of the ruins are not found in later reports.

Side Scan. Site surveyed. No useful contacts.

Remote Viewing. The second Map Probe produced a wealth of new material including McMullen's (R3) most complex drawing of Pharos (see Figure 14).[20] Additionally, the Remote Viewers outlined what seemed to be both temple and lighthouse remains, specifically describing statues, pillars, *heads*, 'stone beads', and square building stones.[21] The Lighthouse is considered to be one of the tallest in the ancient world, possibly as much as 122 meters in height.[22] Notably absent in all of the proffered remote viewing data was any description of the massive remains one would associate with a such a building. It is a classic example of a low a priori probability that is unexpected, and contrary to rational assessment, but nevertheless proves to be correct.

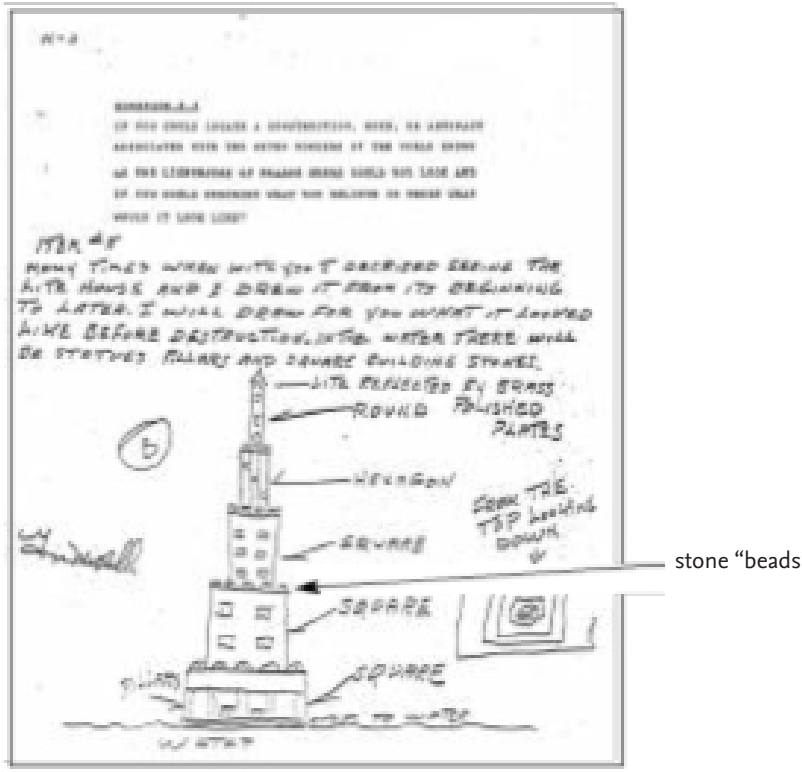


Figure 14. A copy of the original signed drawing of the lighthouse by George McMullen, R3. Note particularly the round stone "beads" ornamenting the first level and the references to the brass mirror.

Field Observations. Approximately 43 hours of diving time were allocated to the Pharos area during the second phase, with as many as six divers in the water at the same time. The average depth varies between 7 and 10 meters. Orienting ourselves on Kait Bey, we directed our search out from the breakwater in a "pie wedge" pattern, filling in each wedge before moving to the next one. We also directed similar search patterns diverging from finds made by the Frost/UNESCO program. These dives were conducted during October and November, the months generally considered by local divers to be the best "diving window" for these waters.[23] The water was certainly clearer than it had been during the early summer months, during Phase One fieldwork, but at no time would one have considered conditions ideal, because a voluminous amount of raw sewage outfall came from a sewer pipe just to the west of Kait Bey. On some days, but not others, it also made photography of the sites very difficult, so difficult that we had some drawings made from photographs because the particulate matter in the water was so dense that the photos when printed lost relevant details.

Diving is best carried out prior to 11:00 because the bottom current usually flows west from Kait Bey until then, when it reverses and returns the sewage to the east where the antiquities are clustered. The sewage then became so dense it could be smelled through one's mask underwater. *Until, if ever, this sewage issue is resolved, no diver, even when the sewers are not operating, should attempt exploration of this area without a full spectrum of protective injections to the maximum dose for bodyweight.*[24]

Further complicating the picture while we were diving, large cement blocks (~2.5 m x 2.5 m) were brought around by barge and dropped in the antiquities zone to either extend or build up the breakwater. The effect of this construction on antiquities was devastating.

This harbor work did result in one positive effect though. After the blocks were dropped, a heavy storm took place in Alexandria over the next two days, making diving impossible. When we returned to the site, we discovered that the storm had caused a shift in the bottom currents.

More than two meters of silt, composed mostly of sand and broken shells, had shifted, effectively lowering the bottom level. Happily for us, this revealed a host of previously undetected ancient structural remnants.

In general, the most interesting area was a sort of pocket zone

coming around from Kait Bey, looking east, beginning approximately 12 meters out from shore and extending from the fort around to the Kait Bey breakwater. Here, in spite of turbidity so bad that visibility was reduced to a meter or less, and underwater photography that was intermittently compromised, we found what were clearly the remains of a major structure.

The floor of the sea was almost carpeted with columns, plinths, pediments, blocks (one meter or more square; Figure 15) and other structures. At almost a bisection of the angle created by the Kait Bey fort and the breakwater, a sphinx was found. The sphinx was oriented on its right side and had no head (see Figure 16). It was approximately 2.1 meter long down the back and 1.25 meters high, with a thickness of just under one meter. Kemal Abu al Saadat, who was diving with us, agreed that this was not one of the sphinxes reported by the Frost group.

Slightly farther out and about 20 meters to the east, a very large

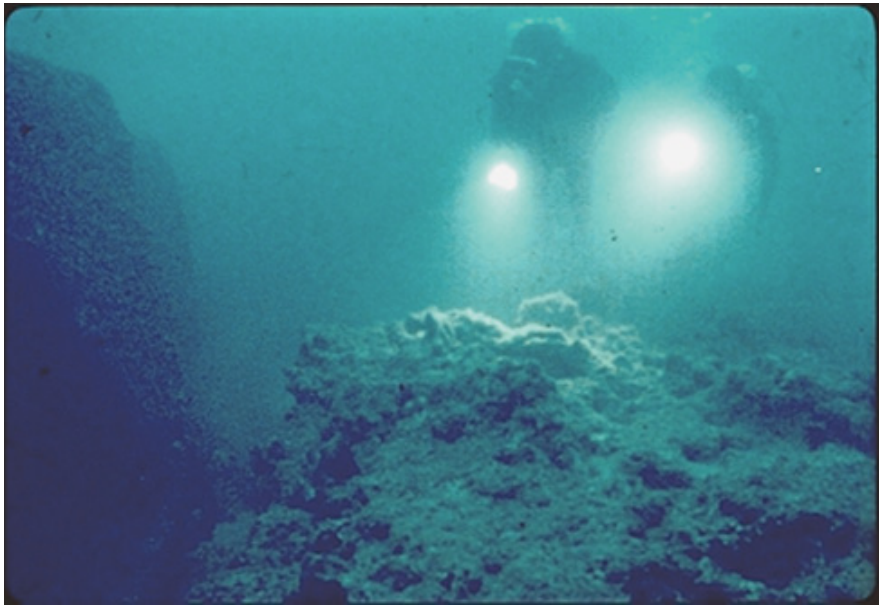
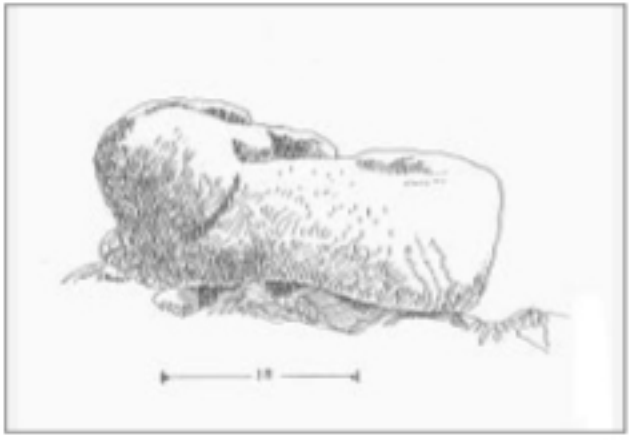


Figure 15. Divers looking at the massive stone blocks that were once the Lighthouse of Pharos.

Figure 16. This sphinx was found in a location selected by remote viewing, and was in the condition predicted and described. The photograph (above) was taken during a period when the particulate matter was very dense, and so a drawing (below) was made from a selection of such photographs to give a better sense of what the figure is like.



rectangular block was located (see Figure 17). This block was previously undetected. It was about 3.60 meters long, 2.70 meters wide, and 3.60 meters thick. Across what was almost certainly its top were incised a variety of small and large cuts, notches, and recesses (some of which are inside of each other), all of which are obviously human-worked.

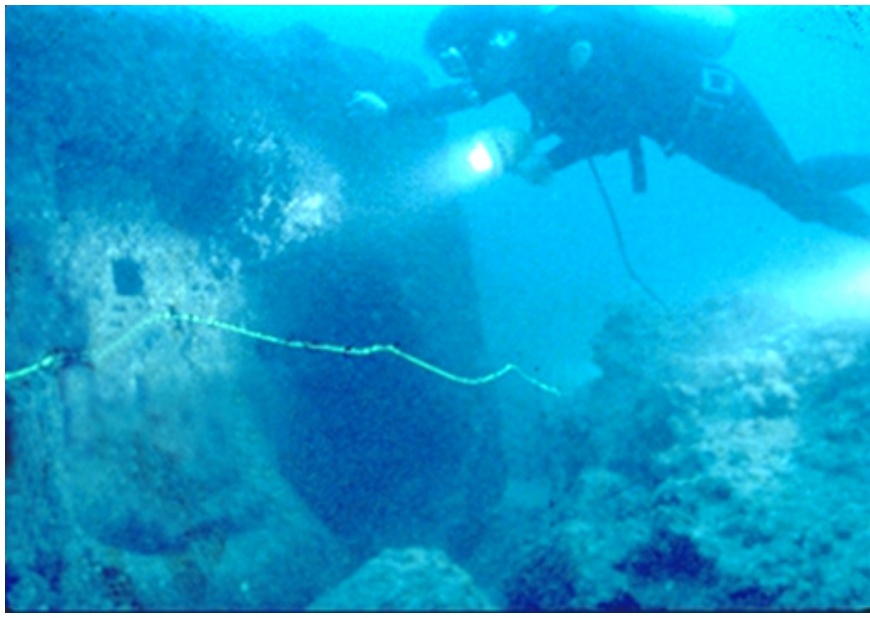


Figure 17. The first photograph ever taken of the Lighthouse of Pharos, one of the seven wonders of the ancient world. The massive scale of the stone blocks makes it clear that the Lighthouse and the surrounding area must have been every bit as impressive as ancient eyewitnesses suggest. Note notches in the base block.

Rodziewicz, when he was shown pictures of this block, provided a possible explanation. He felt that some of the smaller recesses, which were located inside the larger ones, had probably been cut to allow wooden wedges to be inserted to facilitate jamming a lifting ring in place. This allowed the block to be moved. The larger irregular recess was evidently to contain the base of a statue.[25]

Since this recess was over two meters in length it gives some idea of the impressive monolithic nature of the statue. Two other similar large blocks, both reported by Frost, were rediscovered in this area (Frost, 1975, pp. 128–129). Both exhibited similar sockets.

A 4.7-meter long Isis statue also reported by Frost (Frost, 1975, pp. 128–129) was refound. It had what clearly appeared to be a kind of lengthwise rectangular protrusion, possibly used to fasten it to a "female" equivalent in a wall, thus supporting Rodziewicz's explanation (see Figure 18).

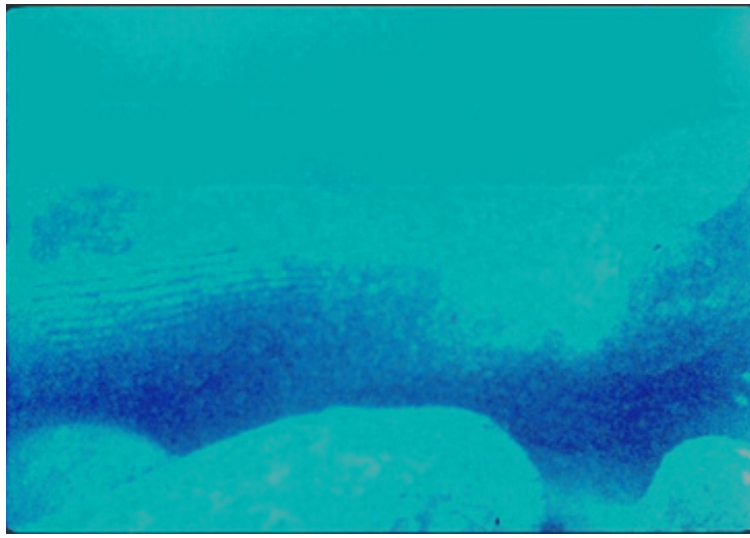


Figure 18. A portion of the Isis statue in the area where the remote viewing data said statues would be found. Note also the heavy particulate pollution in the water. In the color image the folds of the statue's gown can hardly be made out. This situation was not constant but varied day to day.

We did not find the Crown of Isis Hathor which Frost reported (Frost, 1975, pp. 128–129), and we suspect that the hide-and-seek nature of the shifting seafloor accounted for its disappearance. Another crown, however, was located. This one rested about 12 meters offshore. It was 1.8 meters long with Alexandria's trademark blend of Hellenistic and Pharaonic design elements (see Figure 19).

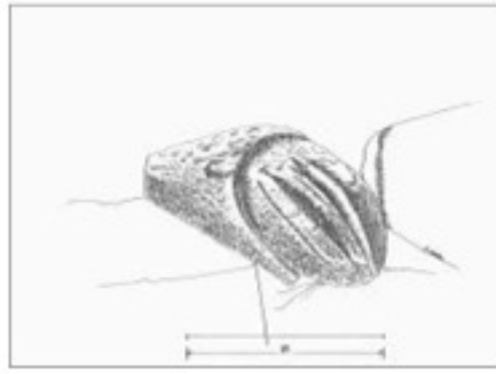


Figure 19. Osirian Crown shows a typical Alexandrian blend of Hellenistic and Pharaonic motifs. It is shown as a drawing because the particulate in the ocean water was so dense it made getting a clear idea of what was found difficult to discern.

The crown was deemed to be masculine by the Historical/Archaeological Team. They felt it was probably associated with Osiris, particularly in light of its proximity to Isis.

Close to the crown we located several clusters of the unusual stone "beads" predicted and described by R3 before the first phase of diving had begun. They apparently were exposed when the seafloor dropped, since we had not seen either them or the crown on earlier dives (see Figure 20). The beads were uniformly about 2.6 meters in circumference and, just as in R3's drawing, had holes approximately 20 centimeters across and between 15 and 20 centimeters in depth. They have archaeological significance, but equally they are an example of something predicted by remote viewing, which no one could have anticipated.

Figure 20. The "stone beads" described by remote viewing and found where predicted. They are shown as a drawing because the particulate in the ocean water was so dense it made getting a clear idea of what was found difficult to discern.

Summary. Although there was an impressive amount of structural material at this site, there was not enough to account for a building the size of the lighthouse, which confirmed what the Remote Viewing data had predicted. It is possible that much, indeed conceivably most, of the building did not fall into the sea but was hauled away for use in the construction of other buildings, possibly including the original Kait Bey Fort, and this would explain its absence. Remote Viewing provided an observation about this which we were unable to follow up on, but that we think deserves future consideration: During the course of an on-site Remote Sensing session with Respondent R3, he stated that much of the lighthouse material had been reused in the construction of the large mosque near where the fishing fleet is currently moored.

Remote Viewing descriptions of granite—rather than marble—also were confirmed. All the objects we found were formed from Aswan

granite, except for the sphinx, the crown, and several columns that were of either a gray granite or of syenite. One diver reported a white marble column, but on subsequent dives this could not be relocated.

Fieldwork seemed to confirm another Remote Viewing observation: Since much of the material we found was seemingly religious in nature, the Remote Sensing descriptions concerning a temple that was proximate to the lighthouse seem very reasonable. The sense of the archaeologists was that it was probably associated with Isis Pharia.

The fact that the majority of these remains are clustered in one area, and are evidently in situ, would also seem to argue that the temple site did not fall over into the sea but rather that the land upon which it was situated subsided.

Only further exploration and study will definitively resolve the issue of the missing lighthouse material and allow us to separate what are specifically temple ruins from lighthouse remains.

The absence of statues that might correspond with the bases that both the Mobius and the Frost groups discovered could possibly be attributed to deterioration of marble in the sea, although the Historical/Archaeological Team felt that something should have remained. Perhaps the statues were removed, possibly even destroyed, during one of the numerous civil confrontations which plague so much of Alexandria's history.

We did not resolve another lighthouse mystery: For centuries there has been a controversy over how the light from the lighthouse was focused—by a lens or a mirror? We can add little except to note that R3 described it as a "polished brass mirror arrangement" (see Figure 9). This seems to us more logical than the lens hypotheses and, although we searched for both, nothing was found. A mirror or lens could, of course, still be beneath the sands. However, we feel—particularly if it was a mirror—that it is far more likely such a valuable mass of metal would have been taken away for recasting.

No one to whom we showed drawings of McMullen's "beads" was able to shed any light as to what they were. Nothing argues against the Remote Viewing data, which suggested they were a decorative element lining the top of one of lighthouse's staged terraces. Indeed, this seems the most probable explanation.

Based on our fieldwork, it seems probable that Fraser is correct,

and that Diamond Rock was not the site of the lighthouse. We searched around Diamond Rock and found nothing that could possibly be identified as lighthouse remains.

Two final points deserve mention here: It is clear is that this was another instance where the "noise" overwhelmed the signal in the side scan survey. Also, that Remote Viewing provided accurate locations and site reconstruction data that contradicted the common wisdom.

Timonium / Poseidium / Emporium, Site 8

Literature Review. Strabo says, "Above the artificial harbor lies the theatre; then the Poseidium—an elbow, as it were, projecting from the Emporium, as it is called, and containing a temple of Poseidon. To this elbow of land Antony added a mole projecting still farther, into the middle of a harbor, and on the extremity of it built a royal lodge which he called the Timonium" (Strabo, 1949, p. 39). The site of the Timonium has always exerted a special fascination, since it was here that Antony reputedly fell on his sword; and it was from here that, still living, he was taken to Cleopatra (Plutarch, 1941, pp. 1756–1757; Frost, 1975, pp. 126–129).

But the question of the Timonium's exact location has remained unsettled.

Mahmoud-Bey placed it on his map of the city, along with an accompanying description, putting it about 650 meters from the site he described as the location of the Royal Harbor, on the west flank of Lochias (Mahmoud-Bey, 1872). Further, he stated that it projected about 200 meters from the coast, with an additional 300 meters of masonry construction projecting beyond that (Mahmoud-Bey, 1872). Hogarth, commenting on Saint-Genis' description, felt that what appears to be the remains of quays are probably ". . . merely the lowest courses of large walls . . . " (Fraser, 1972, Vol. 2, p. 21, cf 36). One difficulty is that even in antiquity the city underwent a period of partial desertion in this area. Ammianus Marcellinus indicated that as early as 273 CE much of the core area, including the sites of many buildings near the palaces, had been abandoned (Marcellinus, 1950, pp. 299–301). Approximately 100 years later another writer, Epiphanius, called the area a "desert" (Fraser, 1972, Vol. 1, p. 10).

Side Scan. Site surveyed. No contact data.

Remote Viewing. Respondent R11 picked a site which he associated with Antony, during the First Map Probe before we left for Alexandria. The Second Probe, which focused on the harbor, produced several overlays on this initial location. Respondent R4 actually used the word Timonium, saying: "There should be parts of columns of the Timonium and one small area at its tip reached by a small hole, this was Antony's small place of his own."[26] Respondent R9 described "a small amphitheater, very small, only room for about 20 people."[27] Respondent R1 picked the same area, but felt drawn to it initially because he believed that "there were also steps to a small building where Cleopatra walked."[28] In analyzing this data, it seemed to us that more than one site was involved, and that this must, collectively, have been an active center during the time of the Ptolemaic city.

Field Observations. As already noted, this site produced substantial finds during our first dives in the late spring of 1979, and became one of our primary targets for diving during the second phase. In all, 30 man-hours were spent diving on this site during the second phase.

Within the harbor, as at Kait Bey, diving is best done in the early morning. A current develops between 11:00 and 11:30, at which time the already turbid water becomes so heavily laden with particulate matter that it seems one is swimming in minestrone soup. Visibility by 13:00 was often reduced to less than a meter. Luckily, there is nowhere near the same amount of sewage as at Pharos, although patches still come in, as well as oil slicks from fishing boats and the usual floating detritus of most modern city harbors anywhere in the world. Strangely though, there is very little litter on the seafloor, found between 6.5 and 8 meters in depth. The bottom is mostly sand and broken shells with some marine growth extending up from the floor.

At the site selected by the Remote Viewers, we found what appeared to be a small peninsula; however we did not find it going out so far as Mahmoud-Bey described. There seemed to be a tapering off at about 80+ meters out. Also, as previously noted, the differential between the seafloor proper, and the level of the now-underwater peninsula is probably not as great as it once was. Today it averages (acknowledging that this could shift by a meter or more depending on the weather and sea currents) about one meter.

The first thing that strikes the diver's eye is the large number of broken columns. Although many were in several sections, they are clearly in situ—probably breaking as they fell—because they all point in a common direction, slightly eastward off perpendicular to the present shoreline. All were of the usual red Aswan granite and, collectively, they gave the impression of making up the long side of a building. Not only are they obviously associated but they are of uniform diameter, about one meter. There is also one fairly large (about 15 meters on a side average) "patch" of pottery. Numerous samples of pottery were discovered. Rodziewicz and Daoud made an initial evaluation that they comprised a mix of Roman and Hellenistic.[29] Their association with the site is, of course, strictly problematic at this stage.

Several bases without columns were discovered, as well as a number of capitals that were approximately one meter across. Unfortunately, the capitals were so corroded that no details could be ascertained except that they appeared to be carved.

At the northern edge of Site 8, there was a rise. Because we had spent so much time exploring closer in, and because diving was possible only a few hours each day, we were not able to explore this in the detail we would have liked. Two divers swimming over the area both reported that the rise may extend for some distance.

The issue of whether we were seeing the ancient seawall or quays was also settled through the subsequent location of a quay running perpendicular to the wall fragments we began discovering in Phase One Fieldwork. Additional portions of this seawall were discovered to the east of Site 4.

Summary. In light of these discoveries, we believe the ancient shoreline, lined with a brick seawall, ran approximately 65 to 75 meters seaward of the present corniche; the variation probably accounted for by the fact that the ancient harbor was not so regular in appearance as the present day's uniformity.

This site is obviously a series of major constructions. For all that, we found nothing that specifically seemed to us to be the small theater mentioned by the Respondents, but the fact that it was described and is known to have existed is provocative. We also did not discover Mahmoud-Bey's 300 meters of masonry, but it could well be there just under the sand.

This area is clearly worthy of a much more complete examination using equipment we did not have.

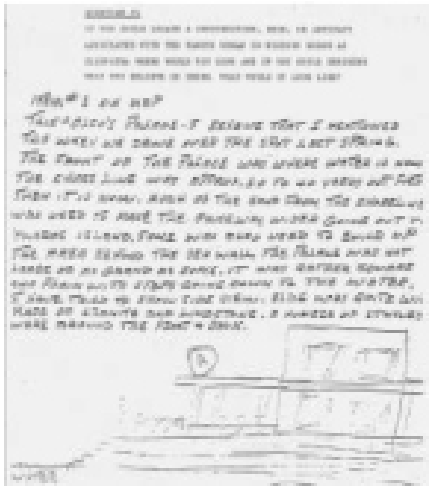
Western Side of the Harbor Including the Base of Fort Silsila / Point Lochias, Sites 5 & 9

Literature Review. Strabo says, ". . . one comes on the left to the inner royal palaces, which are continuous with those on Lochias and have groves and numerous lodges painted in various colors" (Strabo, 1949, p. 39; also see Phase One Fieldwork).

Side Scan Sonar. Site surveyed. No contact data.

Remote Viewing. Respondent R3 marked this area, and initiated his response with the flat statement that a palace associated with Cleopatra had once stood at this site.[30] He also stated that it was at the base of Lochias where Alexander had first sketched out his plans to build the city.[31] Respondent R4, in the second Map Probe, voluntarily traced out what she felt had been the ancient shoreline and stated also that palaces had been at the base while the Royal Harbor was nearby in the harbor.[32] There she also described a palace associated with Cleopatra the 7th (the only Cleopatra history remembers): "Cleopatra's palace overlooked the Royal Harbor."[32] Exactly where she meant the Royal Harbor to be was not clear. A palace was also described by R9 as having been in this area and both she and R3 drew pictures which have many similarities (see Figure 21 and Figure 22). Since we had already dived in this area when it was first selected back in the spring of 1979, it was with particular interest that we returned for a second examination.

Field Observations. All caveats about diving conditions for the Timonium/Poseidium apply here as well. There are substantial construction remains in this area but they lie mostly beneath the silt, where they can be felt but not seen. All that could be seen, at least while we were diving, were a few columns and one base similar to the ones found at the Timonium/Poseidium site; the measurements and description are the same. We also found a low rise about 40 meters out from a line obtained by bisecting the angle created where Lochias joins the shoreline. This rise has a kind of amoebic shape and appears to have constructions under the silt within part of the rise. The rise is perhaps 30 meters across at its widest point, although this was hard to estimate with any accuracy because of the silt, the very substantial weed



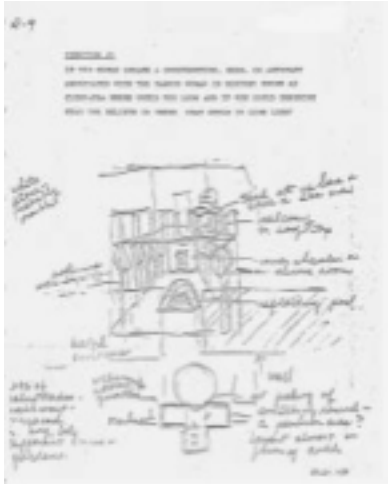


Figure 21 and Figure 22. Similar descriptions independently provided by two Remote Viewers, describing "Cleopatra's Palace." Note the absence of the Pharaonic motifs in each drawing, which are what is usually evoked when most people think of Egypt. A low a priori consensus such as this is considered particularly significant and is given precedence in planning fieldwork.

growth on the seafloor, and the very poor visibility.

Summary. Although this site was visually unrewarding, the fact that material was found, and that so many Respondents, who had been so accurate on so many other issues, picked this one area, leads us to believe that a much more extensive examination should be made. Strabo's description further urges this, since this may well be part of the Royal Complex he describes as the home of the Ptolemies including, presumably, the legendary Cleopatra the 7th.

In our view the rise we found is the other candidate site for the island of Antirrhodus which lay outside the Royal Harbor.

Tip of Point Lochias, Site 10

Literature Review. There appear to be no definitive references to this area, other than Strabo's statement that there was a palace on the tip of Lochias (Strabo, 1949, p. 39). This is possibly the palace to which Antony was taken after falling on his sword, the place of the final scene between him and Cleopatra. However, since the peninsula is so

grossly changed, one can hardly say where the tip that Strabo saw falls in relation to what is present today.

Side Scan. No survey of this area was made.

Remote Viewing. Two Respondents, R3 and R4, each picked a very small and almost exactly overlapping area at the end of the peninsula. Despite the paucity of classical and modern literature source material, and the fact that no side scan sonar was even attempted because the water was too rough, the remote viewing location was so specific that we decided to dive on the site. Viewers R3 and R4 both felt the site had something to do with Cleopatra, although they were not in agreement as to the association, describing it variously as a "tomb" or a "statue" that Cleopatra had built.

Field Observations: Our usual recommendations about diving safety obtained, because there is a sewer with an output equal to that of the Pharos outlet at the eastern base of Lochias whose outfall sweeps around the point (see Figure 9). The average water depth was about 8 meters and the water clarity, when the sewage was not present, was probably the best in the harbor area. The seafloor was also quite clean, with little weed growth and no litter at all. Only one dive, of about 45 minutes, was made here by three divers.

In exactly the area marked by R3 and R4, four large rectangular blocks were located. They appeared to be in situ and were of a size that made it unlikely that they could have been moved. They are not modern. However, because of their angle—they were in a rough line at about a 45-degree angle pointing westward from Lochias' tip—it is possible, although not probable, that they were antiquities dumped here at some later date to form a breakwater. The blocks were all of Aswan granite, and uniform in size and shape; about 3.6 meters long by 1.5 meters wide and 1.65 meters thick. A uniform lip sticking out approximately 10 cm and about 10 cm thick went all the way around one end. They reminded one of the platform bases for large statues seen at the Pharos site, but there were no recesses such as were found there. One of the four was broken and we sought to determine whether they were hollow. However, the break, about a meter in from the end, was positioned in such a manner that this could not be determined.

Summary. We could not evaluate the importance of this site, only note that it was situated precisely as located by Remote Viewing.

Open Sea – North of Kait Bey, Site 11

Literature Review. Nothing specific to the site.

Side Scan Sonar. No survey of this area.

Remote Viewing. Four Respondents chose this area. Two felt that the site was the location of a sunken boat (see Figure 23 for R5's drawing and comments; Arrian, 1942, p. 467). They each drew virtually the same drawing in describing the boat (see Figure 24 for R3's drawing).[33] R3 felt there should also be a statue(s).[34] R8 felt the site was related to the ancient lighthouse.[35]

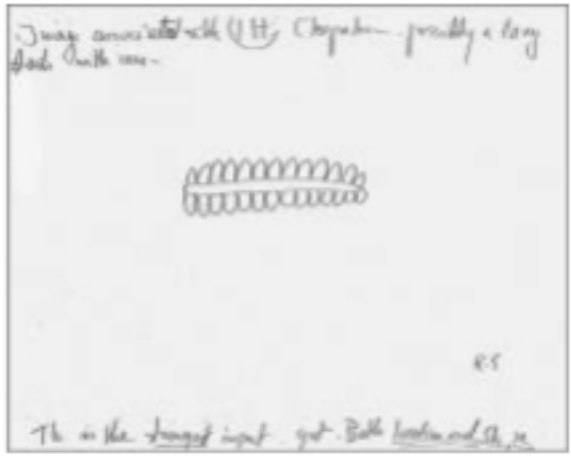


Figure 23. One of two "boat" drawings and descriptions which, along with location, came from Remote Viewing sessions.

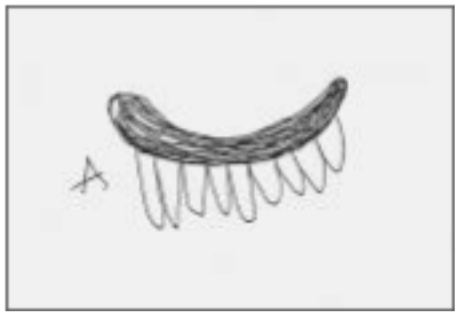


Figure 24. A second viewer, blind to the first, provided essentially the same location, description, and drawing. The repetitive pattern could be oars or amphorae—which were found on site.

Field Observation. The morning of the dive, the Egyptian diver Saadat, who had been told nothing of the remote viewing perceptions, when asked about the site, said that in 1961, he had been diving at this site and had found a boat with two statues aboard as cargo. He went back to the spot several times but because of the shifting sands nothing could be identified and he had not been able to find either the boat or the statues. We dove on the site and went over the area in detail. We could find neither the boat nor the statues remote viewing had predicted and Saadat in his earlier dives had confirmed. However, there were odd suggestive raised areas beneath the silt, and we found several mostly intact amphorae, commonly used as cargo containers on the cargo boats that trafficked in and out of the harbor in antiquity (see Figure 25).

Figure 25. Amphorae used by ships to transport goods found at a site located by Remote Viewing, and described as being associated with a shipwreck.

Summary. Saadat's earlier experience, which confirmed the remote viewing data before we dived, was reconfirmed, and this suggests that this site is worth further exploration.

East Side of Point Lochias, Site 6

Literature Review. The same material cited for Site 5 may be relevant.

Side scan. No survey.

Remote Viewing. There has been considerable subsidence at this site and much silting, but it was clear this is what must once have been a palace or impressive administrative structure.

Field Observations. Ruins are visible nearby from the surface on clear sea days. Modern construction has seriously disrupted everything at this site. Two divers reported what seemed to be constructions, which could not be seen, but which could be felt beneath the silt.

Summary. Unless sites like this are explored in the near future, it is likely it will never happen. As at the tip of Lochias, and around Kait Bey, modern harborworks are rapidly precluding future study.

DISCUSSION

Although this paper presents only a preliminary survey of a complex area, we propose that several independent, yet associated, conclusions can be sustained.

1) **Archaeology.** First, the locations and reconstructions we made, when added to what was already in the literature, make it clear that the Eastern Harbor and environs are a neglected locale for underwater archaeological examination, and one which holds enormous promise. Except for the bothersome output from the sewers, the diving is technically simple, there is no area requiring decompression allowance, and the rewards are great. We view it as a tragedy that so little has been done in this area, although we recognize that until recently political conditions did not permit foreign divers access to these waters. However, under Dr. Mohammed Hilmy, then the governor who was himself a scholar and for many years professor in the field of Urban Planning at the University of Alexandria, a new science orientation emerged in the governing administration. One manifestation, The Department of Antiquities, has also recently demonstrated some interest in the exploration of the harbor.

The work at the sites located has only begun and, obviously, there is a great deal to discover. It is our hope that the entire Eastern Harbor

area can be declared a protected underwater archaeological park, and a sustained multi-year program, similar to that being carried out by the University of Warsaw at Kom El Dikka, funded and begun.

The fieldwork also calls into question some ancient sources, notably Strabo. The complexity of the finds at what we have designated Site 8 suggests that his description of the Eastern Harbor in 24 BCE may be skewed. The things he says were there seem to be there, but not quite where he places them.

2) **Comparison of Electronic and Remote Sensing.** It is obvious that Remote Viewing was more productive than side scan as a search approach, in this setting. Even if the sea conditions had allowed for a more successful side scan survey, doing it would have taken weeks or even months. That is another difference between electronic remote sensing and remote viewing. In remote viewing there is no search. One goes to the selected location and finds what has been described or one does not.

With remote viewing guidance, it never took more than a few minutes to locate the site. There are many benefits: a) It is cheaper to search in this manner. b) Even if electronic remote sensing is used, its employment can be much more focused (if Remote Viewing fails one can always fall back on standard electronic search protocols). c) In underwater archaeology, where time is always an issue, it is more efficient to use Remote Sensing. d) The "worst" case scenario using Remote Viewing, is the "best" case scenario to be obtained using electronic sensing alone. This does not mean we are arguing for the abandonment of electronic sensing, quite the contrary. Our view is that these two approaches are best employed together in both a complementary and comparative manner.

3) **Remote Viewing Accuracy.** It is not clear that the various types of Remote Viewing data should all be given equal weight, and this is the most pressing problem facing this technology. The location data worked very well. The descriptive material was also impressively accurate. The Stone "beads," with their small holes, are a good example. The part that is not clear yet is whether the analytical material, i.e., that this site was associated with Mark Antony, will prove to be equally correct. Our initial conclusion is that it will not. Remote Viewing has not proven very useful for analysis or subjective judgments, i.e., how

many times does a person have to be in a building to be associated with it? But we lack the relevant information to be clear about this. Only further experimentation will answer the question.

4) **Issues of Blindedness.** A problem whose answer was known neither by researcher nor Remote Viewer, but which was known by someone or some literature source, would be double-blind; a question whose answer was totally unknown, to be revealed only through fieldwork, would be considered triple-blind. The Eastern Harbor experiment included sites where varying degrees of blindness obtained. Certain locations, most notably the Lighthouse of Pharos, were known in at least a general sense. Others, such as the site on the flank of Fort Silsila / Point Lochias, were not.

The Respondents probably did not have access to the rare or obscure books or manuscripts which contain the information cited in the Literature Review sections of this paper, and did not know they were going to be asked about these subjects, until they were. But the possibility exists that some general knowledge or just good luck could account for some of the Remote Viewer's success.

It is also true that even where the general location was known there were still opportunities for triple-blind work in the location and description of previous unknown material within the site. The experiment as a whole illustrates how applied Remote Viewing experiments differ from laboratory research. In an applied experiment, success ultimately turns on whether the site being sought is found or not, and whether the reconstructive material is accurate. This is in contrast to laboratory research where evaluations of accuracy ultimately are statistical.

5) **Final Evaluation:** We believe the most conservatively accurate assessment of this survey project would be that the literature review was more useful than side scan sonar data, and remote viewing—particularly in locational terms—was more valuable than either. The mechanism of remote viewing may not be well understood but, operationally, using this methodology clearly produced significant original and supplementary locational guidance as well as providing accurate predictive reconstructive information, all confirmed by diving fieldwork and expert evaluation. As hypothesized, the use of all three information sources working in concert produced optimal results.

POSTSCRIPT

There are two other aspects to this research that are significant and need to be included in this report: Reconfirmation of the expedition's success, and the media. I have described both of these issues at length in my book *The Alexandria Project,* but want to just touch on them here.

Reconfirmation

After our work was completed, Professor Mieczyslaw Rodziewicz, generally regarded as the most knowledgeable working archaeologist on Alexandrine archaeology, made his view clear in a filmed interview. He said: "As an archaeologist [with 20 years experience working in Alexandria], I would say the discoveries are of the highest importance, because they extend the plan of the ancient city. I would classify this as much more important than the discovery of the tomb of Alexander the Great, because this extends our general knowledge of one of the biggest cities of the ancient world."[36]

In the Fall of 1995, a French–Egyptian archaeological team involving some of the Egyptian archaeologists who had worked with Mobius in 1979–1980, and who knew all of our findings, announced the results of a much longer survey they had conducted. Every site located and described by the remote viewers was confirmed, as this map makes clear (Figure 26).

Media

On January 11, 1980, we presented this paper at the annual meetings of the Society for Underwater Archaeology in Albuquerque, New Mexico. A reporter was in the audience, and he filed a story, mentioning that one of the sites found had been the palace of Cleopatra. The reaction was like calling down lightning. The story seemed to move almost instantly across the wires, starting a cascade of calls. In retrospect, it seems appallingly naïve that we didn't anticipate this. But we didn't.

The three major broadcast networks at the time ran the footage they had urgently requested for their evening world news the following day. The next day I stepped outside in the early morning, hair awry, clad in nothing but a galabeya—a kind of long Egyptian nightshirt—to get my morning paper and found, as the door clicked firmly behind me

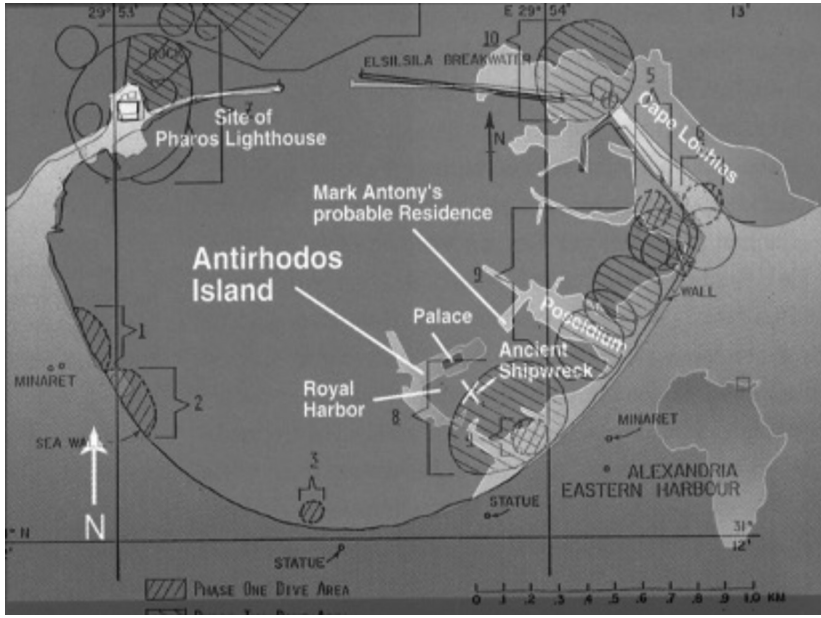


Figure 26. The original Mobius remote viewing master map overlaying the 1995 French–Egyptian team chart reporting their findings.

trapping me in place, three news crews in my driveway, their cameras pointed at me like big game guns about to fire.

I soon learned that newspapers all over the world had put the story on their front pages. Here's *The Washington Post*'s front page first story (Figure 27).

A year later I presented a second paper from the Alexandria expedition, this time at an archaeology conference held at the De Young Museum in San Francisco, a paper recently published in this *JSE* journal (Schwartz, 2019). It described the location and description of a previously unknown Byzantine site in the buried city of Marea in Egypt, about 40 kilometers into the desert outside of Alexandria, and the day after it was presented the whole media madness started again. The Marea paper, like this paper, used the same consensus protocol, and like this paper compared electronic remote sensing and remote viewing (Schwartz et al., 2019). As with this paper, it reported that electronic remote sensing had failed where remote viewing had succeeded.

In the years since the work reported in this paper, I have carried

The Washington Post

Democracy Dies in Darkness

Cleopatra's Palace Believed Discovered

January 13, 1980

What a team of underwater archeologists suspect may be the ruins of the palaces of Cleopatra and Marc Antony have been found in 20 feet of water in the eastern harbor of the ancient city of Alexandria in Egypt.

The discovery of large stone columns embedded in the mud of Alexandria harbor by divers has prompted them to say they discovered the ruins of the two places. The divers did not return any of the columns to land. Instead, they photographed the columns and presented the photographic evidence at the eighth annual Underwater Archeological Conference in Albuquerque Friday.

Bruno Crespi, a spokesman for Mobius, that besides the stone columns divers had found the remains of marble and granite statues in the harbor at a different location that he says he feels came from an

Figure 27. Front page of *The Washington Post*, January 13, 1980.

out a number of other archaeological projects all over the world using remote viewing, and comparing that information with data developed through electronic remote sensing (Schwartz, 2019; Schwartz & De Mattei, 2020). In every case remote viewing proved successful while electronic remote sensing was not. And because it was all filmed, recorded, and under the direct observation of recognized historical and archaeological specialists, none of this work has been attacked by the usual deniers of nonlocal consciousness research, and I think that is an important point.

ACKNOWLEDGMENTS

We wish to acknowledge and thank The Honorable Dr. Mohamed Fouad Hilmy, Governor of Alexandria, under whose personal auspices this research was carried out, for his many kindnesses. We thank also Dr. Youseff Garianhi, Director of the Greco–Roman Museum, and his staff, for their assistance in the literary research that went into this paper. Our thanks also goes to Rear Admiral Aly, AREN, Commander of Egyptian Naval Forces in Alexandria, for making it possible for the commando dive team in his command to work with us. Captain Mosehn El-Gohary, AREN (Ret.), and Captain Shafik Wahden, AREN (Ret.), principals of the Red Sea Divers Service, we wish to thank for their almost miraculous

ability to locate equipment we needed. Finally, and most particularly, we thank John and Pamela Leuthold, Mrs. Margaret Pereria, Trammell Crow, and Gordon McLendon without whose generous financial support the project could not have been undertaken.

NOTES

[1] Fraser's three-volume work (Fraser, 1972) is unquestionably the finest overall modern source, although there is no formal bibliography as such. References are included in the copious notes, often in abbreviations which may be cryptic to those not thoroughly familiar with the source literature on Alexandria. One can do no better in seeking to understand trade during the Ptolemaic period, and to a slight extent later, than to review Fraser's Volume I, Chapter 4.

[2] Reports of underwater ruins abound, but perhaps the best are those contained in *Description de l'Égypte* (Commission des sciences et arts d'Égypte, 1809–1922), which was prepared by researchers accompanying Napoleon during his incursions into Egypt. These men wrote with a standard of observation which at least anticipates the modern day, and they had the benefit of seeing Alexandria before the Khedival and later constructions began. In *Description de 'Égypte,* see especially Saint-Genis in *Antiquities,* Vol. 2 (1817), Chapter 26, pp. 1–95, particularly *Section Premiere, Partie Maritime*, pp. 12–14; also *appendices,* pp. 1–12, also Gratien le Père in *État Moderne,* Vol. 2, 2 parts, pp. 262–324.

[3] Alexandria's shoreline has actually been in a state of man-made flux since the city's founding—the causeway from Heptastadium to Pharos Island being an example. But the late 19th century saw the major changes. In the 20th century the shoreline itself—if not the structures on it—has been relatively stable.

[4] We were never able to locate any written record of this work, although Frost references its occurrence, and several of our consultants remember it taking place, although not exactly what happened; it apparently was very informal.

[5] Although very limited in scope, Frost's work (1975) was the only prior modern survey report of the Eastern Harbor we were able to discover.

[6] Eight Egyptian citizens who had lived most or all of their lives along

the seafront were interviewed; their median age was 63. They reported that within their lifetime, to the east of Lochias, and particularly beyond the Chatby area, the city had been largely vacant. Governor Hilmy reports that, "Alexandria for several decades has had a chronic overpopulation problem which has fueled an extremely active building program. . . . Much that was vacant and even the former gardens of villas have had to be built upon" (personal communications, May, 1979).

[7] The construction of this shoreline has caused enormous problems in establishing any stratigraphic context on finds near the shore (see Fraser, 1972, Vol. 2, p. 13, note 31).

[8] Harold Edgerton, personal communication, May 8, 1979.

[9] Norman Emerson, Department Anthropology, University of Toronto, interview on November 14, 1974. Emerson began reporting on his work using Remote Viewing in 1974 and continued until his death in 1978.

[10] Although we find no research specifically designed to evaluate the accuracy of volunteered vs. elicited data, numerous researchers mentioned the subjective conclusion that "volunteered response material which the sensitive himself feels is worthy of mention, seems often to be more accurate than subject areas predetermined by the researcher."

[11] Diver report, May 13, 1979.

[12] Remote Viewing transcript, R11, February 16, 1979.

[13] Interview with Mostafa el Abbadi, Department of Archaeology, University of Alexandria, and Daoud Abou Daoud, Department of Archaeology, University of Alexandria, and Secretary of the Alexandria Society for Archaeology, on site on May 14, 1979.

[14] Mahmoud-Bey, known casually as "El Faliki" (the Engineer), was actually an astronomer in the Khedival government. Although he is a very controversial figure, his midnineteenth-century excavation work was one of the first systematic archaeological explorations of Alexandria—done at a time when much that was ancient still remained relatively in situ.

[15] It is perhaps worth noting that Egyptian security personnel accompanied us at all times during our survey of the Eastern Harbor.

[16] Remote Viewing transcript, Respondent R3, May 12, 1979.

[17] Remote Viewing transcript, Respondent R3, May 12, 1979, and drawing (Figure 20).
[18] At the time this paper was prepared, the identification of these stone "beads" still remained a mystery.
[19] Interview with Youssef El-Gheriani, Director of the Greco–Roman Museum of Alexandria, May 7, 1979.
[20] Remote Viewing transcript, Respondent R3, October 17, 1979.
[21] Composite Analysis Map, Probe II, October 17, 1979.
[22] Strangely, given its fame, there is no clear source from antiquity which provides the dimensions of the lighthouse, nor more than generalities concerning its appearance.
[23] Interview with Captain Moshen El Gohary, AREN (Ret.), Director Red Sea Divers Service, April 9, 1979. Captain Gohary proved to be the best source *by far* concerning diving information in Alexandrian waters.
[24] Mobius Medical Advisor Donald Zimmerman, M.D., M.E.E. recommended injections of gamma globulin B, tetanus, typhus, and cholera, as minimum protection for diving in the hazardous littoral waters of Alexandria.
[25] Interview with M. Rodziewicz, November, 17, 1979.
[26] Remote Viewing transcript, Respondent R4, response to Map Probe II, October 17, 1979.
[27] Remote Viewing transcript, Respondent R9, response to Map Probe II, October 17, 1979.
[28] Remote Viewing transcript, Respondent R1, response to Map Probe II, October 17, 1979.
[29] Interviews with Rodziewicz and Daoud, November 21, 1979.
[30] On-site Respondent interview in April 1979. Map Probe II, October 17, 1979.
[31] On-site Respondent comment, R3, volunteered April 8, 1979.
[32] Remote Viewing transcript, R4. Map Probe II, October 17, 1979.
[33] Remote Viewing transcript, Respondent R5, response to Map Probe II, October 17, 1979.
[34] Remote Viewing transcript, Respondent R3, response to Map Probe II, October 17, 1979.
[35] Remote Viewing transcript, Respondent R8, response to Map Probe II, October 17, 1979.
[36] Filmed interview with M. Rodziewicz, October 16, 1980.

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Journal of Scientific Exploration, Vol. 35, No. 3, pp. 542–569, 2021 0892-3310/21

RESEARCH ARTICLE

Anomalous Cognition in the Context of Time: Does the Viewer Describe a Deterministic or a Probabilistic Future?

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Submitted August 3, 2020; Accepted April 16, 2021; Published September 30, 2021

https://doi.org/10.31275/20211923

Abstract—In this process-oriented study, we examined the influence of the time dimension on Psi effects in two experimental conditions (present vs. future). For data collection, selected viewers with experience in the remote viewing method gathered information about targets that were distant in space (the present) and time (the future). In this study, we did not balance the two time conditions. The present condition was composed of binary truth statements consisting of two possible options related to current world knowledge. The future condition consisted of two options that were not yet determined at the time of viewing, but which depended on the outcome of future mixed martial arts fights. According to the associative remote viewing (ARV) method, the binary outcomes of the present and future options were each associated with a photo, which had to be described by the viewers. An independent judge analyzed the viewers' qualitative reports through binary correspondence ratings amounting to a hit (1) or no hit (0) per trial. Independently of the time condition, a Psi effect could be observed. The hit rates of the judge (0.88 and 0.62 for the present and future, respectively) were significantly higher than the expected value (0.5) under the null hypothesis (present: $p < .001$, $ES_p = .73$; future: $p = .027$, $ESF = .22$; binomial distribution). In addition, the hit rates in the two time conditions differed significantly from each other ($\chi^2 = 9.01$; $df = 1$, $p < 0.003$). The results confirm the hypothesis that Psi is not completely independent of the time dimension and that the hit rate is influenced by a priori target probabilities. With regard to the Informational Psi (IΨ) theory, we will discuss the implications of a probabilistic future for the understanding of Psi effects.

Keywords: Informational Psi; probabilistic future; associative remote viewing; anomalous cognition; collective unconscious

INTRODUCTION

Theoretical Background

In all time periods, humans have been fascinated by apparently inexplicable phenomena that lay outside of their ordinary understanding of everyday life. Temporal anomalies such as intuitions of spatially or temporally separated (i.e. future) events that become reality are extraordinary experiences (Barušs & Mossbridge, 2016; Kripal, 2019; Radin, 2009; Wargo, 2018). Thanks to the development of academic experimental psychology in the late 19th century, these anomalous or parapsychological experiences and effects have been studied academically (Cardeña, 2018; Mossbridge & Radin, 2018; Roll, 1989). Jung (1963) used the term 'synchronicity' for those phenomena in which a connection of temporally separated events is experienced as personally meaningful, although there is no causal relationship between said events. In contrast, the classic 'transmission' model by J. B. Rhine postulates that causal information is conveyed by some yet-unknown carrier leading to extrasensory perception (for a discussion of causal and noncausal models, see Millar, 2019).

Mainstream science has always been critical or even dismissive of these purported experiences and positive research outcomes in parapsychology or, to use a more recent term, anomalous cognition (May & Marwaha, 2014; Sommer, 2014). It has been argued that such experiences are due to distortions in subjective perception and memory and can find an explanation in the personality of the people making such extraordinary claims (Marks, 2000). Experimental results showing an anomalous effect are often categorically dismissed with statements such as Schwarzkopf's (2018): "No matter how strong the statistical evidence, if the hypothesis is impossible, it must necessarily be false." Alternatively, these results are dismissed because they stem from an allegedly inadequate application of statistical tests (Wagenmakers et al., 2011).

Regarding this latter criticism, the use of the "right" type of statistical test (e.g., Bayesian analysis vs. classical frequentist hypothesis testing) does not necessarily lead to a more straightforward picture. The setting of *priors* in Bayesian models is based on a selection pro-

cess carried out by the researcher, which, in principle, should represent the state of scientific knowledge, but could also be interpreted as the quantification of a personal belief (Maier & Dechamps, 2018; Tressoldi, 2011). Application of Bayesian statistics in meta-analyses has actually shown positive effect sizes for the anticipation of random future events (Bem et al., 2015), following initial significant results after classical hypotheses testing (Bem, 2011). Meta-analyses and systematic reviews of the existing literature reveal the presence of anomalous effects in many fields of Psi research (Cardeña, 2018; Mossbridge & Radin, 2018).

Within the framework of the Star Gate program (May & Marwaha, 2018), the systematic perception technique Remote Viewing (RV) has been developed, which allows for the investigation of a potentially anomalous information transfer. RV is defined as "mental faculty that allows a perceiver (a 'viewer') to describe or give details about a target that is inaccessible to normal senses due to distance, time, or shielding" (IRVA, 2020). From a psychological perspective, RV can be understood as anomalous cognition (May & Marwaha, 2014), because humans become aware of something (a cognition) through a process that is so far unknown (anomalous). The concept of anomalous cognition and the general term Psi (Greek letter Ψ) are used synonymously for the same type of anomalous effects. Proof-oriented empirical studies show that RV-induced Psi effects can be detected (Marwaha & May, 2019a). This means that, under specific conditions, the degree of correspondence between the perception of the subjects and a given target (e.g., an event, an outcome) is higher than expected by chance. Therefore, it has been suggested that future research should focus more on process-oriented issues in order to gain more insights about the mechanisms behind this phenomenon (May & Marwaha, 2015).

Over the years, scholars (Dunne & Jahn, 2003; Krippner et al., 2019; Targ et al., 1995) conducted many different process-oriented as well as applied investigations using the remote or perceptual viewing technique, including distant intention approaches of one individual helping another while meditating (Schmidt et al., 2019). The fact that no convincing theory has been developed so far which could explain Psi effects within the framework of psychological knowledge is particularly noteworthy. Many models exist side by side (e.g., Carpenter, 2015; Walach et al., 2019), but there are no real decision criteria for comparative

validity. An example of a current conceptualization that summarizes the empirical findings and attempts to explain Psi phenomena from a physical and neuroscientific perspective is the Informational Psi (IΨ) theory (Marwaha & May, 2019a).[1]

The IΨ theory postulates that there is only one form of Psi while information builds the core of the Psi experience. It is the temporal localization of a target event in spacetime that defines whether we are dealing with perception of information in real-time (at present) or as precognition (from the future). There are a number of questions that remain unanswered within the IΨ theory (e.g., what is the source of the perceived information? Where does the information come from: actual or possible futures?). Therefore, the IΨ theory should not be seen as a final explanatory model, but rather as research in progress (Marwaha & May, 2019b; see also the external comments on Marwaha & May, 2019b, pp. 52–72).

The idea of the present study is to empirically test a time-related factor that has been discussed in a former study (Müller et al., 2019) as a limitation for RV—namely the probabilistic nature of the future, i.e. the fact that the future exists as various probabilities that can change in the course of time until an event actually happens. The opposite position is the assumption of a deterministic future in which everything is already predetermined or rather predestined. This distinction is relevant for the question of whether the RV-induced Psi effect is completely independent of time ($effect_{present} = effect_{future}$) or if there is a dependence on temporal characteristics ($effect_{present} \neq effect_{future}$). The possibility of predicting the future has been investigated in a series of studies (Harary & Targ, 1985; Kolodziejzyk, 2012; Müller et al., 2019; Puthoff, 1984; Smith, 2009; Smith et al., 2014; Targ et al., 1995). In these studies, the observed hit rate, i.e. whether a prediction is correct or wrong, for binary events[2] was significantly higher than the expected value under the null hypothesis.

The issue of whether it is generally possible to significantly predict a binary event in the future is only a secondary, albeit important aspect of this study because the empirical data are already indicative of a Psi effect. It is still unclear whether there are differences in hit rate between present and future viewing and whether this can be ascribed to the time factor (probabilistic future) or to other factors. If the probabilistic nature

of the future contributes to the observed error variance, the hit rate for binary events in the present theoretically should be higher because additional aspects of the future have no influence on presently existing targets. Radin (1988) discovered that different a priori probabilities of targets in the future influenced the Psi quality in the present. To the best of our knowledge, no study yet has specifically investigated the hit rate difference for targets in the present and in the future. There are, however, meta-analyses on free-response and forced-choice studies (Storm et al., 2010, 2012) that generally found no significant differences in effect sizes (ES) between telepathy/clairvoyance (present targeting) and precognition (future targeting). Two options for possible study results are described below:

(1) $\text{Effect}_{\text{present}} = \text{effect}_{\text{future}}$: If the effects in both conditions were equal, IΨ would be time-independent because it would be similarly possible to correctly describe a target in the present and in the future. The error variance could be ascribed solely to factors that have no relation to time, such as mental noise as explained through cognitive processing of Psi information or the method for Psi induction. This result would support the determinist perspective according to which all future events are already predetermined and can be foreseen at any time with RV.

(2) $\text{Effect}_{\text{present}} \neq \text{effect}_{\text{future}}$: If the effects in both conditions were different, IΨ would be time-dependent because the condition (present vs. future) would influence how accurately a target can be described (provided that Psi effects are measured in both time conditions). We assume that the Psi effect is larger in the present condition than in the future condition ($\text{effect}_{\text{present}} > \text{effect}_{\text{future}}$). The difference between the Psi effects could give us a clue about how large the influence of the probabilistic future actually is. The result would falsify the assumption that IΨ is completely independent of the time dimension. In either case, the result would advance our understanding of IΨ and clarify the issue of whether the perceived information arises from actual or possible futures. Especially if we were to find Psi effects in both conditions and a significant difference between the two ($\text{effect}_{\text{present}} > \text{effect}_{\text{future}}$), we would conclude that Psi depends partially on the time dimension but is not absolutely constrained by it.

The overarching research questions for this study read as follows:

(1) Is there a Psi effect using the remote viewing method for present and future targets; (2) Is there a difference between the Psi effects in the two time conditions, present and future? As operationalization, we use a study design to test whether a target in one of the two test conditions (present, future) has been described by a viewer. It has to be noted beforehand that we did not use a balanced design for the two conditions but for logistical reasons presented first the present and then the future condition. In case there are differences between conditions in outcome, we cannot make unambiguous statements about whether we have a time effect or an effect as a consequence of serial order, i.e. differences are potentially attributable to a learning or fatigue effect from condition 1 to 2. In that way, this study design has the character of an exploratory (feasibility) study.

Moreover, the difficulty in the conception of such a study design is the fact that the outcomes of an RV session (descriptions and sketches) are qualitative data, which are not easy to analyze statistically in terms of target correspondence. This difficulty is rooted in the very nature of IΨ and had already come up in early RV studies (Puthoff & Targ, 1976; Schwartz, 1977). The impressions that a person generates during an RV session are mainly of a descriptive and sensory nature (e.g., descriptions of color, texture, or temperature) and contain in the majority of cases little or no analytical details about the target (e.g., mentions of names and functions). To ensure that a target has been described and that the descriptions contain more than just random correspondences, the data collection can be conceptualized in a so-called Associative Remote Viewing (ARV) design. A more detailed presentation of this design is provided in the Methods section of this paper. Importantly, we used subjects who had previous experience with the remote viewing technique.

The following hypotheses are tested in this study. The Psi hypothesis H1 is accepted, if an independent judge would be able to significantly identify one of two stimuli (binary rating) with the help of qualitative descriptions that subjects generated during a blind RV session in the course of $n = 100$ trials. For H1 to be accepted, the observed hit rate of a judge should significantly differ from the expected value under the null hypothesis (no Psi, hit rate 0.5). The hypothesis is tested for all trials ($n = 100$) and for both time conditions ($n = 50$ each).

H1: The observed hit rate of the judge is significantly higher than the expected hit rate of 0.5 (Psi effect).

To test the time hypothesis H2, the present and future hit rates (based on $n = 50$ trials each) are compared. For H2 to be accepted, the hit rates in the two conditions should significantly differ from each other. From a theoretical perspective, it is assumed that $\text{effect}_{\text{present}} > \text{effect}_{\text{future}}$.

H2: The hit rates in the two time conditions do significantly differ from each other in that the hit rate for the present effect is higher than the hit rate for the future effect ($\text{effect}_{\text{present}} > \text{effect}_{\text{future}}$).

METHODS

Subjects

In total, $n = 5$ viewers took part in the study. They were selected on the basis of their training in the Coordinate Remote Viewing (CRV) protocol (Smith, 1986) and their practical experience with the method. The screening for suitable subjects took place through personal contacts within the German remote viewing community. The viewers had contact exclusively with the principal investigator (PI), who is the first author MM, and they did not know who the other participants were. The subjects were informed that their data would be used only to analyze the results of this study.

According to their own statements, all subjects took part in the study voluntarily and because of their personal motivation. For every trial the subjects received a compensation of €7.50. The subjects who achieved the highest hit rates in each of the test conditions ('present' and 'future' condition) received an additional reward of €150 each. The reward was meant to ensure that the subjects stayed motivated over the course of the study, especially over the last trials. The data collection took place in the period between October 2018 and March 2019.

Targets and Stimuli

Over the course of the study, the PI prepared in total $n = 20$ targets (in essence, unfinished verbal statements, see below) with two options (two possible endings for each of the statements, see below) and, for

each target/option pair, he selected two associated stimuli (in total n = 40 images). The targets (the statements) were related to the present (targets 1–10) and to the future (targets 11–20). The associated stimuli were digital images (photos) which had to be described by the viewers during data acquisition. Each of the n = 5 subjects worked on all n = 20 targets (in total n = 100 individual trials). The following paragraphs provide a closer definition of the terms. In our prior ARV study (Müller et al., 2019), we had n = 50 trials for detecting the target photos which were associated with the stock index going up or down. Since n = 50 trials were sufficient to find significant effects in that study which employed the same dual ARV logic, we similarly chose n = 50 trials for each of the two conditions (5 subjects × 10 targets).

The targets in the present condition were open statements branching into two possible options, the correctness of which was already determined and unambiguously verifiable at the time of data acquisition (i.e., one option was clearly correct and one option was clearly incorrect). Example: "The current acting Federal President of Germany is . . ." Option A: Frank Walter Steinmeier; Option B: Horst Seehofer. At the time of data acquisition, only option A was correct, while option B was clearly wrong. The targets in the future condition were statements branching into two options which were not yet determined at the time of data acquisition, but which became unambiguously verifiable after the future event had happened (i.e. one of the two options was clearly correct after the future event had taken place, while the other option was clearly wrong). Example: "The winner of the MMA[3] fight on the 2nd February of 2019 is . . ." Option A: Magomed Bibulatov; Option B: Rogério Bontorin. Both options were possible at the time of data acquisition. However, after the future event had happened, only one of the two options was correct. A draw is hardly ever an outcome in this type of fight, and this possibility did not occur for any of the ten targets of the future condition.

As associated stimuli, we used pairs of images that had to be as different as possible from each other (see Figure 1). The images were selected by the PI based on subjective criteria and on stimuli selection experience from prior studies (Müller & Wittmann, 2017; Müller et al., 2019). In essence, the perceivable image contents of the two stimuli should be clearly distinguishable on various sensory dimensions

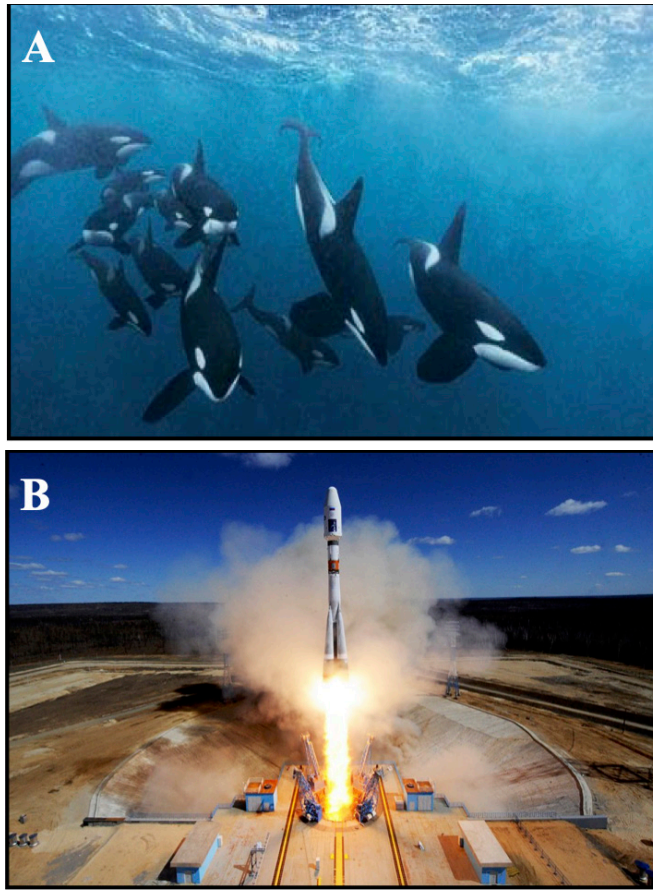

Figure 1. Example stimuli pair for a target. Image A: Orcas, Image B: Rocket launch. The stimuli differ from each other in various sensory aspects (e.g., color, surface quality, temperature).

(visual, auditory, tactile, kinesthetic, etc.). This is important to facilitate the subsequent analysis and to rule out the assumption that wrong decisions could depend on the stimuli being too similar. The stimulus–statement pairs were stored as electronic files (.pdf) on the computer of the PI and nobody else had access to them.

Data Collection

(1) Acquisition: For data acquisition, the subjects used the Coordinate Remote Viewing (CRV) protocol (Smith, 1986). The protocol

consists of a systematic sequence of stages that a viewer has to work through during the RV session (circa 30 minutes). This method is thought to enhance the intuitive perception process of the viewer by focusing the attention on the target stimulus, categorizing the perceived impressions in (sensory) categories, and connecting the separate impressions into a coherent whole with the help of sketches and diagrams (May & Marwaha, 2014). Moreover, the protocol contains mechanisms to bypass so-called analytical overlays (AOLs), i.e., rational inferences or fantasies. The aim of an RV session is to report information about the target stimulus in a way that is as unfiltered as possible (i.e., preferably without analytical overlays). The qualitative data in the form of descriptions and sketches (for example, see Figure 2) that result from

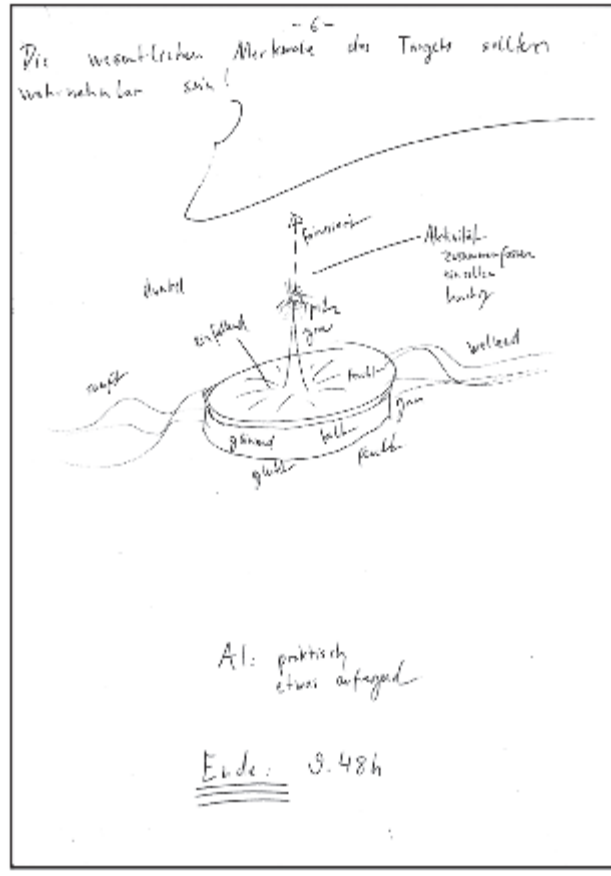

Figure 2. Example of qualitative Psi data. Descriptions and sketches a viewer generated during the RV session. This is an extract of a session which had been conducted on the target with the stimuli from Figure 1, Image B (rocket launch), which was associated with the correct target option.

an RV session can be quantified with the help of a rating method for the statistical analysis. All participants had previous experience with the CRV protocol and used it consistently during the study.

(2) Rating: For the quantification of responses, we used a rating scale which made it possible to judge a session in terms of correspondence with the given stimuli (Figure 3). Our scale is based on the probed-and-tested scale by Targ et al. (1995, p. 374), which ranges from 0 to 7 points. Ours is a 5-point Likert scale with "No correspondence at all" (0) and "excellent correspondence" (5) as endpoints—with the option of marking half points (e.g., 2.5), for a total of 11 steps. Using this rating scale, the judge takes all descriptions and sketches of a session into account to estimate the overall correspondence of the information with the two images representing the two options. In the end, the judge has to make a forced-choice decision giving one of the two images at least half a point more than the other. The image with the higher point score is considered the target. From this judgment one can deduce whether a trial is a hit (1) or not (0).

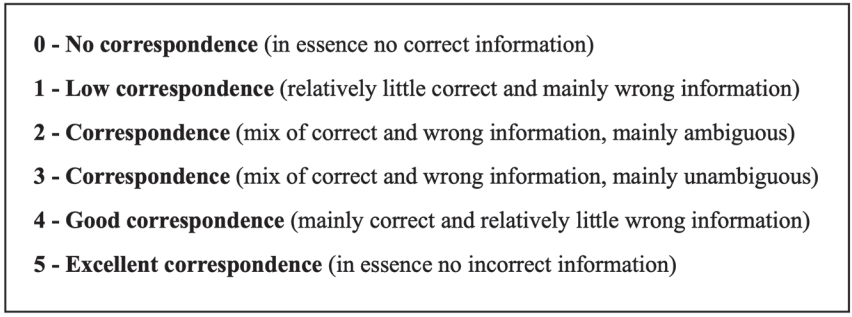

Figure 3. The rating scale used in this study. Shown here is the continuum (0–5) the judge used for classification of the qualitative data. In brackets are the substantial definitions of the correspondence degrees.

We assumed any session to have at least a small correspondence value (>0) with any image of the world because the perceivable world consists of a limited set of repeating impressions. Furthermore, we expected hardly any sessions to have an excellent correspondence (5) with an image because there are many psychological variables (e.g., mental noise or errors in the verbalization of impressions) which lead to

distortions in perceptions and their descriptions. Therefore, the judge should have knowledge about the specific characteristics of qualitative Psi data to produce a useful rating. Eventually, the rating result is a numerical value that reflects the correspondence with the respective stimulus and can be used for statistical analyses.

(3) Evaluation: The difficulty in the acquisition and rating of Psi information lies in the descriptive-sensory or rather nonanalytical nature of the perceptions. To ensure that a Psi effect can be revealed, there has to be an evaluation design that allows for unambiguous decisions. With the Associative Remote Viewing (ARV) method, the viewer does not describe the target itself but instead one of two photos that are associated with the target. The association makes it possible to get information about the target by implication. For example, the target is the name of a specific person. This analytical information is hardly perceivable with RV. Therefore, one should formulate two options as follows: Option A being "the name of the person is X" and option B being "the name of the person is Y", where only one option is correct. Additionally, it is necessary to select two stimuli A and B (e.g., in the form of digital images) and associate them with the two options (note that the images have nothing to do with the person). In written form: If option A, then image A. If option B, then image B.

The viewer is instructed to describe only the image/stimulus that is associated with the correct option (blindly, i.e. without knowing the target or the images). The concrete task for the viewer (coded by a random target reference number) is: "Describe the image which is associated with the correct target option." Through the description of an image, the correct option is identified because it is determined that only one option is correct. The correct target option in the future condition is not yet determined at the time of the session but becomes clear after the event has happened in the future (i.e. one of the two fighters wins the MMA match). An advantage of this procedure is that, through the descriptions of the associated images, it is possible to make a clearer decision about the target. The simplest form is the conception of targets that have two options (A and B) because only two distinct images are needed.

Another advantage of the ARV design lies in the free target choice. The target can be related to the presence of something (e.g., the name

of a person in a specific position, A or B) or to an event in the future (e.g., the winner of a specific competition in the future, A or B). In both cases, it is important to make sure that the statements are binary. Furthermore, the target statements have to be unambiguously verifiable to allow an analysis of the data. When all other variables in both conditions are held constant (ultimately, photos have to be described) and a Psi effect is measured, a direct comparison between the two time conditions (present vs. future) becomes possible. A hypothetical difference would be solely attributable to the a priori probabilities of the targets that are defined by the time conditions.

Experimental Procedure

Over the course of the study, the experimental procedure was always the same and the functions of the PI (MM), the judge, and the five viewers, who all were experienced remote viewers, did not change. All seven individuals had at some point received a formal education in the remote viewing method. Regarding potential questionable research practices, it is important to mention that in this test design the PI functioned as a mediator between the viewers and the judge. Some of the viewers knew each other but were instructed not to exchange information regarding the study. Since knowledge of results was given only after the end of trial 10 (the present condition), communication would not have helped regarding better performance. Importantly, there was no communication between the viewers and the judge. During the course of the study, any information exchange concerning the study between the PI, the viewers, and the judge took place via email. In addition, researcher MW received the predictions about the prospective winner in advance of the fight (see below). The purpose of all these measures was to prevent unwanted information transfer. Thanks to these measures, the experiment fulfills accepted criteria for the testing of the Psi hypothesis (May & Marwaha, 2015). Further details on control measures are described below.

Regarding the exact sequence of procedural steps:

(1) the PI selected one target and two stimuli (the photos), associated them randomly with the corresponding options (A and B; the statements), and generated a random target reference number.

(2) The reference number, and only the reference number, was then submitted to the viewers via email. The email contained no additional information about the target or the two stimuli.

(3) With this number, the viewers conducted an RV session in their private surroundings (alone or with a partner) to collect information about the correct target stimulus. The viewers knew that the number was implicitly associated with the intention of the PI: "Describe the image which is associated with the correct target option." The viewers only knew that they were conducting an ARV session with two stimuli in the respective time condition, they did not know about the underlying statements or photos. With our blocked design, viewers were additionally informed before each block of trials that the ARV session was about present (trials 1–10) or future statements (trials 11–20).

(4) During the session, the viewer generated a transcript that he/she sent back to the PI as a scanned document.

(5) The PI kept the transcripts for himself until one test series was completed in its entirety. One test series consisted of five sessions with the five viewers for a given target and a given option pair.

(6) As soon as one test series was conducted in full, the judge received the five transcripts of the viewers and the two images via email. The judge conducted a blind correspondence rating without knowing the target or the correct stimulus assignment. During the rating, the judge assessed the five transcripts and gave a correspondence rating on each of the given images (A and B) for each transcript. The judge was instructed to make sure that the rating between the images differed by at least 0.5 points so as to enable a binary analysis of the hit rate (hit/no hit). Furthermore, the judge had to rate every transcript as neutrally as possible and without recourse to information from other transcripts.

(7) The ratings of the judge were sent back to the PI, who archived the values with the respective transcripts in a digital folder to which he alone had access.

In the present condition (targets 1–10), the viewers and the judge did not receive feedback about the correct stimulus after each trial. Only after completion of test series 10, i.e., after $n = 50$ trials (for $n = 5$ viewers) were conducted, did the viewers receive comprehensive feedback with a personal analysis of their individual hit rate via email. The judge also received feedback for his rating after the completion of

trial 10. This procedure was necessary to avoid possible information exchange between the subjects regarding the correct target images, as the trials were not conducted in parallel by all viewers.

In the future condition (targets 11–20), the viewers and the judge did receive feedback after each trial because the temporal characteristic of the dependent variable (i.e. the fact that it was in the future) eliminated the possibility of unwanted information transfer. The viewers were given one work week (from Monday to Friday) during the course of which they could conduct the sessions for the future target based on their own schedule. No matter what time they chose for the sessions, the prediction event was always in the future (either on Saturday or Sunday of the same week). After the event occurred (i.e. as soon as one fighter had won the MMA match), the result (hit/no hit) could be verified, and feedback was given the following day. In the future condition, the feedback was given after each trial to keep the viewers motivated over the course of the study. The feedback could have no influence on the hit rate because all sessions of a test series and all ratings had already been conducted when the respective fight took place. As an additional control measure for the future condition, the predictions about the prospective winner of a fight were sent to a third party (author MW). MW was given the task of keeping track of all predictions and of the actual results over the course of the entire study. The following section provides a short explanation of the statistical analyses that were conducted after all results of the rating by the judge were transmitted to the PI.

Data Analysis

The Psi hypothesis H1 is tested against the expected value under the null hypothesis, which is a hit rate of 0.5 for the binary rating of $n = 100$ trials. There is a 50% probability that the judge assigns a higher correspondence to the correct target stimulus by chance only. The observed number of hits for exactly $n = 100$ ratings should be significantly $k > 50$ (binomial distribution) for H1 to be accepted. The observed number of hits in the respective time conditions with $n = 50$ trials each should be $k > 25$ for H1 to be accepted. Potential differences in hit rate between the two time conditions (H2) are tested with chi-square (χ^2) statistics.

RESULTS

Based on the viewers' transcripts, in 75 out of 100 trials the judge rated the correct target stimulus, which was associated with the actual target option, with the higher correspondence rating. This results in a hit rate of 0.75, which is significantly higher than the expected value under the null hypothesis ($p = 1.9 \times 10^{-7}$; binomial distribution, $n = 100$, $k = 75$, $p = .5$). Across the individual trials, the five viewers show different hit rates: V1: 0.8; V2: 0.9; V3: 0.55; V4: 0.7; V5: 0.8 (see Table 1). An analysis of the individual viewers with binomial tests shows that Psi effects occurred independently for 4 out of 5 viewers. Descriptively, across all ratings, the mean correspondence rating of the session data is 2.81 for the actual target image and 1.88 for the nontarget (wrong) image.

TABLE 1
Hit Rates Sorted by Viewers

Viewer	HR	Z	ES	p-Value
1	0.8	2.46	0.55	4.6×10^{-3} **
2	0.9	3.34	0.75	1.9×10^{-4} ***
3	0.55	0.22	0.05	1.6×10^{-1}
4	0.7	1.57	0.35	3.7×10^{-2} *
5	0.8	2.46	0.55	4.6×10^{-3} **

Note: Observed hit rates (HR), *z*-values (*z*), Effect Sizes (ES), and *p*-values sorted by viewers. Analyses for each viewer are based on $n = 20$ measurements.
* $p < .05$, ** $p < .01$, *** $p < .001$ point to significant results and therefore a psi effect.

For the present condition, in 44 out of 50 trials the judge rated the correct target stimulus, which was associated with the actual target option, with the higher correspondence rating (see Table 2). This results in a hit rate of 0.88, which is significantly higher than the expected value under the null hypothesis ($p < .001$; binomial distribution, $n = 50$, $k = 44$, $p = .5$). The effect size of ES_p (d) = 0.73 corresponds to a medium effect (Cohen, 1988). For the future condition, in 31 out of 50

trials the judge rated the correct target stimulus, which was associated with the actual target option, with the higher correspondence rating (i.e., 31 out of 50 predictions of future events were correct). This results in a hit rate of 0.62, which is significantly higher than the expected value under the null hypothesis (p = .027; binomial distribution, n = 50, k = 31, p = .5). The effect size of ES_F (d) = .22 corresponds to a small effect. Consequently, the hypothesis H1 can be accepted (for both time conditions). In the present condition as well as in the future condition, Psi effects could be observed.

A two-way chi-square test for the factor time (present, future) and the hit rate (1, 0) shows a significant hit rate difference (χ^2 = 9.01; df = 1, p < 0.003) between the two time conditions. Descriptively, the mean difference between the ratings for the target image and the rating for the wrong image is higher for the present condition (3.12 vs. 1.59) than for the future condition (2.5 vs. 2.16).

DISCUSSION

The goal of this study was to investigate whether and to what extent Psi effects assessed with the remote viewing technique depend on the time dimension. In other words, we wanted to investigate whether the hit rate differed for present and future conditions. The results show that there is an overall Psi effect across both time conditions and that the hit rates between the two time conditions were significantly different. Therefore, hypotheses H1 and H2 both could be accepted. The following sections discuss possible interpretations and consequences of these results in the context of the IΨ theory (Marwaha & May, 2019a). Before that, we will discuss possible limitations of the experimental design and consider whether it was appropriate for answering the research question.

Because we selected experienced remote viewers for the study, the subjects had the necessary competence to conduct the sessions on their own. Furthermore, through the description of the images it was possible to make clear statements (hit/no hit) regarding the associated targets for both time conditions. The analysis with the rating scale and the use of an independent judge, who was an experienced remote viewer himself, satisfied all requirements for an appropriate use

of the information derived from the qualitative data. Thanks to the experimental design (randomization of stimuli, blind conditions during acquisition and analysis, etc.), the internal validity of the data can be assumed because potential interference factors (e.g., information leak) were controlled for. This means that if an effect is observed, it is reasonable to assume that it is due to a Psi process.

The serial order of the targets for the present condition (targets 1–10) and for the future condition (targets 11–20) leaves room for some criticism. We could have implemented a balanced design where the sequence of the present and future conditions would have been controlled for, but we did not. The rationale behind this decision was our desire to clearly separate the two time conditions for the three parties involved: the PI, the five viewers, and the judge. A potential order effect is relevant for the interpretation of the time effect. The viewers might have been more enthusiastic and motivated for the first batch of trials (present condition, targets 1–10) than for the second batch (future condition, targets 11–20). The viewers might have worked with less concentration in the later trials which in turn might have caused a reduction of the Psi quality and the lower hit rate for the future condition.

With the monetary incentive of €7.50 for every completed trial and an additional reward (€150) for the highest hit rates in each of the two time conditions, we wanted to make sure that the participants were committed to performing to the best of their abilities. The viewers did not receive any feedback about the hit rates of the other participants during data acquisition. Therefore, the motivation to win the rewards should have stayed consistent for each viewer over time. The positive attitude of the viewers becomes evident from the transcripts of the RV sessions. This is evident through inspection of the qualitative data which has detailed descriptions and sketches from start to finish. Objectively, the judge rated the correspondence of the transcripts with the images (independent of whether it was a target stimulus or not) in both time conditions as nearly identical (2.36 vs. 2.33 for the present and future conditions, respectively). This means that, based on the ratings provided by the judge, the perceptions of the viewers in the present condition had the same level of quality as those in the future condition.

Nevertheless, a potential order effect through the target sequence cannot be completely excluded. This should be taken into consideration

when interpreting the time effect. A replication study implementing a counterbalancing design is needed to fully test the hypothesis of time differences. A further difference between the time conditions is related to the time of feedback. In the present condition, comprehensive feedback with a personal analysis of the individual hit rate was given via email only after all trials (1–10) had been completed. For the future condition, the viewers and the judge did receive feedback after each trial (11–20). This more immediate feedback of performance for the future condition could have influenced remote viewing behavior differently, i.e. trial-to-trial adjustments, from the overall feedback given only at the end for the present condition. This leaves room for a stricter methodological isomorphism in a replication study.

The issue of replicability in Psi research is of the highest importance. Our results are meaningful only if future attempts replicate the outcome of this study with redesigned and preregistered replication studies (Marks, 2020). Additionally, it could be useful to implement a design in which the viewer is not aware of the time condition of the trial. This would ensure that the observed effects are solely attributable to the manipulation of the independent variable "time." It is still interesting to note how the qualitative data have nearly identical rating values for both time conditions, which speaks against a mere order effect. The fact that the viewers generated stimuli descriptions that had equal quality in both time conditions, but significantly different hit rates, could be an indication that the outcome of the event in the future was not completely predictable at the time of the session. Therefore, the time factor could have had an influence on the size of the Psi effect in the time conditions.

Considerations on the Psi Effect

The Psi hypothesis H1 could be accepted overall and for both time conditions because the hit rates of the judge were significantly higher than the expected value under the null hypothesis for binary ratings. Working blindly (i.e., without knowing the correct stimulus), the judge rated the correspondence for the correct image significantly more often than for the wrong image. These effects are consistent with findings of other studies (e.g., Dunne & Jahn, 2003; May & Marwaha,

2014) showing that under specific conditions subjects are able to receive information from spatially and temporally separated targets. The observed Psi effects in this study lie in the small-to-medium size range, which is what was expected given the choice of trained subjects (Utts, 1996).

We will now tentatively discuss the question of how the viewers were able to perceive the stimuli and, furthermore, which source of information they potentially used to correctly identify a target significantly often. Because the viewers did not perceive a target directly but with the help of associated images, a connection between targets, stimuli, and the viewers has to be assumed. Because of the study design, the viewers were blind toward both the targets and the stimuli during data acquisition. The perceptions described must have come into the information processing system of the viewers by other means, enabling them to generate significantly correct descriptions of the stimuli, which in turn were associated with the correct target options. The IΨ theory postulates a physical information transfer of which the characteristics are unknown and that the source of the Psi information can be localized as a "distant point in spacetime" (Marwaha & May, 2019b, p. 15).

From a psychological perspective, the qualitative data (perceptions of the viewers) provide starting points for the identification of a potential Psi information source. This type of perception is not entirely unlike sensory perception; in fact, there are some parallels. The impressions a viewer generates during an RV session are mainly of a descriptive-sensory, or nonanalytical, nature. The viewer reports what they intuitively perceives when their attention is directed on the target (bottom-up processing) and preferably without interpreting concrete content into the perceptions (top-down processing). Practice shows that the exclusion of any analytical processes (e.g., memory, logical reasoning, etc.) is possible only to a given extent. The analytical processes that cannot be prevented are known as mental noise—an error source for RV. The acquisition of target information can be compared with tapping into a signal that, in addition to other cognitive processes, should be perceived as much as possible without filters (i.e., without analytical overlays). Marwaha and May (2019b) assume that IΨ is, just like the other human senses, a signal-based sensory system with a clear

source as well as transmission and detection mechanisms. According to Carpenter (2015), Psi processes are inherently, but unconsciously, involved as the "leading edge" in any conscious perceptual and decision process.

The signal should arise from a distant point in spacetime but the perceptions of the viewers are always local (Marwaha & May, 2019a, 2019b). This assumption presupposes an external information transfer between target and viewer that has not been shown yet. Alternatively, one could consider the source of the Psi signal not as distant but, just like the perception of Psi information, as a nonlocal process. 'Nonlocal' means that the Psi information is already present for the viewer and is brought to his awareness during the RV session. In contrast to the IΨ theory, this explanatory model presupposes an internal information access, whereas the possibility of an external information transfer in the form of an external signal is rejected. Furthermore, this assumption presupposes the existence of a part of the psyche that contains information beyond the mental limitations of the individual which is inaccessible by means of conscious processes. Inspired by the conceptual analyses of C. G. Jung (1959, 1963), we could think of the unconscious mind and, additionally, a so-called "collective unconscious," as the source of Psi information. By collective unconscious, Jung meant an omnipresent construct that is an unconscious part of the psychic system of every person, but which has a nonpersonal or rather collective character. During the RV session, the viewer might have access to this unconscious construct to receive or become aware of information about a target. Importantly, this idea is not based on the assumption of a local-causal signal transfer from spatial or temporally remote targets but instead on the inherent nonlocality of psychic phenomena which is independent of material causes (Walach, 2020).

Although the theories presented are coherent, they can hardly be considered congruent with the world, i.e., that elements of the theory show an isomorphism with empirically shared and universally accepted evidence of underlying structures and processes. The explanatory model suggested above is mainly based on observations of the phenomenal characteristics and of the analysis of qualitative Psi data. A comprehensive explanation of Psi in relation to the concept of the collective unconscious is beyond the scope of this empirical study.

Nevertheless, the possibility of an internal signal in addition to the assumption of an external signal (as postulated in the IΨ theory) should be considered. In addition to the physical and neuroscientific domains, psychology or analytical psychology also should eventually provide an explanation for IΨ effects.

Considerations on the Time Effect

The time hypothesis H2 was accepted because the hit rates in the present and future conditions differed significantly from each other. The Psi effect in the present condition (ES_P (d) = 0.73) showed a higher effect size than the Psi effect in the future condition (ES_F (d) = 0.22). The Chi-square statistics for the percentage of hits between the time conditions provides evidence for significant differences. These findings support the theoretical assumption that RV is not completely independent of the time dimension. There is ample evidence for remote viewing of future targets in prior ARV studies (e.g., Müller et al., 2019; Smith et al., 2014; Targ et al., 1995). The effect size in our study (ES (d) = 0.22) was indeed relatively small compared with prior studies. The probabilistic nature of the future would explain the difference between the time conditions in our study. Based on the data, it is also possible to discuss whether the Psi effect is dependent or independent of a priori target probabilities. According to Targ and Targ (1986), Psi effects are independent of a priori defined target probabilities, whereas Radin (1988) observed opposite results.

Bearing the methodological caveats in mind, as discussed above, the fact that the variables pertaining to the identification of images were kept constant in both time conditions, the difference could potentially be attributed to the time factor. The future condition negatively influenced the hit rate, i.e., the viewers described the stimulus associated with the correct target option in the future less frequently. The time of the information acquisition can be considered crucial: In the present condition, the correct target option is already determined during the RV session. In the future condition, the correct target option is not yet determined during the RV session, i.e., the target event is open for possible changes until it finally happens. At the time of the RV session about a target in the future, the viewer does not describe the defi-

nite target option as he/she does in the present condition, but merely the most probable target option. This leads to the conclusion that the future exists in probabilities and is not completely determined. A possible explanation for the failure to detect a strong future effect could be the nature of the prediction objects. In contrast to many previous ARV studies, which used the future course of a stock index (up, down) as the target (e.g., Müller et al., 2019; Smith et al., 2014; Targ et al., 1995), we used martial arts fights and their future winners as targets in this study. Based on the concept of the probabilistic future, it is obvious that different prediction objects underlie different a priori probabilities for the target events. We are aware that this interpretation is speculative, but it may be a helpful framework for the design of studies which attempt to vary future conditions with more or less determined futures. Potentially, there could be an expectation effect as precognition (future condition) could be perceived to be more difficult than real-time (present condition) psi (Storm & Thalbourne, 2003). One solution would be to hide the type of condition (present or future) from the viewers, but it could be argued that a viewer could still sense the difference. The influence of the probabilistic future on Psi effects can be investigated for time-related variables because it is reasonable to assume that there is a predictable but "open future." For some targets, the hit rate is equal to random guessing because volatile events are not significantly foreseeable whereas other events are. From our theoretical deliberations, it seems plausible that the perception of the viewer and the relating hit rate of the judge are influenced by the predictability of a target in the future—depending on whether the a priori probabilities change after data acquisition (a posteriori) or not. This issue can be investigated in follow-up studies with the use of experimentally manipulated a priori target probabilities. This is consistent with the previous study by Radin (1988), who also assumed that the Psi effect depends on a priori probabilities of a future target.

The results described here have consequences for the controversially discussed topic of Psi and time (Barušs & Mossbridge, 2016). The controversy can be summarized as "from where does the information arise—from an event or from later feedback, from actual or possible futures?" (Marwaha & May, 2019a, p. 40). In various studies, no connection between Psi quality and feedback could be found (May et al.,

2014; Müller et al., 2019; Targ et al., 1985). In the present study, we gave feedback for both time conditions, but the hit rates still significantly differed. Therefore, feedback cannot be used as an axiomatic explanation for observed Psi effects. In this context, and under the assumption of the probabilistic future, a hypothetical "future answer book" (Marwaha & May, 2019b, p. 104) cannot be the principal source of the Psi information. In sum, the data indicate that the perceived Psi information describes nothing but a probable future. As discussed above, our data results have an exploratory character and replication studies need to follow. It remains unclear whether the viewer perceives the information from the target event itself (or rather the associated stimuli) or from another source.

CONCLUSION

With a systematic application of the CRV protocol, this study was able to confirm that humans can gather information that would not be accessible to them through their ordinary "five senses" or their analytical mind. Potentially, we tapped into an anomalous type of cognition that apparently functions independently of space and time. The results regarding the time effect show that IΨ is not independent of the time dimension and that the future most likely consists of probabilities. Marwaha and May (2019b, p. 107) write: "The crux of the psi experience is indeed understanding the nature of time and information." Therefore, future studies could experimentally manipulate the a priori target probabilities and measure their effect on the qualitative Psi data. To finally achieve a holistic understanding of IΨ, the source of the Psi information (internal vs. external) has to be identified. Only with a theory that can convincingly explain the source of the Psi information in connection with accepted knowledge about the world, could the controversial research subject of Psi and its observed effects be accepted by the scientific community (Mossbridge & Radin, 2018; Schwarzkopf, 2018).

NOTES

[1] Informational psi (IΨ) is defined as the transfer of information, which is based on entropic considerations, arising from a distant

point in spacetime leading to the local acquisition of noninferential information by an atypical perceptual ability (Marwaha & May, 2019a, p. 16).

[2] According to the null hypothesis (no Psi effect), the expected hit rate for binary events is 0.5, which means that 50% of all predictions are correct by chance.

[3] MMA = Mixed Martial Arts is a full-contact sport similar to boxing, but which also includes elements of other combat sports (among which are ground fighting). Victory is normally achieved through a knockout (KO), or one fighter admits defeat, or based on points.

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Journal of Scientific Exploration, Vol. 35, No. 3, pp. 570–589, 2021 0892-3310/21

RESEARCH ARTICLE

Laboratory Investigations of Extrasensory Identification of Concealed 5-Character Codes by a Presumably Gifted Teenager in China

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Submitted April 22, 2020; Accepted May 15, 2021; Published September 30, 2021

https://doi.org/10.31275/20211827

Abstract—We report on laboratory investigations of extrasensory identification of object information against a visual sensory barrier conducted on a presumably gifted teenage female subject in China. The investigations challenged the subject to identify a 5-character code (black, bold, Arial, font size 14) prepared by a double-blind procedure and sealed to block ordinary sensory access. Each of the five characters of each sealed code were randomly generated by computer permutation among 34 choices, including capitalized letters of A to Z and numbers from 2 to 9, by a third party at a remote site before mailing to the examiner. The subject's attempts to identify, via self-claimed extrasensory means, the concealed 5-character code over the duration of each trial was monitored and video-recorded. Trials of 16 and 18 tests were conducted approximately three months apart. Of the total 34 trials, the subject made a full hit (i.e. five correct characters at the entirely correct sequence) five times, corresponding to a binomial probability of $p < .00001$. We conclude that extrasensory identification against a visual sensory barrier deserves further investigation.

Keywords: clairvoyance, extrasensory perception (ESP), extrasensory identification (ESI), altered or alternative state of consciousness (ACS), second consciousness state (SCS)

INTRODUCTION

Extrasensory perception (ESP; Auerbach, 1996; Irwin, 2004; May et al., 2014, Radin, 1997, 2006), which refers to the ability of human beings to access object information across spatial or temporal barriers, remains an open topic in parapsychology. Manifested in many forms (Nelson et al., 1996), phenomena of an ESP nature are inconsistent with what could be expected based on the five common sensory apparatuses. ESP involving information acquisition that is inexplicable by way of visual sensory responses has been called various names, such as "eyeless sight" (Romains, 1924) or "extraocular vision" (Jen, 1983). In this work we specify ESP involving information acquisition inexplicable by way of visual sensory responses as extrasensory identification (ESI) against a visual sensory barrier.

As early as 1884, the French physiologist and 1913 Nobel Laurate Charles Richet began experimental studies of a metapsychical nature akin to ESI (Maxwell & Richet, 1905). During that period, another French scientist, Émile Boirac, also conducted studies that were ESI-like (Boirac, 1917). The 1930 publication of Upton Sinclair's *Mental Radio* (Sinclair, 1930) didn't directly advocate information transfer or acquisition via extrasensory means; however, the "telepathic" communications as reported would be inexplicable otherwise. These earlier efforts by scientists and nonscientists aroused the public and scientific interests that challenged future research to exercise more rigorous measures in studies of extrasensory faculty. In 1934, Professor J. B. Rhine (Rhine, 1934) of Duke University in the United States used five different symbols on Zener cards to carry out studies on ESI against a visual sensory barrier. Those studies by J. B. Rhine were followed upon to assure adequate experimental controls in examining extrasensory phenomena (Rhine & Brier, 1968).

Speculations include that a major difference between a phenomenon of extrasensory faculty and a phenomenon of a purely physical nature may lie in the engagement of human consciousness as an indispensable experimental factor that, however, cannot be easily replicated (Jahn, 1979; Atmanspacher, 1999; Cardeña, 2018; Nelson, 2018). And a gifted person presumably would enhance the yield of an experiment on ESI (Marwaha & May, 2017).

In modern China, researchers have held the view that ESI against a visual sensory barrier could be inducible, using training that helps focus and direct the mind—a norm in the qigong culture that has been practiced for thousands of years. Such a perspective had prompted some researchers in China to take an approach different from Western ESI forefathers and counterparts in investigating ESI against a visual sensory barrier: (1) to train ordinary people to develop their ESI abilities, (2) to test ESI on people who have received training with the expectation that higher yields of ESI may result compared with results from the random population (Wu et al., 1998). In 1979, Professor Shouliang Chen (Chen, 1979) of Beijing (Peking) University reported ESI against a visual sensory barrier from a cohort of the preadolescent population. A subsequent study by the same author suggested that the ability of ESI against a visual sensory barrier might not be uncommon among children of preadolescent age (Chen, 1980).

In the years that followed, several laboratories in Chinese universities, including Fudan University (in Shanghai City), Yunnan University (in Kunming City, the provincial capital of Yunnan Province in the southwestern region of China), and Hangzhou University (in Hangzhou City, the provincial capital of Zhejiang Province in the vicinity of Shanghai), also reported experiments of ESI against a visual sensory barrier conducted on a predominantly preadolescent population (Zha & McConnell, 1991). The claimed success rate of ESI against a visual sensory barrier in those studies published in Chinese-language journals had been at 40% to 60%, versus a base rate that was hardly greater than 1% by chance expectation (i.e. equivalent to guessing a two-digit number or a Chinese character out of hundreds of common simple characters; Wu et al., 1998). Unfortunately, those original results faced difficulty in dissemination to the Western community via peer-reviewed venues and appeared in English-language literature only as isolated reports (Jen, 1983).

In the past 40+ years, many other experiments were carried out in China to further investigate ESI against a visual sensory barrier, or other presentations of ESP faculty that included color recognition (Wu et al., 1998), residual information identification (Chen, 1993; Liu, 1998), telepathic information transfer (Shao & Yu, 1992), etc. These and other studies (Chen & He, 1999; Chen, 1999; Fang & Yu, 1990; He et al., 1980;

Lee, 1998; Lee, 1999; Lin & Liu, 1997; Luo & Zhu, 1990; Song, 2014; Somatic Information Science Research Group, 1994) spanned a broad spectrum of phenomena with most of them focusing on ESI; they were conducted at various levels of scientific rigor. These reports seemed to have supported Chen's view (1980) that ESI abilities likely could be inducible and thus easier to register in the preadolescent population. However, questions remain in terms of the experimental controls that would firmly substantiate such notions.

Following the earlier paths of Chinese-based ESI studies, Dong Shen (subsequently noted as D. Shen) had been in search of a gifted subject in China for over a decade prior to this work (Shen, 2001; Shen, 2010; Shen, 2014), and he succeeded in confirming only one. Hereby we report the laboratory testing of ESI against a visual sensory barrier conducted on this single subject, using a new protocol designed to safeguard the integrity of experimental controls in a resource-limited setting.

EXPERIMENTAL MATERIALS AND METHODS

The Presumably Gifted Subject

The presumably gifted female subject was born in 1999; she was given a disguised feminine name of Xuan Chen by her parents due to privacy concerns. The subject was a middle school student for the duration of this investigation. Starting in December 2013, the subject had engaged in training by a party independent from this study, who advertised trainings to promote cognitive functions that would enhance performance on schoolwork (this kind of promotion is extremely popular in China). By the Spring of 2014, the subject self-reported being able to complete ESI tasks such as identifying Chinese characters concealed to be inaccessible by ordinary visual sensory means. The subject was introduced to D. Shen (accompanied by R. S. Shen) on August 1, 2014, for a demonstration (single-blind) in Yangzhou City in Jiangsu Province, China, which is close to her hometown. Later the subject was invited to travel to two other cities to take double-blind tests (neither the subject nor the examiners knew a priori any of the codes of the test samples), to be detailed hereafter. On all these occasions, the subject was escorted by both parents to the mutually agreed-upon test

site (a hotel guestroom). Verbal consent from the parents of the minor were secured for the tests. The tests required video surveillance and recording and the presence of D. Shen and one assistant who all were blinded to the test samples.

Double-Blind Off-Site Preparation of the Test Samples

The test samples were prepared as double-blind according to the consensus referred to as "Zhu's Five Criteria," which was established in the 1980s among Chinese-speaking ESP investigators (Zhu & Zhu, 1987). The test samples were prepared by Ms. Bo Li, a friend of D. Shen in Beijing, and express-mailed to D. Shen. Ms. Li had never met or communicated with the subject. Neither did Ms. Li know the exact date and actual site of the tests. The test samples remained sealed until a reading was claimed to be completed by the subject.

The test sample contained a 5-letter code generated from a pool consisting of capital English letters A to Z and Arabic numerals 2 to 9. The Arabic numerals 0 and 1 were removed from the pool because they could be easily confused with the English-language capital letters O and I and unnecessarily complicate the reading, based on the prior understanding that finer differences would be lost in the information transfer presumed to be associated with ESI, as is true with any information transfer process (Yang & Liu, 1981). The number of characters in the pool was therefore $26 + 10 - 2 = 34$. From this pool of 34 characters, five were randomly selected for each sample using the pseudorandom character string functions of Microsoft Excel. The code comprised the randomly permuted 5-character combination which was then printed in black, boldface, Arial font, at a font size of approximately 14, on A4 paper (80 g/m^2, size 210 mm $\times$ 297 mm). Examples of the test samples are shown in Figure 1. Twelve codes were printed on each sheet over twelve rows covering the entire height of the page with equal spacing between neighboring rows. Each of the bold characters measured approximately 5.0 mm $\times$ 4.0 mm (height $\times$ width). A 20-mm margin was placed on the left side of each sheet. On this margin, as well as on the other side of the sheet, a unique two-digit Arabic number was printed in duplicate.

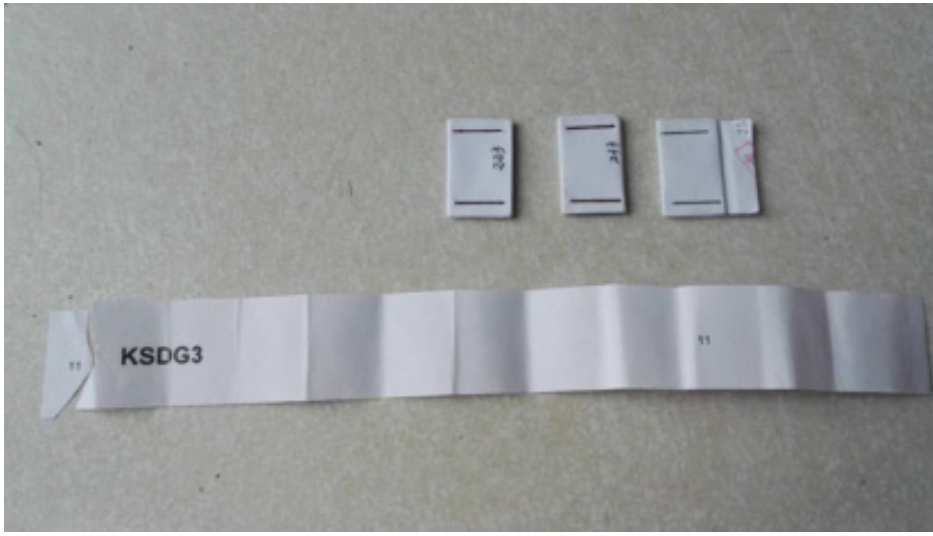

Figure 1. Photograph of some samples used for the tests. Shown in the photograph are four samples, with three remaining in the sealed condition (upper row), see the staples at the opposite ends of each sample) and one unfolded to expose the 5-character code (lower row).

Upper row: **Seen on the outer surface of the two sealed samples are 3-digit numbers (223 and 233) handwritten on-site to uniquely mark each sample. Seen on the partially unfolded pagelet of the one still-stapled sample (on the right) is a preprinted 2-digit number (25) intended to provide an additional safeguard to prevent the sample being tampered with or replaced.**

Lower row: **Seen on the unfolded sample on the lower panel is the 5-character code printed in Arial font, bold, size 14. Also seen on the unfolded sample is a small 2-digit number (11), used as the additional safeguard against fraudulence.**

Each sheet with 12 rows of printed codes was cut into 12 individual strips. A small irregular piece of paper was torn off over the left margin of each strip of paper. The torn-off portion was retained by the person preparing the sample in accordance with the so-called HUFU (which literally means "tiger-seal") method (see Figure 1, lower row), which consisted of two uniquely matched objects to verify military command as used by the ancient Chinese. The remaining long portion of each strip of paper with the code at one far side was then folded 9 times from the side of the code, resulting in a total of 10 layers of paper with the code hidden in the middle 2 layers. This ensured that the hidden code could not be seen by holding the paper against strong light. Finally,

the folded samples, each the size of a thumb-drive, was stapled on the two opposite ends to complete the off-site preparation. Approximately 80 sealed test samples and torn-off pieces were mailed by Ms. Li to D. Shen.

On-Site Preparation of the Test Sample

Prior to the test, D. Shen hand-wrote a unique 3-digit number at the outer edge of each test sample. Afterwards, approximately 50% of the total of ~80 test samples were randomly chosen by D. Shen and placed in a small open container (not big enough to hold the entire batch of samples as they were mixed) and thoroughly mixed. A test sample was then randomly picked up by D. Shen or his assistant and then given to the subject. There were also a few occasions when the test sample was picked by the subject herself. No one on-site had any prior knowledge of the code on any test samples. Codes were not checked until after the subject claimed to have completed a reading and the test process had moved to the code-checking phase.

The Test Protocol

The subject was informed that she was to "read" a code consisting of 5 characters, and each of the five characters could be a combination of any letters of the capitalized English alphabet A to Z and the Arabic numerals 2 to 9. The subject was permitted to place the test sample on the table at which she was sitting but was not allowed to handle or move the sample in any way suggestive of covert manipulation. The subject occasionally held the thumb-drive–sized test sample between her thumb and forefinger when focusing. The test sample remained within the field of vision of D. Shen and his assistant as well as any witnesses (the subject's parents). Recorded video surveillance was running continuously, with the subject, table, and test sample in the complete field of view without any blockage of the views or interruption in the videoframes. Breaching of any of the aforementioned conditions would trigger the declaration of an invalid trial.

Within each trial, the subject was permitted to touch or grip the test sample with her fingers because she claimed to need to touch the test sample to facilitate the reading (no time limit was set, but repeated

attempts at such tasks requiring strong focus of attention would soon get frustrating and boring for a teenage subject, or anybody). No staple seals of the test samples were breached in any of the trials until the subject declared (verbally or sometimes with body language) the completion of a reading after writing the perceived code onto the reporting sheet. D. Shen and the assistant would then inspect the exterior condition of the test sample, confirming that the original handwritten mark had not changed and that the stapled condition remained intact. The staples were then removed under recorded video surveillance by D. Shen or his assistant, and the sample was unfolded to make the code visible and then announced to everyone who was on-site. The segment with the code was cut from the paper and pasted onto the logging sheet. A new trial was not started until the previous trial had had a verdict.

The time it took for the subject to conduct the task of identification also was recorded. The starting time of a trial was marked from when the subject had possession of the test sample drawn by the examiner or occasionally by herself from the sample box. The stopping time of a trial was marked when the subject indicated, verbally or with body language, that a reading was complete. The confirmation of completion of the attempted "reading" was not necessarily immediately after she wrote down something on the reporting sheet. The time she took to write down the perceived code was spontaneous, and the number of characters she wrote down at a time also was spontaneous.

The Testing Sites and Dates

All tests were conducted during the daytime in a hotel guest room. One test was conducted in Haikou City, Hainan Province, China, and another one in Wuxi City, Jiangsu Province, China. The tests in Haikou City included 16 completed trials, which were performed over four days during February 19–24, 2015. The test in Wuxi City included 18 trials, which were conducted on May 16 and 17, 2015. Three more trials were actually conducted earlier, on August 1, 2014, in Yangzhou City when the subject first met D. Shen (accompanied by R. S. Shen) for a demonstration round. Those three trials were not counted toward the study results, however, because the test objects were not prepared in a double-blind way.

Merit of Match and Statistical Consideration

The outcome of reading the 5-letter codes was assessed with a "merit-of-match (MoM)," defined as $MoM = \sum_{i=1}^{5} M_i$, where M_i is a binary number. M_i was assigned 1 if there was an exact match of the letter at the *i*-th position of the five-character code. M was assigned 0 otherwise. The reading can thus result in any integer number of MoM from 0 to 5, with a higher number indicating a better hit. A full miss is counted as MoM = 0, and an exact match (full hit) is counted as MoM = 5.

This was a study of a single subject attempting multiple trials of trying to identify a five-character code. Each character had the same probability of being permutated from a pool of 34 choices. A binomial probability thus can be calculated for the chance of making a full hit out of random guessing.

The trials were expected to result in a small number of hits (if there would be any hits at all) and a much greater number of misses. In comparing the conditions of the possible hits and the more-likely misses, it would also be interesting to compare if there was any difference in the time the subject took for a full hit, a full miss, or something else. The resulting durations of the trials were thus grouped into full miss, partial miss, and full hit, for assessing the difference in the times taken by the subject. The time difference between different outcomes with different sample sizes was analyzed by an independent two-sample *t*-test (Campbell et al., 2007). An alpha value of $p < .05$ was considered significant.

RESULTS

The Outcomes of the 16 Trials Conducted in Haikou City, February 19–24, 2015

The outcomes of the 16 trials conducted in Haikou City during February 19–24, 2015, are tabulated in Table 1. The table lists the trials in chronological order and the code as was prepared and read. Out of the 16 trials, there were six MoM = 0 (full miss), two MoM = 1, one MoM = 2, one MoM = 3, three MoM = 4, and three MoM = 5 (full hit).

TABLE 1
Outcomes of First Phase of 16 Total Trials Conducted in Haikou City. Codes of Trials That Resulted in Full Hits (MoM = 5) Are in *Bold Italic*

Cumulative trial #	Duration (minutes)	Code as printed	Code as reported	Merit of match (MoM)					
				0	1	2	3	4	5
1	14	KJG3D	HD3G4	X					
2	18	CSZXN	UT39F	X					
3	15	XDKNS	SW5H3	X					
4	23	SB3QM	S3BQ7			X			
5	29	KLD9R	6RXC	X					
6	20	AG2JM	3TCYM		X				
7	13	***5XKCS***	***5XKCS***						X
8	14	AC2MJ	ACBMJ					X	
9	19	***5CAFO***	***5CAFO***						X
10	19	AJT31	AJT3D					X	
11	18	AC9LJ	ACSLJ					X	
12	21	WB2JY	A3DUQ	X					
13	9	***KJT3S***	***KJT3S***						X
14	13	LB2JM	LJ2BM				X		
15	28	U7XRB	FYKRA		X				
16	26	Z6ESL	ZXE6	X					
			Total	6	2	1	1	3	3

The Outcomes of the 18 Trials Conducted in Wuxi City, May 16–17, 2015

The outcomes of the 18 trials conducted in Wuxi City on May 16 and 17, 2015, are tabulated in Table 2. Table 2 is constructed in the same way as Table 1, except that the trials are numbered in a cumulative way following from the Table 1 numbering (17–34). Out of the total 18 trials, there were eleven MoM = 0 (full miss), two MoM = 1, zero MoM = 2, two MoM = 3, one MoM = 4, and two MoM = 5 (full hit).

TABLE 2
Outcomes of Second Phase of the Total 18 Trials Conducted in Wuxi City. Codes of the Trials Resulting in Full Hits (MoM = 5) Are in *Bold Italic*

Cumulative trial #	Duration (minutes)	Code as printed	Code as reported	Merit of Match (MoM) 0	1	2	3	4	5
17	9	SFHBH	F53VY	X					
18	14	RELA5	JLFYZ	X					
19	15	DAEE8	7BVH8		X				
20	16	K6A3F	FAUTB	X					
21	19	MLWXH	MLHXK				X		
22	5	8BS9M	BOXK9	X					
23	12	QLWGP	QLNGP					X	
24	22	6WHF3	FKMBL	X					
25	16	C6SL4	DUHLA	X					
26	18	A3EDT	HKZ03	X					
27	30	S6DE9	KFHBW	X					
28	18	BYE8L	BYI3L				X		
29	23	L7B77	LWYE6		X				
30	12	5ZLJ2	TDHY8	X					
31	13	***W8J5L***	***W8J5L***						X
32	15	***ZUZXH***	***ZUZXH***						X
33	30	F6R7E	PS3TL	X					
34	15	2SX6L	LYDJF	X					
			Total count	11	2	0	2	1	2

The 34 Trials Combined

Combining Tables 1 and 2 gives a total of 34 trials. Of the 34 trials, there were seventeen MoM = 0 (full miss), four MoM = 1, one MoM = 2, three MoM = 3, four MoM = 4, and five MoM = 5 (full hit). The trials other than full misses and full hits combined to make a total of 12 partial misses, listed in Table 3.

TABLE 3
Outcomes of the Two Phases of 34 Trials When Combined

	Full Miss	Partial Miss	Full Hit
Number of Trials	17	12	5
Duration (Minutes)	18.2 ± 7.3	18.5 ± 4.7	13.8 ± 3.6

The time taken for the 17 trials of full miss was 18.2 ± 7.3 minutes, for the 12 trials of partial misses was 18.5 ± 4.7 minutes, and for the 5 trials of full hits was 13.8 ± 3.6 minutes. $p = .91$ is found between the times of full misses and partial misses. $p = .21$ is found between the times of full misses and full hits. $p = .06$ is found between the times of partial misses and full hits. The differences among the time taken in any of the three categories of outcomes were not significant.

DISCUSSION

The Odds of a Hit

It is informative to assess the odds of one hitting the 5-character code by simple guessing. Each of the 5 characters in a code were generated randomly with replacement, at an equal probability of permutation, from a pool of 34 characters. The odds of one character occurring at one position of the code is 1/34. The odds of the 5 exact characters occurring at the exact 5 positions is therefore $(1/34)^5 = 2.2 \times 10^{-8}$, or one in 45 million. The odds of hitting 5 exact characters five times over a total 34 trials has a binomial probability of $p < .00001$. This astonishingly small probability implies that the subject's hitting 5 exact characters five times over a total of 34 trials is difficult to justify by chance expectation. This would then invite us to speculate which kind of process could have facilitated the subject in acquiring the code information without utilizing information transfer through ordinary sensory routes. That speculation first arose during the demonstration test conducted in Yangzhou City, which was done single-blind and with a much smaller number of trials.

The Demonstration Test in Yangzhou City

The demonstration test in Yanzhou City on August 1, 2014, was conducted with only three test samples. The three test samples were prepared by D. Shen. The preparation of those three samples differed from the preparation of test samples by Ms. Li in Beijing in that the strip of paper cut from the A4-size paper sheet was folded 6 times instead of 9 times, resulting in a total of 7 layers of paper with the code hiding in the middle layer, in comparison with the total of 10 layers of paper with the code hiding in the two middle layers.

The 5-character codes used for the demonstration were, respectively, 37K9J, 8Z3N6, and 37K9J. The subject was instructed to report exactly what she was able to "read." The subject took 35 minutes in trial 1 to make a full hit on the code 37K9J. The subject then took 6 minutes in trial 2 to make a near-hit, reporting 8Z3N9 in comparison to the actual code of 8Z3N6 (MoM = 4), mistaking only the number 9 with 6. The subject then was put to trial 3, taking 5 minutes to make a full hit, again, of the code 37K9J.

It is worth noting that the code in trial 3 of this demonstration test was made intentionally identical to the code of trial 1. Should the subject deduce the code with a process based on nonaffirmative information accessed from the target by whatever means that might be, hitting the exact same code would likely encourage the subject to report something else as she might consider the duplication of code to be unlikely and an artifact. Should the subject have the genuine ability to access the target information, encountering an identical code that was confirmed in a previous trial as a full hit would not discourage her from reporting the same exact code.

Only three trials were completed in this demonstration test. This test with only three trials resulted in a hit rate of 66.7%. We note that the three test samples in this test were not prepared double-blind. That means the examiner knew the code, and it would be difficult to exclude the scenario that the subject could have "read" the test sample by presumably accessing the examiner's conscious awareness of the code, should there be such a "telepathic" information-transfer path.

Such a telepathic faculty for information transfer or access, however, can hardly be justified for the two double-blind tests with a total of 34 trials. Those trials produced a hit rate that was substantially smaller than that of the demonstration test but nonetheless remained inexplicable by chance expectation. We must admit that the history of research in China on ESI against a visual sensory barrier as a special presentation of ESP has had integrity problems due to deceptive practices of subjects (Wu et al., 1998). This experiment, however, implemented the necessary control measures to adequately safeguard the integrity of the examination by setting multiple levels of tractable physical barriers that not only discouraged but also prevented any deceptive fraudulent manipulations of the test sample by the subject.

The Subject's Self-Description of the Process of "Reading"

Some insights into the hit rate, which is inexplicable by chance expectation, may be rendered by the subject's own description of the "reading" process. D. Shen and his assistant conducted a few interviews with the subject, one of which was done immediately after completing the cumulative trial number 32 in Wuxi City that resulted in a full hit of the code ZUZXH. According to her, after she was able to get enough focus on the reading, the characters appeared on the so-called "third eye region," which is in the anterior domain or in the vicinity of the frontal lobe. The characters would appear once, but were unstable, and the arrangement of the characters at the beginning was often wrong. The subject claimed that she needed to wait for some time for the characters to stabilize, before affirming what the characters and their order really were. The instability or the momentary nature of the image-formation could be associated with some of the partial misses that were incredibly close to full hits. For example, in trial #14, the code LB2JM was read as LJ2BM. All five characters were correct, but the sequence was missed. Several other trials ended up with similar levels of partial misses, including trials #8 (target: AC2MJ; reported: ACBMJ), #10 (target: AJT31; reported: AJT3D), #11 (target: AC9LJ: reported: ACSLJ), and #23 (target: QLWGP; reported: QLNGP). In each of these trials, only one character out of the five positions was erroneous.

Is There an Alternative Channel of Information Transfer in the Altered/Alternative State of Consciousness?

The instability of the image formation, as perceived by the subject, may be appreciated with the average time taken to affirm a "reading." The times taken to reach a full miss, a partial miss, and a full hit were statistically insignificant. However, the $p = .06$ between the times taken to make a full hit (13.8 ± 3.6 minutes) and a partial miss (18.5 ± 4.7 minutes) is interesting. If more testing were done to increase the sample sizes, it might have been possible to see a statistically significant difference in the time taken to make full hits vs. partial misses. With $p = .06$, the average time taken to make a full hit was shorter than the average time taken to make a partial miss, indicating that the more certain the "image-formation" was, the less time was taken in hesitating to call a code. With $p = .06$, the standard deviation of the time taken to make a full hit being smaller than that taken to make a partial miss implies that the clearer the "image-formation," the less hesitation there was before calling a code.

We postulate that the subject's psychological and perhaps physical condition could have influenced the outcomes of the trials. In the first three trials in Yangzhou City, the subject felt fresh, excited, and had slept well the previous day. And that preceded her amazing demonstration in the small-sampled single-blind trials. The subject was in considerably less optimal psychological and physical states in the two tests subjected to double-blind readings. Traveling and being in an unfamiliar environment farther away from home could have made the subject's psychological and physical condition deviate from her more accustomed and energetic state. The lesser excitement and the likely increased psychological/physical/stress of the subject over the total of three separate tests at different sites could have affected the hit rate. The demonstration test had an amazingly high rate of 2 full hits out of 3 trials, followed by the test in Haikou producing a much lower rate of 3 full hits in 16 trials, with the last test in Wuxi producing an even lower rate of 2 full hits in 18 trials. As elaborated on previously, the high hit rate in the demonstration trial could have been associated with its single-blindedness, as it was difficult to reject a telepathic information-transfer pathway which would depend upon D. Shen either intentionally or subconsciously transmitting the code or that the subject somehow

could have accessed the code stored in D. Shen's consciousness space. Should that single-blindedness alone in the demonstration test not be the reason for the high hit rate in that test, and had the psychological/physical condition of the subject remained indifferent in all tests, the declination of the hit rate over the subsequent phases of trials would be consistent with the "declining" effect (Jahn, 1982) which has been regarded as a hallmark of ESP or psi-like demonstrations.

The subject's self-disclosed experiences were unfamiliar to an ordinary person. Those experiences, however, may imply a connection between an extraordinary consciousness state and an extraordinary perceptive faculty. We postulate that a special process of consciousness might have been voluntarily practiced by the subject in presenting ESI against a visual sensory barrier and other demonstrations inconsistent with common sense (Gimeno & Burgo, 2017). According to D. Shen (Shen, 2010), a "Second Consciousness State" (SCS) that may be akin to an alternative or altered state of consciousness could have been experienced by the subject in demonstrating ESI against a visual sensory barrier, or in any other phenomena inconsistent with common sensory responses. D. Shen suggested, based on earlier interviews with some presumably gifted subjects who also claimed extraordinary demonstrations of ESP faculty, the following: (1) the success of such demonstrations was highly correlated with a consciousness state different from the normal waking state; (2) the consciousness state deviating from the normal awake state was perceived to engage with the appearance of a momentary low-resolution image-formation of the test sample over a "third-eye screen," as it was called by a lay gifted person claiming experiences similar to that of the subject of this study.

We regard ESI against a visual sensory barrier as a manifestation of information acquisition using channels that are not yet known, i.e. via an alternative channel of information transfer. We further postulate that entering an alternative state of consciousness is needed to open consciousness to information that cannot be reached by ordinary sensory means, thus activating an alternative channel of information transfer. Such an alternative channel of information transfer could also imply an alternative channel of energy transfer which would then potentially permit some mind–matter modulations to manifest as psychokinesis.

The subjective experiences similar to those claimed by the subject of this study would be extremely challenging to validate by means of instruments. It may be possible, however, to objectively monitor the state of perception that deviates from the normal awake state. Any state of consciousness must have a neurophysiological manifestation, as it ultimately involves synchronization of neurons over spatial networks and it would maintain certain levels of temporal coherence over the duration of the state. We envision that special states of consciousness that may be associated with ESI against a visual sensory barrier could be amenable to instrument measurement such as by electrical encephalograms, which showed unusual neurophysiological bursts at moments of psi presentation in a presumably gifted subject (Gimeno & Burgo, 2017). Access to readings of neurophysiological states could shed light on what differs in the neuromodulation of sensory and peri-sensory responses between normal consciousness states and altered states of consciousness that are believed to be directly associated with the phenomena of extrasensory faculty.

CONCLUSION

We conducted laboratory investigations with a presumably gifted teenaged female subject in China on identifying information of concealed objects unidentifiable via ordinary visual sensory means. A total of 34 trials were conducted in 2015 at two sites located in two different provinces. The test samples were prepared in accordance with "Zhu's five criteria" to assure double-blindedness. The test sample contained a 5-character code. Each of the five characters of the code was randomly generated by computer permutation among 34 choices including capitalized letters in the English alphabet, from A to Z, and Arabic numbers from 2 to 9. That permutation corresponded to a chance of less than 1 in 45 million of hitting the 5-character code in one trial by simple guessing. The subject's attempt to identify the concealed 5-character codes over the entire duration of each trial was monitored and video-recorded without the possibility of fraudulence or breach. The two trial sets of 16 and 18 tests were conducted in two separate cities, approximately three months apart. Of the total of 34 trials, 5 trials had a full hit, which corresponded to a binomial probability of $p < .00001$.

ACKNOWLEDGMENTS

We thank Miss Xuan Chen for her commitment to the tasks, and her parents for encouraging their child to participate in this study. We thank Ms. Li Bo for helping to prepare the samples. Special thanks also go to Dr. Glenn Hitchman.

The authors wish to express appreciation to Dr. Daquing Piao for his significant efforts in revising this manuscript. Considering the efforts that he has aggregated toward this work and his credentials that pertain to this work, Dr. Piao had been asked to coauthor this work. He declined the coauthorship with the following statement: "I felt personally and professionally obliged to apply my expertise to help make this interesting experimental work accessible to the broader English-speaking community of SSE. However, I am not comfortable to coauthor this paper because I was not involved in any aspect or phase of the experiments which shall prevent me from practicing objective judgment of each aspect of the experimental investigation and proceeding impartially to the conclusions inferred by the authors as listed." The authors look forward to the opportunity to collaborate with Dr. Piao in future experimental studies when conditions permit.

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Journal of Scientific Exploration, Vol. 35, No. 3, pp. 590–622, 2021 0892-3310/21

RESEARCH ARTICLE

Are Hessdalen Lights a Reality, an Illusion, or a Mix of the Two?

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Submitted April 14, 2021; Accepted May 23, 2021; Published September 30, 2021

https://doi.org/10.31275/20212171

Abstract—Hessdalen Lights (HLs in the following) are luminous, floating, more or less spherical atmospheric phenomena, with a lifetime of a few seconds to sometimes several minutes. These phenomena have been seen in the Hessdalen Valley in Norway for decades. Unfortunately, a full understanding of these baffling events is still lacking in spite of solid, working scientific projects intended to explain them. This paper tries to improve the situation. It raises the questions of where the energy for the creation of the HLs comes from, and what its nature is: (geo)chemical, electric, or other? We propose a new scenario for the Hessdalen lights. It exploits the recent idea of stable and traversable wormholes whose potential existence is beginning to be recognized in physics. Even though appearing highly speculative, this hypothesis has so far not been explored elsewhere, even though it possibly could supply a full description of the wholeness of the phenomenon. On the other side, even if the probability that an HL could indeed be a wormhole is maybe low, this question should not be dismissed out of hand. These theoretical considerations could help to increase knowledge and understanding of both HLs and wormholes. In this framework, we discuss the stability, energetics, and oversized dimensions of HLs. In physics, the final arbiter is not the theory but the experiment. Thus, some 'simple' experiments are suggested (high time-resolution photometry and magnetic field measurements). Eventually, if the process described is real, after mastering it there would be a free and inexhaustible source of energy, a tremendous breakthrough after which we could forget controlled nuclear fusion.

Keywords: Hessdalen Lights; wormholes

INTRODUCTION

Hessdalen lights (HL) and related phenomena reported from other regions of the Earth (and also "big" ball lightning) are certainly a great challenge for the scientific community. Scientific studies of these events began with Project Hessdalen led by E. Strand in the summer of 1983 (http://www.hessdalen.org) followed by the EMBLA Project in 1998 (Teodorani, 2004, p. 217). Several explanations have been proposed, but unfortunately most of them are far from explaining the puzzling facts (energetics, sizes, erratic motions, velocities, etc). In spite of decades of intense interest and of the large datasets acquired during many observing campaigns by teams at the Hessdalen and Embla projects, no consensus has been established.

First, it seems unlikely that HLs are simple atmospheric phenomena, given that the sightings do not correlate with meteorological data. We know that ionized gas (nitrogen and oxygen are dominant, with a percentage of other elements such as Sc, Fe, etc.) is involved (Teodorani et al., 2001; Hauge, 2007).[1] However, simple flames issuing from combustible gas (methane, etc.) or burning dusts of metal (scandium, etc.) also are excluded because HLs are insensitive to wind and gravity (most of the time the entities are approximately spherical). On the other hand, theoretical models based on possible geophysical or electrochemical sources existing on the site (Hessdalen Valley) fail to answer important key questions.

The first of these questions is relative to the creation of HLs. At this level, we could appeal to another perplexing phenomenon which seems to be correlated to the HLs, that is, ball lightning (BL in the following). In this case, the process of creation is usually identified with electric discharges occurring in stormy weather. Unfortunately, HLs can appear in clear weather, and the obvious exploitable source of energy feeding the BLs (a lightning strike) is not available for HLs.

On the other hand, the energy densities associated with BLs are mild,[2] ~10–100 Jm^{-3} (Boerner, 2020), so "soft" models for BLs, within the framework of classical electrodynamics and/or chemistry, have also been invoked. They are based on chemical reactions (Fischer, 1981; Abrahamson & Dinnis, 2000), on electromagnetic radiation stored in a conducting shell (Endean, 1997; Engholm et al., 1990), or on light

trapped inside a shell of low-density air (Torchigin, 2019). Many authors have subsequently tried to stick the various electromagnetic and/or (geo) chemical models which were seemingly suitable for the BLs to the HLs. Therefore, some rather interesting models have been proposed. For instance, Paiva and Taft (2010) have suggested that HLs are formed by a cluster of macroscopic Coulomb crystals in a dusty plasma produced by the ionization of air and dust by alpha particles during radon decay in the atmosphere. On the other hand, Monari et al. (2013) have hypothesized that the valley's shape, microclimate, or unique geology might also act as a giant battery that powers the lights. However, the energies at stake are much higher (by a factor of 100–1000 for the energy density) than those supplied by ordinary (geo- and/or electro-) chemical reactions which are assumed to be present on the site. Therefore, to create a plasma ball a powerful source has to be found (even for a centimetric plasma ball as will be discussed below). What might be the nature of this source when ordinary chemical or electromagnetic processes are very likely not at its root? So what do we do when "simple" models based on the usual physics do not work? To answer this question, we need to inevitably enter into a world of new concepts supported by more exotic models. Thus it appears that the most recent physics should be involved to boost a domain whose study seems to be suspended today. Bear in mind that the primary goal of any researcher is to widen scientific information, even into unexplored areas.

THE WORMHOLE HYPOTHESIS

Black holes have been invoked for explaining BLs (Rabinowitz, 2001), but the trouble with this idea is that black holes would describe a rectilinear trajectory like a meteorite entering the atmosphere. HLs often exhibit a chaotic (or erratic) trajectory similar to Brownian motion and definitely not a rectilinear trajectory. What is the cause of this rather surprising motion, assuming that this is real? In any case, wormholes, the near relatives of black holes, seem to be better adapted for explaining this very intriguing characteristic. And if black holes have proved their existence, it is very likely that stable (and traversable) wormholes also exist. The value of wormholes in physics is attested to, starting with the seminal paper of Morris and Thorne (1988). In this remarkable paper these authors demonstrate that maybe stable

and traversable wormholes could be somewhat more than simple mathematical curiosities (Morris & Thorne, 1988 ; Morris et al., 1988). Stable and traversable wormholes have received increasing attention ever since as objects that could really exist in the real world; very possibly, at least, as cosmological relics created in the quantum stage, or during the inflationary period of the evolution of the Universe. These primordial wormholes may also initially have captured some magnetic lines of force (Kirillov & Savelova, 2020).

Understanding of the stable and traversable wormholes is in progress, but there remains a great amount of work to do. A good deal of time and effort must be devoted to working out how these strange entities might form, and what might keep them open.[3] Unfortunately, we do not yet possess a theory unifying General Relativity and Quantum Mechanics. Thus, the entire landscape of all the possible types of stable wormholes is largely unknown. Options are wide open and physicists are strongly divided on these questions. Despite this rather uncomfortable situation, the cosmologists have succeeded in proposing a natural (and well-admitted) origin for the wormholes. In its very early (quantum) stage, the Universe should have a foamlike topological structure. Its relics might well survive the cosmological expansion, thus creating a certain distribution of wormholes in the Universe (a kind of porous medium). Moreover, the inflationary stage (Starobinsky, 1980; Guth, 1981; Linde, 1982) should enormously stretch the characteristic scales, pushing the ends of these strange entities farther apart, and eventually making a web of "sleeping" wormholes of all sizes. A rich and complex mixture of silent wormholes could thus exist in the Universe (Kirillov & Savelova, 2011). These tunnels would still be minute in diameter, but the two ends (the mouths) could be millions of kilometers apart (with the only visible features in our three-dimensional space being these two mouths, which are seen as spheres). It is hard to predict how many wormholes there are; but if they follow a Maxwell-Boltzmann distribution (Kirillov & Savelova, 2011) the existence of a wormhole with a millimetric (or metric) throat must certainly be very rare. Moreover, that one of these sleeping wormholes intermittently links two stars, and remains locked in this situation for a short time, has to be an even rarer situation.

At the present time, in view of the difficulties encountered when

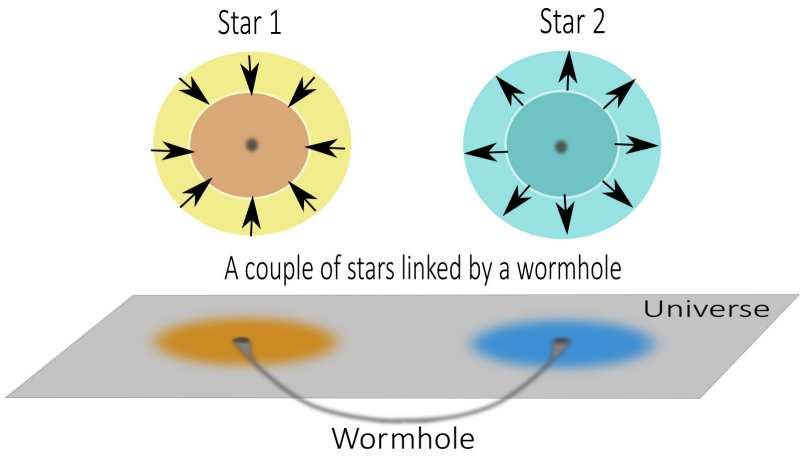

Figure 1. Schema of stars linked by a wormhole (from Dzhunushaliev et al., 2011).

carrying out the mathematics, only very simple solutions have been imagined. Thus, Dzhunushaliev et al. (2011) imagine that a wormhole (of a metric? size) could link a couple of stars. In their model, two twin stars are shown and the wormhole (which can still be seen as an extradimensional channel) links the centers of these stars (Figure 1).[4] In addition, the wormhole instantaneously follows the orbital motion of the two stars. These very special conditions of symmetry are obviously chosen in order to make the problem easily tractable.

However, an extension of this mathematical work is needed, even though the analysis of a situation with a broken symmetry is very likely a hard task. If two stars can be connected by a wormhole as shown by these authors, is it possible to conjecture that a star (the Sun) and one of its planets (the Earth)—de facto a highly asymmetric problem—also are connected by a similar shortcut in space? And in this case what would be the observed phenomenon in the atmosphere of this planet? The question is speculative but it warrants consideration, especially if it makes it possible to advance further our understanding of wormholes. Let us imagine for a moment that HLs have something to do with wormholes.[5]

Before we go any further, two important questions still deserve to be asked:

1. Could a wormhole's mouth be locked in the Sun? In fact the

wormhole's mouth could be found anywhere in space. Most of the time the wormhole's mouth resides in the void, but in this case the other extremity is not fed and remains invisible, and nothing happens. In our scenario one must imagine that, at times (rare), one mouth of the wormhole has been entrapped by the Sun and remains locked in it for a period of time. It is obviously a working hypothesis, but this situation could be achieved following the calculations realized by Dzhunushaliev et al. (2011) about this topic.

2. Why would the second mouth appear "only" at Hessdalen and only intermittently? In fact it is true that Hessdalen is in the area of the world where anomalous light phenomena are found. The big conundrum is that hitherto no one has managed to correlate the phenomena with local meteorology and/or geology, even after forty years of observations! De facto the phenomenon does not seem to be especially linked to Hessdalen Valley. This could be a mere coincidence. Thus, similar events have also been described elsewhere. Apart from fakes, hoaxes, optical illusions, or misidentifications, most of the so-called Unidentified Aerial Phenomena (UAPs), which are recurrent in several places in the world, are possibly Hessdalen-like phenomena not recognized as such (Teodorani, 2014, table 1).

On the other hand are we entirely sure there is not another Hessdalen on the planet, for instance in the middle of the oceans (the majority of the Earth's surface is covered by oceans, or about 71% of the surface of the Earth), or in a vast desert area such as the Antarctic or the Sahara (cold and hot deserts actually make up 1/3 of the land's surface area), where there is no one to observe the phenomena? By contrast let us recall that only three percent of the world's land surface is covered with urban areas. Unfortunately in a city the light pollution and skyglow prevent the observation of Hessdalen-type lights (it is admitted that in the United States and Europe 99 percent of the people cannot experience a natural night!). Eventually owing to the air traffic above urbanized regions the Hessdalen phenomena would go completely unnoticed (most of the time a typical Hessdalen light is just an unsignificant luminous point in the sky, with the legitimate question: Is it an airplane light or a "true" HL?).

There is moreover another answer to the second question (about the small area covered by the Hessdalen Valley where the phenomena

are seen). We can look at the study of volcanism on Earth, even if the proposed analogy cannot be taken at face value. Why would a small-volume hot spot volcano (as seen at Yellowstone for instance) appear at a well-located point at the Earth's surface and not a few hundreds of kilometers away, and why is this type of event only intermittently active? In addition geologists indeed estimate there are only about 40 to 50 hot spots around the world. The orthodox response suggested today is that a hot spot is the mouth of a mantle plume[6] which rises through the Earth's mantle and which is deeply anchored at the core–mantle boundary.

Likewise let us imagine that the space is a kind of topological porous medium (Kirillov & Turaev, 2007) as is hypothesized in our scenario, of which we distinguish only three spatial dimensions (the smooth surface of the porous medium). The wormhole could then percolate by accident toward a specific point, and for a finite moment, i.e., in the present situation at Hessdalen and not in the nearby valley (bearing in mind that a wormhole of submillimetric size in diameter is obviously much more specifically located than a hot spot volcano of more than 100 km in diameter). This "conduit" in the fabric of space can also temporally (or definitely) disappear, like the mantle plume in the hot spot in volcanism. Maybe there is nothing special at Hessdalen; by the way the events have significantly decreased in recent years, even though the meteorology and the geology of the place have remained unchanged (how can we explain this fact if the phenomenon is specifically related to the location?). It is likely that there will be nothing left to observe at Hessdalen in a few decades. Thus we can even suggest that the same phenomena will one day reappear elsewhere on the Earth's surface with a strong intensity (even though we cannot predict where and when this event will occur, just as we cannot predict the re-awakening of a volcano).

A practical analogy of HL with the so-called problem of the flexible pipe is quite interesting, even though they are different in many respects. The motion of a flexible pipe has been well-studied (Etlender et al., 2007; Xie et al., 2016). As far as we are concerned, with the wormhole problem both radiation and the magnetic field play the role performed by water in a pipe. On the other hand, we can proceed by analogy for the size of the mouth of the wormhole (whose possible cycle of closing and opening regulates for instance the mass or the

radiation flux between the two stars) versus the section thickness of the pipe (which regulates the water fluxes). Eventually we must compare a foreseeable erratic and rapid shifting in the extradimensional space for the wormhole versus the wall motion in the radial direction in real space for the pipe. All these descriptions deserve a deep analysis with the aim of transposing them to the wormhole world and maybe would lead to decades of complex mathematical studies. In spite of the fact that the theory of wormholes is not yet fully developed, the pictorial analogy made above will be useful in the following section.

We know at least that a wormhole has two extremities connected by a "throat." Let us imagine that one extremity is located somewhere in the earth's atmosphere, but where is its counterpart? The mouth of a wormhole is usually invisible (as a naked black hole without its accretion disk) unless the other extremity is immersed in a medium that produces a strong radiation field. The only object in the solar system that generates a large radiation field is the interior of the Sun. We can then imagine that the wormhole funnels the radiation field of an interior zone of the Sun from one of its extremities up to the other extremity placed in the earth's atmosphere (and very possibly also along magnetic field lines) (Figure 2). This suggestion is thus closely based on the model of Dzhunushaliev et al. (2011) where two twin stars are linked together, but with the difference that we suppose that the wormhole is traversable only by radiation and magnetic fields and definitely not through solar matter.[7] Thus an unsuspected connection, other than gravitational or magnetic, would exist between the Sun and the Earth. Even though this connection appears prima facie like a remote possibility today, it might reflect reality in the future. Astrophysicists are searching wormholes, far away at the galactic center (Dai & Stojkovic, 2019), whereas these entities may be far closer to home than we think.

To begin with, a first issue arises: What could the diameter of the throat of a wormhole connecting two stars be? Unfortunately, Dzhunushaliev et al. (2011) did not address this important question in their theoretical paper. Likewise what could be the diameter of the throat of a wormhole connecting a star of the solar type and a (telluric) planet? It turns out that HLs studies (see the text that follows) could eventually give an estimate of this diameter, of the order of 0.1 mm for a star–planet wormhole.

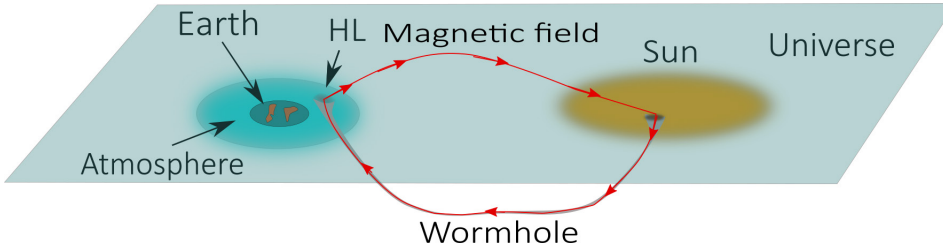

Figure 2. Schema of a wormhole between Earth and the Sun.

On the other hand the mean temperature in the Sun is of the order of 10^5 *K*,[8] and we shall take this value as the "surface" temperature of the (spherical) wormhole's mouth in the earth's atmosphere. We can now compare the mouth of the wormhole to a submillimetric star in the earth's atmosphere. The remarkable idea of comparing an HL to a very small star has been suggested by Teodorani (2014). Note that once the power of an HL (100 kW) and the temperature of the source (10^5 K) are fixed, the radius of the mouth of the wormhole is no longer a free parameter of the model but is automatically fixed by the Stefan–Boltzmann law. In order to avoid any ambiguity we must also specify that the very hot gas surrounding the wormhole cannot be detected by the observer (no more than the wormhole itself which is submillimetric in size). This region which emits a hard UV spectrum is constantly hidden from view by a surrounding shell of dense gas as we shall see below.[9] This shell is optically thick, and radiates in the visible range at temperatures in the continuous range from 5000 to 300 K. The few spectra that we can analyze[10] show features that are a recombination of line spectra of nitrogen and other species (atomic and molecular) directly produced in this shell.

THE PHOTOIONIZATION MODEL FOR THE HLS

In this part the hypothesis "wormhole" is not essential, a point source of the order of 100 kW is sufficient.[11] The theory of photo-ionization in gaseous nebulae is indeed well-developed today (see Morisset, 2016, for instance). However a basic statement is sufficient for our purpose here. Also we refer only to seminal papers on this

important topic. On the other hand we have taken a medium composed of pure dinitrogen (by far, dinitrogen is the most abundant gas in the Earth's atmosphere, accounting for about 78.1% by volume of dry air), but the introduction of other gas (dioxygen) would not change the main conclusions of the paper. The recombination lines of nitrogen are prominent in the spectra of HLs (Hauge, 2007). In the following, the species N_2, N_2^+, N, N^+, and N^{++} are indexed 1, 2, 3, 4, 5, respectively.

The Equations

The problem has seven variables: The species density $n_{N^{++}}$, n_{N^+}, n_N, $n_{N_2^+}$, n_{N_2} (m^{-3}), the electronic density $n_e(m^{-3})$, and the temperature T_e(K), and seven equations are needed:

— **The neutrality of charge in each volume unit (a plasma is globally neutral)**

$$2n_{N^{++}} + n_{N^+} + n_{N_2^+} = n_e \tag{1}$$

— **The gas equilibrium equation**
The Euler equation for a static spherical ball of gas is

$$-\frac{\partial P}{\partial r} - \frac{GM\rho}{r^2} = 0 \tag{2}$$

where P is the gas pressure,[12] ρ is the mass density, r the radius measured starting from the point source (the mouth's wormhole which is assumed to be here a quasipoint source of energy), G the gravitational constant, and M the apparent gravitational mass of the wormhole.

First we begin by the estimation of the pressure gradient in the plasma ball, for a ball filled with plasma with a temperature of at least 2000 K (the minimum threshhold for the temperature in a plasma). Taking the particle density in the atmosphere n_{atm} ~2.5 10^{25} m^{-3} and a mean mass for the molecules ~4.8 10^{-26} kg (dinitrogen or dioxygen), we find numerically for the gradient (with a radius for the plasma ball of the order of 1 m), $\left|\frac{\partial P}{\partial r}\right| \sim 7\ 10^5\ Nm^{-3}$. Eventually we find for the cor-

responding acceleration field $g = \frac{GM}{r^2} \sim 6\,10^5\, m\, s^{-2}$. It is a fully unrealistic value indeed (6 10^4 times the acceleration gravity at the surface of the Earth!). The gravitation being a long-range force, the influence of this gravitational field on the environment would be detected at a very large scale. This is obviously not the case. We deduce from this result that the gravity of the star–planet wormhole is necessarily low (contrarily to a black hole, the mouth of a wormhole can appear gravitationally neutral—a kind of massless or sleeping entity).[13] More generally no long-range force, gravitational or electrostatic, can contribute to the stability of a plasma ball such as an HL.[14] The appropriate solution is then

$$\frac{\partial P}{\partial r} \sim 0 \tag{3}$$

and eventually we obtain the pressure equilibrium

$$\left(n_e + n_{N^{++}} + n_{N^{+}} + n_N + n_{N_2^+} + n_{N_2}\right) kT_e = n_{N_2 atm} k T_{atm} \tag{4}$$

with $n_{N_2 atm}$ = 2.7 10^{25} m^{-3} and T_{atm} = 298 K. The cohesion of the plasma ball (approximately spherical) is ensured by the ionizing point source.

— The photoionization-recombination equilibrium equations

$$n_i \int_{\nu_i}^{\infty} d\nu \frac{4\pi J_\nu}{h\nu} \sigma_{1,\nu}(i) = n_e n_{i+1} \alpha(i) \tag{5}$$

where J_ν is the mean specific intensity of the radiation field detailed below ($\frac{4\pi J\nu}{h\nu}$ supplies the number of photons per unit area per unit time per unit frequency) and $\sigma_{1,\nu}(i)$ is the photoionization cross section from the fundamental level for the species i (ν_i is the threshold frequency). The total recombination rate coefficients for the transition $i + 1 \rightarrow i$, $\alpha(i)$, are given by the fitted expression

$$\alpha(i) = 10^{-19} z \frac{at^b}{1+ct^d} m^3 s^{-1} \quad (6)$$

where the coefficients *a, b c, d* are from table 1 of the paper by Péquignot et al. (1991) (*z* is the ionic charge, *z* = 1 for the neutrals), and the normalized temperature $t = 10^{-4} \frac{T}{z^2}$. The molecular recombination coefficients $\alpha_D(i)$ are taken from Tamadate et al. (2020).

For the photoionization cross sections of the atomic N and its ions, we have chosen a well-known simple law for the species *i*, i.e.,

$$\sigma_{1,v}(i) = 10^{-22} \left[\alpha \left(\frac{\nu_i}{\nu} \right)^s + (1-\alpha) \left(\frac{\nu_i}{\nu} \right)^{s+1} \right] m^2 \quad (7)$$

where α and *s* are coefficients which are supplied in the paper by Henry (1970) and ν_i are the threshold wavelengths tabulated in Table 1 in this paper. For the molecular nitrogen N_2, we have fitted published tabulated values using the downloading link https://home.strw.leidenuniv.nl/~ewine/photo . A counterpart curve has been used for the corresponding monocation

The mean specific intensity of the radiation field (Williams, 1968) is

TABLE 1
Threshold Wavelengths

Reactions	Energies (eV)	Threshold frequencies (Hz)	Wavelengths (nm)
$N_2 \rightarrow N + N$	9.8	$2.4\ 10^{15}$	$\nu_{D1} = 125$
$N_2^+ \rightarrow N + N^+$	9 .8	$2.4\ 10^{15}$	$\nu_{D2} = 125$
$N_2 \rightarrow N_2^+ + e^-$	15.5	$3.8\ 10^{15}$	$\nu_1 = 79$
$N \rightarrow N^+ + e^-$	14.5	$3.5\ 10^{15}$	$\nu_3 = 86$
$N^+ \rightarrow N^{++} + e^-$	29.6	$7.1\ 10^{15}$	$\nu_4 = 43$

$$J_v = \frac{R_S^2}{4r^2}\, l_v\, exp\,(-\tau_v) + \frac{(n_3)^2}{n_1}\frac{2h^4}{(2\pi mkT_e)^{\frac{3}{2}}}\frac{v^3}{c^2}\, exp\left[\frac{h(v_{D1}-v)}{kT_e}\right] +$$

$$\frac{n_3 n_4}{n_2}\frac{2h^4}{(2\pi mkT_e)^{\frac{3}{2}}}\frac{v^3}{c^2}\, exp\left[\frac{h(v_{D2}-v)}{kT_e}\right] + n_e\frac{n_2}{n_1}\frac{2h^4}{(2\pi mkT_e)^{\frac{3}{2}}}\frac{v^3}{c^2}\, exp\left[\frac{h(v_1-v)}{kT_e}\right] +$$

$$+ \Sigma_{i=3}^{4}\, n_e\, \frac{n_{i+1}}{n_i}\,\frac{2h^4}{(2\pi mkT_e)^{\frac{3}{2}}}\frac{v^3}{c^2}\, exp\,[\frac{h(v_i-v)}{kT_e}] \qquad (8)$$

where the intensity of the source (i.e., the mouth of the wormhole assimilated to a black body) is

$$l_v = \frac{2h\frac{v^3}{c^2}}{exp\,\frac{hv}{kT_{WH}} - 1} \qquad (9)$$

The optical depth is given by

$$\tau_v(r) = \int_{r_{WH}}^{r} dr'\left[n_1\sigma_{D1,v}(1) + n_2\sigma_{D1,v}(2)\right.$$

$$\left. + n_1\sigma_{1,v}(1) + n_2\sigma_{1,v}(2) + n_3\sigma_{1,v}(3) + n_4\sigma_{1,v}(4)\right] \qquad (10)$$

— **The temperature equation**

$$kT_e[(n_3)^2\alpha_D(1) + n_3n_4\alpha_D(2) + n_en_2\alpha(1) + n_en_4\alpha(3) + n_en_5\alpha(4)]$$
$$= n_1\int_{\nu_{D1}}^{\infty} d\nu\frac{4\pi J_\nu}{h\nu}h(\nu-\nu_{D1})\sigma_{D1,\nu}(1) + n_2\int_{\nu_{D2}}^{\infty} d\nu\frac{4\pi J_\nu}{h\nu}h(\nu-\nu_{D2})\sigma_{D1,\nu}(2)$$
$$+n_1\int_{\nu_1}^{\infty} d\nu\frac{4\pi J_\nu}{h\nu}h(\nu-\nu_1)\sigma_{1,\nu}(1) + n_2\int_{\nu_2}^{\infty} d\nu\frac{4\pi J_\nu}{h\nu}h(\nu-\nu_2)\sigma_{1,\nu}(2)$$
$$+n_3\int_{\nu_3}^{\infty} d\nu\frac{4\pi J_\nu}{h\nu}h(\nu-\nu_3)\sigma_{1,\nu}(3) + n_4\int_{\nu_4}^{\infty} d\nu\frac{4\pi J_\nu}{h\nu}h(\nu-\nu_4)\sigma_{1,\nu}(4)$$

(11)

The Results

The equation system considered above has been normalized and solved by an iterative method at each point of radius *r*. MATLAB numerical computing was used throughout the calculations. The results are displayed in Figure 3.

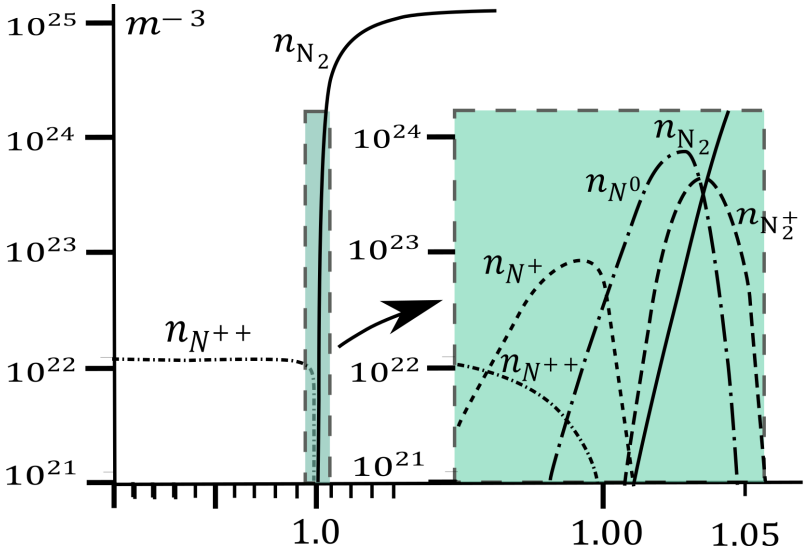

Figure 3. Results of the equations using Matlab.

We can see that HLs are described in the present context by a small quasi hollow ball filled with plasma at a low density (the unit on the abscissa is of the order of 1 cm). In the transition region (thickness < or ~ a millimeter) the density increases by three orders of magnitude and the temperature rapidly drops from 10^5 K to 298 K. The surrounding thin shell is optically thick and radiates as a black body in the visible range (with a quasicontinous spectrum in the recombination lines by giving HL the appearance of an opaque disk). The energy contained in this hot plasma ball is

$$\frac{4\pi}{3} R_{N^{++}}^3 (n_{N^{++}} + n_e)(kT_e) \sim 0.5J \tag{12}$$

This seems to be a relatively low energy, which would instantaneously dissipate within ~10^{-5} s without the input of energy from the wormhole (power 100 kW). This energy can increase the temperature of one kilogram of water by only 10^{-4} °C. There is no risk for the observer even at a short distance (nobody has been injured in Hessdalen Valley by an HL, or at least no claim has been made). Nevertheless the energy density which is associated is rather high, of the order of 500 kJ m^{-3}. By comparison, let us note, however, that the energy density usually attributed to an "ordinary" (and not exceptional) ball lightning and produced by an electric discharge (for instance a strong lightning impact in stormy weather) is much weaker and of the order of 10–100 Jm^{-3} (Stenhoff, 1999). An HL cannot be generated by a weak electric source (such as a natural battery as proposed by Monari et al., 2013) and lighting strikes are excluded. Other chemical sources are dubious. Another more energetic source must be found, as suggested here.

However, and contrary to expectation, even with a continuous input of energy of 100 kW, the plasma ball is found to be very small given that its radius is of the order of one centimeter! Let us note that this result is independent of the ionizing nature of the point source (a wormhole, a black hole, or any other "exotic" particle). Only the power of the source matters and it is approximately fixed by the observation. A checking by a direct calculation of the radius of the Strömgren sphere, for the reaction $N^{+} \leftrightarrow N^{++} + e^{-}, v_{N^{+}} = 7.1\ 10^{15}\ \mathrm{Hz}$ leads much more rapidly to a similar conclusion.

The number of ionizing photons (for the considered reaction) emitted from the mouth of the wormhole is

$$N_{ph} = 4\pi R_{WH}^{2} \int_{v_{N^{+}}}^{\infty} dv \frac{l_v}{hv} \tag{13}$$

or numerically $N_{ph} = 1.3\ 10^{22} ph\ s^{-1}$

The electronic density is given by $\left(N_2 \rightarrow 2N^{++} + 4e^{-} \Rightarrow n_{N^{++}} = \frac{n_e}{2}\right)$

$$n_{N^{++}} + n_e = \frac{3}{2} n_e = \frac{n_{atm} T_{atm}}{T_{WH}} \tag{14}$$

let, with $n_{atm} = 2.7\ 10^{25} m^{-3}, n_e \simeq 5.4\ 10^{22} m^{-3}$

The Strömgren radius is given by (cf for instance Osterbrock & Ferland, 2005)

$$R_s = \left(\frac{3N_{ph}}{4\pi\alpha_{N^+} n_{e^2}}\right)^{\frac{1}{3}} \quad (15)$$

Inside the Strömgren sphere the simulations give $T_e \simeq T_{WH}$ From Equation (1) we find thus $\alpha_{N^+} \simeq 3\ 10^{-19} \mathrm{m}^3 s^{-1}$. Eventually we obtain again

$$R_S \sim 1\ \mathrm{cm}$$

Again we find a diameter of the order of a few centimeters (smaller than a tennis ball).[1] Nevertheless it is a rather deceptive result given that HLs are generally described as much bigger with a diameter of the order of one meter. Obviously, here the energetics is not a pitfall for a star–planet wormhole as it could be with an ordinary chemical source, and wormholes with a "bigger" diameter, for instance of the order of 1 mm, easily could supply a very high power of 10 MW (for a same temperature of 10^5 K), but even with such an impressive (but not observed) power, the radius of the HL would be no greater than 5 cm. It appears at last very difficult to fully ionize a cubemeter of air![15] So is an HL with a diameter of the order of one meter a reality, or an illusion produced by the brain of the observer seeing a bright point light source (with diffraction artifacts that spread the image of a point source on the retina)?

Does a Skyglow Surround the Small Plasma Ball?

A prosaic scenario could however be supplied to explain the "big" size of HLs. It is well-known that soil dust aerosol is higher under cold climate conditions (as prevailing across Hessdalen Valley during the winter season, a period where the HLs are seen to be more numerous) as a consequence of dry air and weakened precipitations (Petit et al., 1999). Let's assume a complex mixture of hybrid mineral aerosols is present in the atmosphere of Hessdalen Valley. In order to estimate the

extension of the diffusion zone produced by these aerosols illuminated by the plasma ball, the aerosol optical depth, which is a measure of the amount of light that aerosols scatter and absorb in the atmosphere, must be known. Complex organic aerosols constitute a large portion of these particles (Bzdek et al., 2014),[16] but here we will take spherical microclusters made of pure silicon associated with soil dust.

We can estimate the dust concentration to be of the order of 1 μg m^{-3} in the atmosphere of Hessdalen (the mean dust concentration in the Arctic). Let particles have a mean radius *r*. The mass and the radius of a silicon atom are respectively 4.7 10^{-26} kg, 1.11 10^{-10} m. This gives for the particle density (with particles of micrometric size), 3 10^{-14} r^{-3} (m^{-3}). With an extinction cross section[17] in the visible range ~2 x πr^2, we find for the extension of the diffusion zone surrounding the plasma ball ~5 10^{12} *r* (m). We note that regardless of the size of the particle (micrometric or submicrometric) the medium surrounding the plasma ball is optically thin and therefore no diffuse glow of a metric size is created.[18]

The Possibility of a Mixed Explanation

A closer look at an HL photograph (Figure 4), however, shows a rather inhomogeneous and patchy surface and definitely not a perfect small disk with a sharp circular boundary as often falsely related.

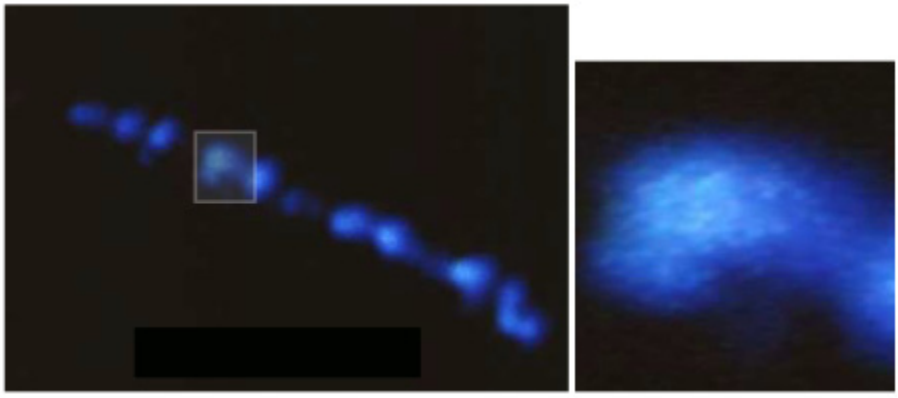

Figure 4. Imprint of the wavering trajectory of the HL (taken from the Hessdalen Project, E. Strand). Magnified enlargement on the right side.

On the contrary, well-individualized grains appear on this photograph and at some moment the "global" ball splits into several small pieces. The HL brightness strongly fluctuates and can even disappear and then a moment later suddenly reappear. This oscillation between appearance and extinction is difficult to explain, invoking for instance a chemical source or a point electric discharge for the HLs. What energy source can produce such strange phenomena?

Maybe a mixing of a real event (visualized by the small grains on the photograph) combined with an optical illusion (i.e., the extended disk) is a way to solve the problem. From the various and enigmatic reports of eyewitnesses, skeptics of HLs (or more generally BLs) often deduce that they are afterimages on the retina due to exposure of the intense flash of light from linear lighting. We know that lightning balls as an optical illusion often have been invoked in the literature (Argyle, 1970; Berger, 1973; Peer et al., 2010; but see also for critics, Bäcker et al., 2007). However, it seems that at least a part of the phenomenon has a physical reality. It is well-known that after seeing a bright light, a persistent afterimage remains in the visual field for several minutes. Sometimes this afterimage is even complex (Taya & Ohinata, 2002) and the effect also similarly affects cameras. More precisely the persistence or recurrence of an image after the stimulus (the physical phenomenon) has been removed can produce on the retina or on a photograph the impression of an extended, diffuse, or granular picture instead of a unique, small, and sharp one.

We continue our investigation by now presenting more specifically two likely scenarios, labeled A and B, even though other possibilities arguably exist.

Scenario A. A wormhole subject to a very fast Brownian motion on the spot + a "slow" drift? This is the context in which the wormhole hypothesis appears most useful. We can imagine that the mouth of the wormhole fluctuates in diameter, alternating between a "large opening" (~.1 mm) and closing.[19] The erratic appearance of this mouth in a spatial zone of ~1 m, approximately spherical in shape (Figure 5), can thus give the subjective impression of an extended luminous surface (taking into account the afterimage perception and the light trail, it is well-known that light trails create a sense of speed and energy in the images).

This effect can also easily explain the intriguing fact related by

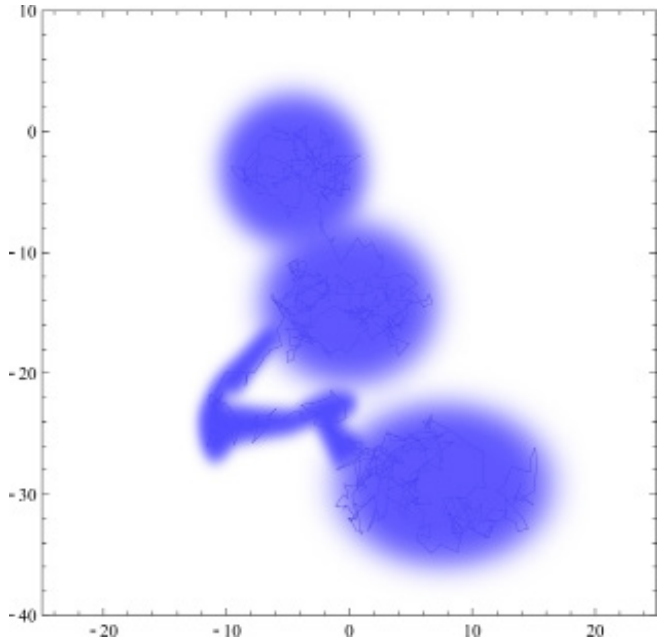

Figure 5. An example of a typical Brownian motion of a quasipoint light source. The resolution imaging device (eye or camera), if low, can strongly blur the trajectory of the primary tiny source.

witnesses: In some cases the HLs have also been perceived as suddenly animated with very rapid velocities, larger than the sound celerity in the air without sonic bang (Strand, 1990). This immediate description is obviously weird in view of the physics. Yet here the explanation is rather simple. When the mouth of the wormhole appears at one place it ionizes its immediate environment to form a plasma ball (more than one centimeter), then this ball collapses and then again reappears elsewhere leaving the illusory percepts of a continuous motion of a well-individualized small plasma ball, even though it is not the same piece of gas which is ionized each time (let us note in support of this claim that the luminous ball seen in Figure 4 appears to be a compact agglomerate of seemingly individualized patches of gas, but having approximately the same size, and this gives the impression that the "primary" HL draws a wavy "S" on the sky background). This is the so-called phi phenomenon which is an illusion of motion that arises when stationary objects (lightbulbs, for instance) are placed side by side and

switched on rapidly one after another (Wertheimer, 1912; Kohler et al., 2008; Steinman et al., 2000). In reality, here the plasma ball is not at all subjected to a superfast translational displacement from one point to another one in space, given that the air is ionized on the spot (but submitted to a succession of cycles, each of them being composed of a rapid expansion of a hot ionized gas, ~10^{-5} s, a stability phase of a few seconds to a few minutes (the primary HL itself), and then a "slow" contraction of a recombined cold gas, ~3 10^{-4} s). Thus the plasma gas forming the ball at a given moment does not move in a translational way and this is very likely why no sonic bang is associated with the phenomenon.[20]

As shown in Figure 4, on the magnified view (right side), we distinctly guess the fuzzy imprint of the wavering trajectory (which overlaps itself, but a straight track composed of small well-individualized patches, ending at each extremity with a sudden change of direction that is clearly visible) of the "primary" HL (i.e., the small plasma ball surrounding the wormhole's mouth and instantaneously produced by ionization). The corresponding path is drawn superimposed on the "global" phenomena (registered by a low-time resolution camera or the eye) in Figure 6. A high time resolution imaging camera system with submicrosecond timing accuracy and very low remanence level should ensure easy confirmation (or refutation) of this statement. On the other hand a time-dependent model also remains to be created to theoretically establish this idea.

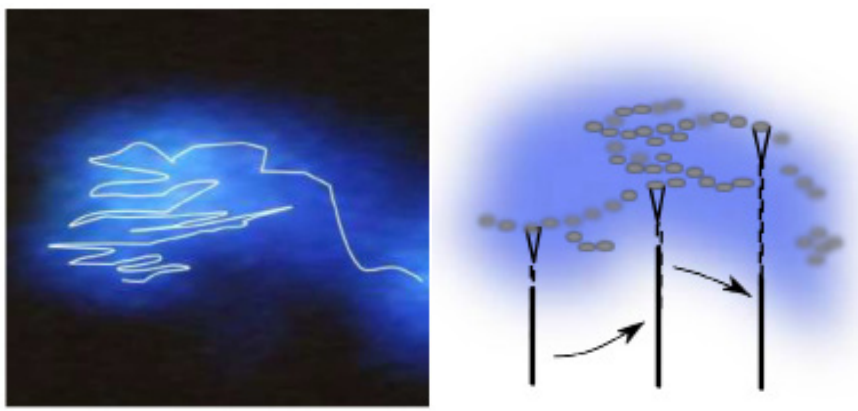

Figure 6. Path of the trajectory from Figure 4 superimposed on the global phenomena.

Scenario B. A wormhole with multiple heads? Another daring hypothesis would be that the mouth of the wormhole splits into a multitude of very small heads[21] (producing a structure that can be pictured as a kind of "swarm of bees"), for the same total power of ~10–100 kW. The attractive interaction between these heads should naturally produce an extended cohesive spherical ball. This scenario is very different from scenario A where just one head with high-speed motion is present. The resulting effect would then be a metric or decametric in size plasma ball, appearing with a grainy texture, as seen in Figure 4 (enlargement on the right side). The great interest of this second scenario is that the ball could now be divided into two or three components during the interaction, and the result would be a geometric structure, i.e., respectively, a dumbbell or retaining a triangular shape (as in the impressive figure 5c in Teodorani, 2004).

Unfortunately this very interesting possibility has not been examined in the literature on wormholes and it is difficult to say whether it is logically defensible (even though there exists no counterargument against it). But precisely because of this statement we can suggest that the study of HL phenomena is helping to advance knowledge of wormhole physics and vice-versa. Again, capturing an HL phenomenon with a ultra-high-speed camera is highly desirable in order to see how the ball can divide into several parts from one initial unit.

The Magnetic Field

With an assumed magnetic field of the order of 10^{-1} tesla[22] taken at the mouth of the wormhole, and assuming a decrease as r^{-2} for a monopolar field in the ball,[23] we obtain 10^{-9} tesla at one meter from the HL. This value is very low (compared to the earth magnetic field ~5 10^{-5} tesla). At 10 m this value falls to 10 picotesla, but this is still above the accuracy of the ultrasensitive magnetic sensors, ~1 picotesla (Abel et al., 2019).[24] A protocol for measuring the field configuration is sketched in Figure 7. Even though this operation will not particularly be easy to achieve, this would enable us to conclude the presence of a monopolar field[25] and therefore the likely existence of a wormhole at the center of the HLs.

The intensities that are supplied above are, however, minimal but

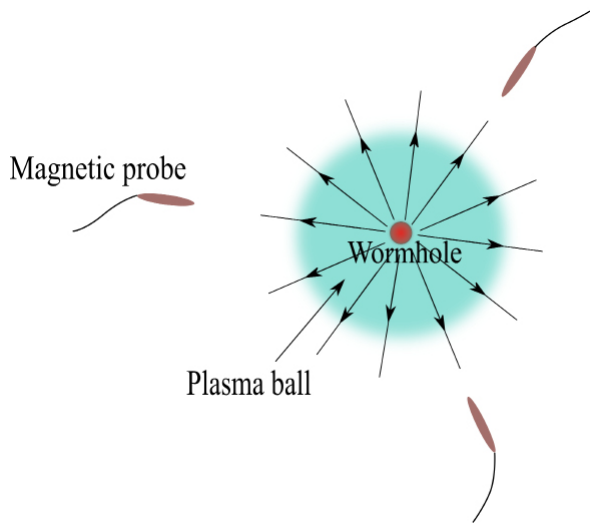

Figure 7. Positioning of three magnetic sensors to measure the magnetic field configuration at the mouth of a wormhole.

could be much higher (cf Note 24). On the other hand, in addition the positioning of the three magnetic sensors as shown in Figure 7 naturally leads to a triangulation of the HL. This crucial experiment could thus contribute to the accurate determination of both the position (its size) and the luminosity of an HL, two key parameters in the understanding of the phenomenon; even though trapping any elusive thing such as an HL between three sensors represents a great challenge. Unfortunately, we must admit that as long as we have not realized this type of experiment, the full understanding of HLs will remain out of range.

THE CREATION OF A WORMHOLE

Following the scenario described here, to create an HL or a big BL, a wormhole is appealing. However what process could build up a wormhole? The problem seems to have been moved from one area to another and ultimately left unsolved.

Brushing aside this question, we could even say that wormholes have existed since the time of the big bang where these entities were created by quantum fluctuations and then considerably expanded to millimetric or metric size during the inflationary phase. Thus worm-

holes might have been prefabricated by nature at the very beginning of the Universe (Cramer, 2016). Unseen since the dawn of time, these sleeping wormholes are patiently awaiting matter or energy coming into close proximity, to reveal their fantastic nature.

Unfortunately, from an experimental point of view, the situation appears much more complicated with regard to the fact that an "immeasurable energy" seems needed to build a wormhole from nothing. However, the latter question is ill-posed and this requirement of an "immeasureable energy" is possibly a false appearance. A stable wormhole may be easier to create from "nothing" (more exactly not from nothing but in fact from the fabric of space–time) than we usually believe. The goal is asking the right question: What energy is required for burning down a gigantic forest of hundred-year-old oaks? Is the answer a very huge energy? No, just the energy contained in a match (a very small activation energy indeed). Most reckless people are unaware of this simple fact. Maybe the universe is actually full of stable topological defects and is similar to a porous Swiss cheese of which we see only the smooth surface.

In the special case of HLs a strong magnetic disturbance or a magnetically collimated particle flux sourced from the Sun and reaching the polar terrestrial regions (Hessdalen is located in a Nordic high-latitude region) is maybe this small match that triggers a hidden machine in the fabric of space–time producing a longitudinal rip between the Sun and the Earth. Subsequently an extradimensional submillimetric channel (a wormhole) could open up between the Sun and the Earth for a few seconds or even minutes.

Another point still deserves special attention. Let us imagine for a moment that a technology could be derived from this scenario (simply retrieving a primordial stable wormhole and domesticating it—after all, man did not create atoms but has learned how to use them to extract hidden nuclear energy). The exploitation of a centimetric star–planet wormhole located at the center of a simple spherical shell of water of a few meters in size located on this planet could supply a power of 100 MW to its inhabitants (the power of a small nuclear reactor but without radioactive wastes). Will future generations be able to master this revolutionary technology, much more simply than the long-overdue controlled nuclear fusion?

CONCLUSION

This paper has been devoted to an understanding of Hessdalen lights and "big" ball lightnings a few decimeters or meters in size. If it is well-known that the Earth and the Sun interact through gravity and magnetic fields in usual space, we have shown that it could well be that they also interact in another more subtle extradimensional way. This bold remark could eventually constitute the first expected evidence that stable submillimetric wormholes exist in the universe and furthermore close to home. We end by emphazing that we are aware that this idea is highly speculative. However, it is located at the crossroads of several topics, such as plasma physics, magnetohydrodynamics, and wormhole theory (the latter still in its infancy). This is a remarkable field for investigation, even if a good deal of work remains to be done to specify exactly the nature and behavior of a star–planet wormhole.

NOTES

[1] Let us notice, however, that the spectrochemical analysis and line interpretation are unfortunately questionable in these works, due to a too-low–resolution spectrum and a very low signal-to-noise ratio. Even though very important, these works are just a first step. We know that an accurate identification of the chemical elements is strongly dependent on the spectral resolution level. A high spectral resolution would be highly desirable, although we feel that this type of experiment, realized on transient moving sources, is indeed a huge challenge. Some suitable devices do exist and could be tested. For instance, a slitless echellelike (multiorder) wide field spectograph is able to allow a resolution of the order of $\frac{\lambda}{\Delta\lambda} = 10^3 - 10^4$ which is at least a factor 10–100 times higher than the spectral resolution typically obtained using a simple transmission grating (see for instance the patent: https://patents.google.com/patent/US8749781). The wide field of this kind of disperser allows one to obtain a good quality spectrum even if the light ball is randomly moving (within an acceptably small angular motion), in the case that it is sufficiently luminous.

[2] Remarkable exceptions have been noted, however (Nikitin et al., 2018), even though some values appear to be overestimated in the latter work.

[3] In pure (ordinary) General Relativity, static wormholes are unstable. Imposing the stability of static wormholes requires a supplementary ingredient. Several hypotheses were suggested, such as the presence of an exotic negative mass (Morris & Thorne, 1988). However, static and traversable wormholes solutions also have been found in the vacuum of $R2$ gravity, a special case of $F(R)$ theory where the role of exotic matter is played by a modification of general relativity (Duplessis & Easson, 2015), etc. The zoo of stable wormholes is decidedly wide.

[4] We have reduced the Universe to a two-dimensional space (a plane), so that we can visualize the wormhole in its entirety. Especially the mouths of the wormholes are not circles as shown in Figure 1, but spheres! In our three-dimensional world, locally, a wormhole would appear as a sphere (the core of an HL?).

[5] Until now all models using conventional physics that have been proposed (Paiva & Taft, 2010; Monari et al., 2013; and many other equivalent or more exotic models), in order to explain the HLs, encounter serious difficulties, and for more than four decades now. From a theoretical point of view we can say that the topic of HLs is at a standstill with standard physics. The challenge is twofold: the energetics and the incredible motions of HLs, characterized by rapid accelerations and abrupt changes of direction.

i. Let us consider first the energetics. In the case of a ball lightning the energy is "easily" supplied by a lightning bolt. It is clear that we can then attempt to treat the question with the help of conventional physics. However, for the HLs no lightning bolt is present and the question is: What is the nature of the energy source of HLs? How is a large energy confined in a small volume (size less than or about equal to 1 m) and, secondly, how does the cohesion of the plasma endure for sometimes several minutes?

ii. The erratic motion of HLs, in turn, seems to defy laws of physics (obviously in appearance only, and we will see that this is not a problem with the wormhole hypothesis).

Nonetheless, it is difficult to understand why no explanation of all these things has been supplied after nearly half a century of studies (Hessdalen and EMBLA projects). Are we reluctant to receive an explanation for HL phenomena in terms of standard physics? This

is why a speculative and unconventional hypothesis (a wormhole), even though daring, deserves our attention, and we must take this opportunity to move things along. In physics the credibility of a hypothesis is not based on whether it is conventional or odd, but upon its falsifiability. Falsifiability is the key concept in the separation of science from pseudoscience. De facto we propose in "The Magnetic Field" section an experiment to test it. A wormhole's mouth has a characteristic signature, it is clearly identified by its monopolar magnetic field. Is this the case for HLs? We are convinced that it will be a difficult task to extract this information from this unusual and transient phenomenon. However, if this experiment were carried out, and it proved positive, we would have taken a major step toward understanding both HLs and wormholes. This should whet the appetites of experimentalists.

[6] A mantle plume is a long thin conduit connecting the top of the hot spot (the visible aerial part) to its base, locked at the core-mantle surface.

[7] The wormhole under consideration is thus an entity "fitted" between the nontraversable wormholes of the type Einstein–Rosen bridge, captured by general relativity (and which serves no purpose in physics) and the "more physical" wormhole analyzed by Dzhunushaliev et al. (2011). We still have an opportunity to investigate a vast and varied field of knowledge between these two limits.

[8] For this mean temperature, we take a round value near the geometric average of the central temperature (10^7 K) and the surface's temperature (6000 K).

[9] If the wormhole's mouth ($P = 100$ kW) were located outside the dense earth's atmosphere (i.e., for instance, located at 100 km in altitude above our head), we could think that its apparent brightness should be the same as a solar-type star (absolute luminosity ~$3.83\ 10^{26}$ W) located at 0.7 light-year, a short distance indeed; as the nearest star to our solar system is 4.3 light-years away. However, the wormhole's mouth emits in the hard UV range while the Sun emits in the visible range. The hard UV is completely absorbed by the Earth's atmosphere. Eventually this "star" would not be visible from the ground level.

[10] Once again let us note that these spectra were recorded with the help of low-resolution spectrographs, in fact basic grating filters

mounted in front of video cameras and SLR cameras (Hauge, 2007). More sophisticated devices are needed to obtain confirmation. High-resolution spectroscopy is indeed of basic importance in this type of research, for not only line identification but also for calculating the number of atoms that contribute to a given excitation level that produces the spectral line of a given chemical element. This would provide a precise measurement of pressure, density and temperature of the atmospheric plasma induced by the exit hole (where only the radiation field passes) of a hypothetical wormhole.

[11] The content of this paragraph is independent of the nature of the source, a wormhole, or something else (for instance a black hole, an exotic particle made of dark energy, or Rydberg matter, etc.).

[12] We assume here that the radiation pressure in the ball of ionized gas is negligible with respect to the gas pressure.

[13] The apparent gravitational mass of a wormhole's mouth seen by an outer observer can be positive, null, or even negative (Cramer et al., 1995). For the other extremity of the wormhole, the inner pressure gradient of the Sun must still be compensated by a negative mass, M, forming a spherical shell lining the wall of the mouth. This mass creates a repulsive gravity which prevents the solar matter from entering the wormhole. It is easy to show that

$$\left|\frac{M}{r}\right| \sim \frac{M_\odot}{R_\odot}\left(M_\odot solar\ mass\ and\ R_\odot solar\ radius\right).$$

With $r \sim 10^{-4}$ m, we find $M \sim -3\ 10^{17}$ kg. However, we think that the introduction of a huge negative mass is problematic in theory, even though some theoreticians of wormholes admit this possibility (so far negative masses have never been detected in the Universe). Recently, an exploration of the vacuum solutions of pure R^2 gravity uncovered solutions for the stability of wormholes without appeal to elusive negative masses (Duplessis & Easson, 2015). This second path is deemed much more credible.

[14] A magnetic field could still contribute to the stability of the plasma ball. Nevertheless, taking into account the energetics it would necessarily be very high. In this case we might detect some environmental interferences (for instance on both the electrical systems and the informatics devices, and this field might also have

left magnetic remanence behind in some ferromagnetic materials). De facto magnetic recordings (Teodorani & Strand, 2001, especially figure 5) seem to clearly suggest that a correlation exists between HLs and magnetic pulsating events with a mean amplitude of a few nanoteslas. With these values registered at a distance of 1 km we deduce a magnetic intensity of a few milliteslas in the environment of the HLs (both assuming a decrease of magnetic intensity by r^{-2} and a radius for the "environment" of the plasma ball of the order of one meter.

In addition, we can still imagine that a strong magnetic field is confined deep inside the plasma ball and is rapidly decreasing toward its surface. We know indeed that a magnetic field with a characteristic monopolar configuration with rapid decrease in intensity can be associated with a wormhole (see the section "The Magnetic Field").

[15] In addition to the energy problem, the issue of the size is also recurrent for HLs and BLs. Likewise in the laboratory BLs of a diameter larger than a few centimeters seem difficult to produce, as low-energy chemical processes are involved (Paiva et al., 2007). To fully ionize a cubic meter of air at atmospheric pressure, a minimum of 100 MJ are needed.

[16] Let us still note that HLs are seen in extremely dry air and that tiny droplets are excluded. Urban and industrial areas are prolific producers of sulfates, nitrates, black carbon, and other particles, but that is not the case in Hessdalen Valley. It is in a boreal forest, where organic particles such as amines are dominant (Kannosto et al., 2008). The conclusion found for silicon microclusters is easily transposable to these types of particles.

[17] Factor 2 (extinction efficiency) is a mean value for dielectric microscopic or submicroscopic particles (with sizes comparable to the wavelengths of the radiation in the visible range); the extinction efficiency strongly oscillates around this value (Mie Theory).

[18] Let us note that a ball lightning (BL) has been observed with a diameter estimated at 5 m (Cen et al., 2014). This is a rather strange observation. Ordinarily a BL is generated by a cloud-to-ground lightning strike and is of small size (centimetric). The lightning bolt strikes the soil and a plasma of small silicon clusters (Si, Si_2, Si_3, ...) is generated (a kind of natural laser ablation). Thus the prominent

lines of the neutral radical *Si* (λ = 478.2, 479.2, 568.4, 594.8, 615.5, 633.1, 655.6, 672.1 nm; cf the Charlotte Moore's Tables) were clearly identified in the spectrum. If the description is right this transient chemical species (characterized by a very short lifetime) had spread over a distance of 5 m from the impact point of the lightning strike. However the diffusion coefficient in the stable air for an atomic species is of the order of 10^{-5}–10^{-4} m^2s^{-1}. Eventually, for a distance of 5 m we calculate a diffusion time immeasurably much greater than the lifetime of free radicals such as *Si* which is very short (without a continual input of energy). The evaluation of the diameter in this observation is thus strongly questionable (the result is without doubt linked to a very approximate evaluation of the distance).

[19] This wave effect assimilated to a kind of gravitational wave of strong amplitude would deserve special attention by itself, but unfortunately it is not yet fully described in the literature on wormholes.

[20] When the wormhole's mouth is opening, an ionized ball instantaneously appears around it. A few moments later the wormhole's mouth is closing and the ionized ball instantaneously disappears, leaving a trace in the sky with an afterimage effect (or an image retention for a photographic device). The cycle can renew further from a new position, giving to the observer the false impression of a plasma ball acquiring an incredible (but obviously fictive) acceleration. More precisely, it seems from Figure 4 that two phenomena are superimposed with regard to the behavior of the wormhole, a Brownian turmoil which is extremely rapid and jerky (difficult to display with a low time resolution recording system), and a slow drift.

[21] Another analogy can also be made with a magnetic field bundle which can be decomposed in a multitude of rope strands, as seen for instance in the Sun's atmosphere.

[22] This is the mean value attributed to the magnetic field deep in the Sun. The magnetic field lines can funnel up to the mouth of the wormhole where they very rapidly expand.

[23] Let us note that the mouth of a wormhole has the appearance of a monopolar magnetic field, but it is not a magnetic monopole (a particle) which very likely does not exist in nature.

[24] Let us note, however, that measurements of magnetic field carried out at a distance of a few kilometers from HLs (Teodorani & Strand, 2001)

seem to supply much higher values, of the order of one nanotesla (i.e., ~10^{-3} tesla when referred at one meter distance from the HL). This suggests that values as high as 10^5 teslas could eventually be reached at the mouth of the wormhole (radius ~0.1 mm). In the framework of this interesting scenario a compression of the solar magnetic field (10^{-1} tesla) by a factor of 10^6 would then be produced in the throat of the hypothetical wormhole.

[25] As appropriate a magnetic field line ultimately forms a closed path by passing by the wormhole channel and by looping through the real space between the Earth and the Sun (Figure 2).

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Journal of Scientific Exploration, Vol. 35, No. 3, pp. 623–638, 2021 0892-3310/21

COMMENTARY

A New Case of Scientific Dishonesty in the Field of Parapsychology

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Submitted June 26, 2021; Accepted June 28, 2021; Published September 15, 2021

https://doi.org/10.31275/20212237

Abstract—The present article informs about a case of prolonged scientific dishonesty in the field of parapsychology. It emerged that Alejandro Parra, an active member of the parapsychological community for about three decades, has published substantially plagiarized books and articles since at least 2006. Currently, I am aware of 22 publications that contain plagiarized sections or that consist almost entirely of plagiarism. In the following, I present striking examples of such plagiarized texts and provide background information about the development of this case. Parra even presented research results obtained by others as his own research results, which amounts to data fabrication. Therefore, I conclude one cannot trust any of his books and articles. Even Parra's publications that contain data obtained in surveys or experimental studies must be disregarded by the scientific community unless the validity of their raw data has been very carefully established by examinations performed by others.

Keywords: Plagiarism; parapsychology; Alejandro Parra; fraud

I publish this article about a prolonged episode of scientific dishonesty in the field of parapsychology with uneasy feelings. Yet, it is an obligation to write this article in order to inform the public as well as the scientific community about a case of long-standing plagiarism and even data fabrication by a parapsychologist. Hence, the case I present adds to the list of previous instances of scientific dishonesty in our field as exemplified by the cases of Walter J. Levy (Rhine, 1974, 1975) and

Samuel G. Soal (West & Markwick, 2018; see also Roe, 2016). These cases are particularly unfortunate because many contemporary scientists regard parapsychological research with considerable skepticism already. Accordingly, the *Ethical and Professional Standards for Parapsychologists* of the Parapsychological Association state:

> The consequences of scientific dishonesty may be especially great in a controversial and widely discussed area such as parapsychology. So, while the importance of truthfulness in any scientific field is fundamental, the secondary effects of a lapse in this regard may be especially great in parapsychology. For such reasons, investigators in this field should be especially circumspect in the conduct and reporting of studies to insure the highest level of accuracy and truthfulness. (Parapsychological Association, 2005)

The case I need to report is even more deplorable as it concerns a past President of the Parapsychological Association (2011–2013) and a long-term member of its Board of Directors (2013–2015; 2018–2020), Alejandro Parra. I first stumbled upon suspicious contributions of his in October 2020 when performing a literature study into exceptional phenomena in near-death states. In a book by Parra about his survey of unusual experiences of Argentinian nurses, *The Last Farewell Embrace* (Parra, 2019a), I noted a case report that sounded very similar to a case reported from a previous survey conducted in England (Brayne et al., 2008). I present Parra's Argentinian case and the British case below.

A caregiver named Emilia told an extraordinary story of an elderly resident who suffered a severe spinal fusion that left her able to look only towards the floor. "A couple of days before she died," said Emilia, "her head went up and she could look out the window. She [the resident] said, 'I can see the house!' We were so delighted that we moved her to the window, so she could enjoy the view for the first time in years. Shortly after, she died." (Parra, 2019a, p. 69)	Several of the interviewees told the remarkable story of a resident who had severe spinal fusion to the extent the resident could only look at the floor. "A couple of days before she died," said one of the interviewees, "her head was up and she could look out of the window. She [the resident] said 'Oh I can see the house over there.'" The nurses were so delighted, they wheeled her to the window so she could enjoy the view for the first time in years. She died shortly after. (Brayne et al., 2008, p. 201)

When I asked Parra about the striking similarity of these two cases, he replied that he had unfortunately been unable to record his interview with Emilia, neither in writing nor via audio recording. But because Emilia's report would have been so similar to the British case, he decided to simply reproduce the version given by Brayne et al. (2008). He apologized for this unusual conduct (personal communication to the author, October 24, 2020).

Thereafter, taking a closer look into Parra's book, I noted that numerous other cases and text passages also sounded very similar to text contained in other sources. I present a few other examples below.

Many of the stories that emerged through my interviews with nurses in hospitals and nursing homes were particularly moving. For example, a patient often dreamed of her dead sister sitting next to her bed. She also dreamed that she herself was younger, that she had gone for a walk and done "the usual things" with her sister. She described these dreams as extremely comforting, because "I'm not going alone . . . [my sister] is with me." (Parra, 2019a, p. 53f)	These dreams and visions were overwhelmingly described as comforting to the patient. For example, 1 patient reported that she had frequent dreams of her dead sister sitting beside her bed. She also dreamed that she was younger, going for walks, and doing "the usual things" with her sister. She described these dreams as extremely comforting because "I am not going alone—[my sister] will be with me." (Nosek et al., 2015, p. 3)

A caretaker of a nursing home told me about the following experience where she heard the voice of her deceased father on her mother's deathbed: "I took some time to take care of my mother at home, and, when she died, I had her in my arms. Also present was my brother and a niece. I clearly heard my father's voice calling her right before she died. He had died twenty-four years earlier, so, of course, I was not thinking about him. It may have been in my subconscious, but I clearly heard his voice calling her by her name. It was incredible!" (Parra, 2019a, p. 61)	5.2. Carer hears deceased father's voice at mother's deathbed 'I took time off to nurse my mother at home and when she died, I was holding her in my arms and there was a brother there and a niece and I distinctly heard my father's voice calling her, just at the point of death. He had died some twenty-four years before and he certainly wasn't on my mind, as far as I'm aware. He may have been in my subconscious but I distinctly heard his voice call her name. That was amazing!' (Fenwick et al., 2010, p. 5)

Stella C., a home nurse, said that these experiences and hallucinations can be the same. She remembered the case of an old woman whose husband had recently died. The wife became ill, and, after returning home, began to call for her deceased husband. "She was always repeating her husband's name, saying, 'Jack, I'm coming,' every time she talked about him. Sometimes I think it's because they have dementia, and that's why they have this kind of hallucination." (Parra, 2019a, p. 65)	Another interviewee said that ELEs and hallucinations might be the same thing. She cited an example of an elderly woman whose husband had died recently. The wife became ill, and after returning to the nursing home from hospital, she began calling out to her dead husband. "She was always saying her husband's name, `Jack I am coming,' whenever she talked about her husband. I think sometimes it's because they have dementia, and that's the reason they have hallucinations like that." (Brayne et al., 2008, p. 199)

Natalia, a young nurse who had studied psychology, reported: "You can see it in their eyes, in their eyes. When they have a fever, they see things or are agitated or anxious. You can see that there is a fear, something that you do not understand. . . . The end-of-life experience is like a process, and, once you have experienced it, you move into a different mental state. The experience at the end of life is usually something so positive. . . . It's like a trip." (Parra, 2019a, p. 65)	A nurse said, You can tell from their eyes. When they have a high temperature they see things and it's an anxiety-based thing. You can see there's an underlying fear because they don't understand it. . . . Whereas with the end-of-life experience it's like a process and once they have experienced it they move onto a different level. End-of-life experience is usually such a positive thing. It's like a journey. (Brayne et al., 2008, p. 199)

One of them told me: "Sometimes the room was cold. Other times, it was very hot. Opening the window sometimes helps; you calm down by opening the window." Another spoke of a "physical" sensation [. . .] after a resident died. (Parra, 2019a, p. 67)	One said, "Sometimes the room is freezing. At other times it is really, really hot. Opening a window often helps. You feel a calm going out of the window." One care assistant spoke of a physical sensation after one resident died. (Brayne et al., 2008, p. 200)

It is obvious that these texts are very similar, despite the explicit attribution of Parra's cases to his own personal interviews with the nurses and the slightly different wording. This difference in the exact wording might simply be due to translating the original texts into Spanish and then retranslating them back into English, because Parra's book was first published in Spanish before the English edition was issued (Parra, 2019b).

However, I became even more concerned when I noticed that numerous cases presented in Parra's book were also contained in an article he published in the magazine *EdgeScience* (Parra, 2018)—and that this article contained additional plagiarism not contained in his book. These text passages were virtually copied verbatim and without attribution. Even worse, they referred directly to the methods applied and the results obtained in his Argentinian survey, but were obviously taken from the already mentioned British survey:

After they completed the questionnaire, those who agreed to an interview were invited to take part in a tape-recorded session that lasted between 1 and 1½ hours. The interviewees were encouraged to talk freely about their experiences with dying residents. These interviews were transcribed verbatim to enable examination of how anomalous experiences may have affected the interviewee personally and professionally and to explore further training needs in order to enhance best practice for end-of-life care. Potential interviewees were approached through the management team. Ten responded, five of whom were trained nurses, including the matron and the undermatron, and five were care assistants, including a care assistant supervisor. (Parra, 2018, p. 13)	After they completed the questionnaire, the interviewees were invited to take part in a tape-recorded interview that lasted between 1 and 1½ hours. The interviewees were encouraged to talk freely about their experiences, with enough direction provided to cover the criteria outlined in the questionnaire. These interviews were transcribed verbatim to enable examination of how ELEs may have affected the interviewee personally and professionally and to explore further training needs in order to enhance best practice in the provision of end-of-life care. [. . .] Potential interviewees were approached through the management team. Ten responded, 5 of whom were trained nurses, including the matron and the undermatron, and 5 were care assistants, including a care assistant supervisor. (Brayne et al., 2008, p. 197f)

When I asked Parra to explain this apparent identicalness of these passages, he confessed that he used texts written by others because he was probably under pressure. He apologized and admitted that this may "sound" like plagiarism (personal communication to the author, October 29, 2020). In response, I informed Parra that this practice would not only sound like plagiarism, but would clearly *be* plagiarism. He never replied to me (I sent my entire correspondence with Parra on this matter to the Editor of this *Journal*).[1]

Thereafter, I discovered more and more instances of unmistakable plagiarism in Parra's book. Additionally, it contains numerous oddities

that signify a rather sloppy style of editing the text. For example, an entire page section is accidentally printed twice in slightly different wording, indicating reiterated software processing (Parra, 2019a, p. 5). Page 10 contains an odd and seemingly accidental footnote inserted after the word "Italian"—it is the only footnote in the entire book. Strangely, it neither concerns Italy nor the topics of the main text, but unrelated writings of a French philosopher. What is worse, all English verbatim quotes Parra transferred from the original literature are not verbatim quotes anymore because of their being translated into Spanish and then retranslated back into English. Of course, this resulted in different wording that doesn't necessarily convey the exact meaning anymore, as already evident in some sentences of the examples given above.

Some retranslated text passages even border on the nonsensical, for example when a mist that left the body of a dying person and "lifted itself into an upright position" (Alvarado, 2006, p. 138) turns into a mist that "rose above itself in a vertical position" (Parra, 2019a, p. 15); when visions of "animals, objects, and unformed (e.g., an electric current) perceptions" (Ethier, 2005, p. 109) turn into visions of "animals, objects, and deformations (e.g., an electric current)" (Parra, 2019a, p. 25); or when the dying describe "dead relatives and friends standing at their bedsides, watching over them" (Nosek et al., 2015, p. 4), and this turns into dead relatives and friends of the dying "standing in their beds, watching them" (Parra, 2019a, p. 57). I also wondered that transpersonal experiences such as deathbed visions possess "mundane" qualities that cannot be easily explained by the pathological process of dying (2019a, p. 59), whilst this statement referred to these experiences' "other-worldly" qualities in the original text (Fenwick et al., 2010, p. 2). Parra furthermore informs the reader that anomalous behaviour of "flies" that appear around the dying ranks among the unusual death-related phenomena reported by nurses (Parra, 2019a, pp. vii, 59). I never heard of that before—did he perhaps mean "butterflies" (Fenwick et al., 2010)? It is additionally surprising to learn that Janice Miner Holden, a former Professor of Counseling at the University of North Texas, currently President of the International Association for Near-Death Studies, and since 2008 Editor-in-Chief of the *Journal of Near-Death Studies*, is actually a "nurse" (Parra, 2019a, p. 82).

These examples should suffice to reveal the quality of Parra's book.

Apart from a section in Chapter 3, *each chapter* consists almost exclusively of translated and retranslated text of unacknowledged source material written by other authors. Even the Conclusion, in which one might expect to find at least a few personal reflections of the book's author, consists entirely of plagiarism. **Appendix 1** contains a list of the original sources used in each chapter of Parra's book.

I duly informed several of the plagiarized authors and editors about these findings. This resulted in the retraction of Parra's English book (Parra, 2019a), the retraction of his article in *EdgeScience* (Parra, 2018; for the retraction notice see Anonymous, 2021a), the retraction of an article in this *Journal* about the survey in Argentina (Parra & Giménez Amarilla, 2017; for the retraction notice see Anonymous, 2021b), the retraction of another article about his survey in the *Zeitschrift für Anomalistik* (Parra, 2019c; for the retraction notice see Mayer, 2021), and a notice in the magazine *Fortean Times* (Anonymous, 2021c) highlighting massive plagiarism in one more of Parra's articles on the Argentinian survey (Parra, 2020).

Curiously, however, Parra denied having plagiarized after my conversation with him. In a letter sent to several parapsychologists and some of his supporters on March 8, 2021, he stated that the plagiarism was actually performed by undergraduate students of his, and that he merely published their texts under his own name without knowing that the students' texts contained plagiarism. Nevertheless, it is evident that in numerous instances (I gave some examples above), these texts explicitly state that *he* interviewed the nurses, and that the nurses told *him* about their experiences. This is in line with his initial explanation of the Emilia case to me: He informed me that *he* interviewed Emilia; and he later even confessed having used texts of others, i.e., having plagiarized. Moreover, if this book and all the articles derived from it were really written by his students, and if he published them under his own name thereafter, not even checking and correcting their content, and without naming the true authors, I wonder: Would this be any better from a scientific perspective than merely plagiarizing on one's own?

But the claim that Parra was only misled by his students is questionable, anyway. On further examination, it turned out that numerous other publications by Parra are heavily plagiarized as well, at

least from 2006 onward. This even includes his Spanish doctoral thesis (Parra, 2011) in which a cursory search identified large sections that were simply translated from *Varieties of Anomalous Experience* (Cardeña et al., 2000) and other sources such as Alvarado (2006) and Sherwood (2002) without attribution. I don't consider it unlikely that many more publications of Parra contain plagiarized, translated, retranslated, shortened, and/or repeatedly rearranged puzzles of text taken from unnamed or inappropriately cited original literature. At least, I found plagiarized text passages in almost all his publications that I checked, and I strongly doubt that all this was the work of nasty students whose work he published unchecked under his own name since at least 2006. **Appendix 2** contains a list of Parra's publications that are currently known to contain plagiarism, sometimes massive.

Given that Parra already knew in the autumn of 2020 that the plagiarism in his book about the Argentinian survey (Parra, 2019a) was spotted, it is furthermore astonishing that a French translation of precisely this book was published in 2021. Before this French version was printed, it was advertised by its publisher in advance. Renaud Evrard, at that time President of the Parapsychological Association, informed this publisher on the 3rd of December 2020 that the book consisted almost exclusively of proven plagiarism. Consequently, the publisher considered stopping the editing process and intended to contact Parra to clarify the matters. Surprisingly, however, his book was nevertheless published in January (Parra, 2021). Parra even advertised its publication on Facebook. Similarly, Parra was informed in March 2021 that the plagiarism in another recent book of his, *Neurociencias* (Parra, 2019d), had been spotted as well. This book contains dozens of pages that were simply translated from English sources (e.g., from Krippner & Friedman, 2010, and most notably from Williams, 2015). Nevertheless, Parra also advertised his spurious *Neurociencias* book on Facebook on the Argentinian "Writer's day" in 2021, which is celebrated each year on June 13th to honor the work of honest writers.

The fact that Parra continues to publicly promote his known plagiarized texts further, after all that has already happened, shows an astonishing lack of insight that underscores the necessity to publish the present report. This is especially evident because he stressed in his letter to his friends and selected parapsychologists in March 2021

with regard to the alleged plagiarism of his students "that plagiarism constitutes a serious contradiction of the most elementary rules of scientific conduct, an execrable crime that must be denounced and condemned by the scientific community." However, despite these bold statements, the public as well as the scientific community must obviously be prepared to witness further attempts of Parra to produce and disseminate plagiarized publications—be they initiated by students under his supervision or by himself.

CONCLUDING REMARKS

It is impossible to avoid the conclusion that Parra's plagiarism was performed purposefully and systematically for many years to obtain personal advantage and fame, even when he published texts about rather sensible topics such as experiences of the dying and the bereaved, what he considered a "great spiritual experience" (Parra, 2019a, p. xiv). Parra also must have known all the time that his conduct might cause considerable damage to parapsychology when uncovered, but he willfully took this risk. In fact, there are allegations against Parra concerning potential scientific dishonesty that date back to 1991 (Gimeno, 2021). Still, it came as a surprise to me that some parapsychologists already knew that Parra had had a habit of plagiarizing for many years. Allegedly, he was repeatedly asked to stop plagiarizing. Nobody, however, seemed to have an appreciable interest in checking his conduct and publications. The result of this curious neglect is plain to see now: Parra simply continued to publish an enormous amount of texts of doubtful origin that must now be prevented from being cited in the downstream literature.

This also goes for the his numerous publications about the surveys and experimental studies he performed. I don't think one can trust data published by a person who has profoundly sympathized with and enacted scientific dishonesty since at least 2006. Moreover, contents of interview reports can also be regarded as data. Therefore, plagiarizing them and presenting them as results obtained in one's own research project even amounts to data fabrication. This was confirmed by Miguel Roig (personal communication to the author, June 25, 2021), an expert on the topic of plagiarism in the sciences (see, e.g., Vasconcelos et al.,

2019). As a consequence, all other data presented by Parra should be disregarded unless one is willing to check his original data records very, very thoroughly, and then finds absolutely nothing to complain about. For my part, I prefer spending my time on numerous much more exciting and rewarding matters.

NOTE

[1] In an explanation termed "An honest reply and clarification" that Parra sent on March 8, 2021, to several of his supporters and other parapsychologists to elucidate how plagiarism entered his writings, he nevertheless presented a rather different version of what happened. He claimed that after I informed him about plagiarized sections in his work, he would have told me that 1) these paragraphs were inserted into his texts without his knowledge, and that 2) he wanted to initiate an investigation regarding the origin of this mishap. He furthermore complained that 3) I never responded to him thereafter. Yet, documented email correspondence proves that none of this is true.

ACKNOWLEDGMENTS

My investigations into the plagiarism of Parra and my attempts to induce an appropriate reaction of the parapsychological community were not always greeted with sympathy. I am therefore immensely grateful to the following colleagues who encouraged my work, providing invaluable moral and practical support of different kinds: Carlos Alvarado, Eberhard Bauer, Stafford Betty, Stephen Braude, Etzel Cardeña, Renaud Evrard, Kathleen Erickson, Wolfgang Fach, Peter Fenwick, Juan Gimeno, Pei Grant, Patrick Huyghe, Christopher Kerr, Stanley Krippner, Gerhard Mayer, Chris Roe, Miguel Roig, Peter Mulacz, Stefan Schmidt, Christine Simmonds-Moore, David Sutton, Doreen Westera, Marc Wittmann, and Ricarda Zöhn.

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APPENDIX 1

Original Sources of Parra's book *The Last Farewell Embrace* (2019)

The main plagiarized sources constituting the book's chapters are given in bold font. Other plagiarized sources are in regular font.

Chapter 1: Spiritual Health in Nursing Practices

Ruder, S. (2013). Spirituality in nursing. Nurses' perceptions about providing spiritual care. *Home Healthcare Nurse, 31, 356–367.*

Chapter 2: When the End Is Only the Beginning: Extraordinary Experiences Observed in Palliative Care

Alvarado, C. S. (2006). Neglected near-death phenomena. *Journal of Near-Death Studies, 24,* 131–151.

Ethier, A. M. (2005). Death-related sensory experiences. *Journal of Pediatric Oncology Nursing, 22,* 104–111.

O'Connor, D. (2003). Palliative care nurses' experience of paranormal phenomena and their influence on nursing practice. Presentation at the *2nd Global Making Sense of Dying and Death Interdisciplinary Conference*, November 21–23, 2003, Paris, France.

Chapter 3: The Transformative Experiences of "Sensitive Nurses"

Brayne, S., Lovelace, H., & Fenwick, P. (2008). End-of-life experiences and the dying process in a Gloucestershire nursing home as reported by nurses and care assistants. *American Journal of Hospice & Palliative Medicine, 25,* 195–206.

Ethier, A. M. (2005). Death-related sensory experiences. *Journal of Pediatric Oncology Nursing, 22,* 104–111.

Nahm, M., Greyson, B., Kelly, E. W., & Haraldsson E. (2012). Terminal lucidity: A review and a case collection. *Archives of Gerontology and Geriatrics, 55,* 138–142.

O'Connor, D. (2003). Palliative care nurses' experience of paranormal phenomena and their influence on nursing practice. Presentation at the *2nd Global Making Sense of Dying and Death Interdisciplinary Conference*, November 21–23, 2003, Paris, France.

Chapter 4: "Windows to the Beyond": The Dreams and Visions of the End of Life

Brayne, S., Lovelace, H., & Fenwick, P. (2008). End-of-life experiences and the dying process in a Gloucestershire nursing home as reported by nurses and care assistants. *American Journal of Hospice & Palliative Medicine, 25,* 195–206.

Fenwick, P., Lovelace, H., & Brayne, S. (2010). Comfort for the dying: Five year retrospective and one year prospective studies of end of life experiences. *Archives of Gerontology and Geriatrics, 51,* 173–179.

Nosek, C. L., Kerr, C. W., Woodworth, J., Wright, S. T., Grant, P. C., Kuszczak, S. M., Banas, A., Luczkiewicz, D. L., & Depner, R. M. (2015). End-of-life dreams and visions: A qualitative perspective from hospice patients. *American Journal of Hospice & Palliative Medicine, 32,* 269–274.

Chapter 5: Experiences at the End of Life in Nursing Homes of the Elderly

Brayne, S., Lovelace, H., & Fenwick, P. (2008). End-of-life experiences and the dying process in a Gloucestershire nursing home as reported by nurses and care assistants. *American Journal of Hospice & Palliative Medicine, 25,* 195–206.

Nahm, M., Greyson, B., Kelly, E. W., & Haraldsson E. (2012). Terminal lucidity: A review and a case collection. *Archives of Gerontology and Geriatrics, 55,* 138–142.

Chapter 6: The Near-Death Experience as an End-of-Life Event

Foster, R. D., James, D., & Holden, J. M. (2009). Practical application of research on near-death experiences. In J. M. Holden, B. Greyson, & D. James (Eds.), *The handbook of near-death experiences: Thirty years of investigation* (pp. 235–258). Praeger/ABC-CLIO.

Greyson, B. (2007). Near-death experiences. In E. Cardeña, S. J. Lynn, & S. C. Krippner (Eds.), *Varieties of anomalous experience: Examining the scientific evidence* (pp. 315–352). American Psychological Association.

Holden, J. M. (2009). Veridical perception in near-death experiences. In J. M. Holden, B. Greyson, & D. James (Eds.), *The handbook of near-death experiences: Thirty years of investigation* (pp. 185–211). Praeger/ABC-CLIO.

Chapter 7: Spirituality in the Visions of the Dying

Alvarado, C. S. (2006). Neglected near-death phenomena. *Journal of Near-Death Studies, 24,* 131–151.

Betty, S. (2006). Are they hallucinations or are they real? The spirituality of deathbed and near-death visions. *Omega, 53,* 37–49.

Chapter 8: Death and Dying: Palliative Care and Spirituality

Westera, D. A. (2017): Spirituality in nursing practice. Springer (plagiarized sections are taken from pp. 295–314).

Conclusion

Brayne, S., Lovelace, H., & Fenwick, P. (2008). End-of-life experiences and the dying process in a Gloucestershire nursing home as reported by nurses and care assistants. *American Journal of Hospice & Palliative Medicine, 25,* 195–206.

McDonald, C., Murray, C., & Atkin, H. (2014). Palliative-care professionals' experiences of unusual spiritual phenomena at the end of life. *Mental Health, Religion & Culture, 17,* 479–493.

APPENDIX 2

List of Publications by Alejandro Parra Known to Contain Plagiarism

Books:

1. Book on Argentinian survey among nurses, published in different languages (see Appendix 1 for the true sources of the content):
   a. **2021** Parra, A. *L'ultime transition: Le monde médical face à l'après-vie.* Agnières: JMG Editions.
   b. **2019** Parra, A. *The last farewell embrace: Spirituality, near-death experiences, and other extraordinary events among nurses.* New York: Nova Science Publishers. (Retracted by publisher)
   c. **2019** Parra, A. *El último abrazo de despedida: Experiencias paranormales de enfermeras.* Ediciones Luciérnaga.
2. **2019** Parra, A. *Neurociencias en la frontera de lo paranormal*. Madrid: Kier.
3. **2014** Parra, A. *Alucinaciones: Experiencia o trastorno?* Buenos Aires: Teseo, Universidad Abierta Interamericana.
4. **2009/2011** Parra, A. *Percepciones imposibles* (**Doctoral Thesis**). Saarbrücken: Editorial Académica Española.
5. **2009** Parra, A. *El mundo oculto de los suenos.* Buenos Aires: Kier.

Articles and Book Chapters:

6. **2020** Parra, A., & Giudici, R. Cognitive–perceptual features associated with nonconventional healing practices. *Imagination, Cognition and Personality: Consciousness in Theory, Research, and Clinical Practice, 0(0),* 1–17.
7. **2020** Parra, A., & Giudici R. Experiencias senso-perceptuales en las practicas de sanacion: Estudio de encuesta. *Ciencias de la Conducta, 35,* 85–118.
8. **2020** Parra, A. Dreams, death and spirituality. *Fortean Times, 398,* 40–45.
9. **2020** Parra, A. Nurses' unusual hospital experiences. *FATE, 734,* 74–79.
10. **2019** Parra, A. Negative experiences in childhood, parental style, and resilience among people reporting paranormal experiences. *Journal of Nervous and Mental Disease, 207,* 264–270.
11. **2019** Parra, A. Berichte von Krankenpflegerinnen über außergewöhnliche Erfahrungen: Eine Studie zu Persönlichkeits-, Wahrnehmungs- und kognitiven Faktoren. *Zeitschrift für Anomalistik, 19,* 347–363. (Retracted by publisher)
12. **2018** Parra, A. Experiences at the end of life in nursing homes. *EdgeScience, 33,* 12–17. (Retracted by publisher)
13. **2018** Parra, A., & Argibay, J. C. El constructo de "limite" y experiencias anómalas en psíquicos. *Persona, 21,* 45–59.
14. **2017** Parra, A., & Giménez Amarilla, P. Anomalous/paranormal experiences reported by nurses in relation to their patients in hospitals. *Journal of*

Scientific Exploration, 31, 11–28. (Retracted by publisher)

15. **2016** Parra, A., & Argibay J. C. The boundary construct and anomalous experiences in psychics. *Journal of the Society for Psychical Research, 80*, 13–23.
16. **2016** Parra, A., & Giménez Amarilla, P. Relación entre estrés laboral, alucinación y experiencias anómalas entre profesionales de enfermería. *Revista Ciencia y Ciudado, 13*, 22–40.
17. **2015** Parra, A., & Argibay J. C. Sensibilidad psiquica: Evidencia empirica y experimental. In A. Parra (Ed.), *Ojos invisibles. La cruzada por la conquista del espiritu* (pp. 253–254). Buenos Aires: Antigua.
18. **2013** Parra, A. Análisis fenomenológico de la imaginería sensorial en las experiencias hipnagógica e hipnopómpica. *Persona, 16*, 165–186.
19. **2011** Parra, A. Thinking styles of psychic claimants. *Australian Journal of Parapsychology, 11*, 61–71.
20. **2010** Parra, A., & Villanueva, J. Unusual perceptual experiences and ESP under psychomanteum stimulation: Imagery/hallucination proneness and schizotypal personality measures. *Australian Journal of Parapsychology, 10*, 41–59.
21. **2007** Parra, A., & Argibay, J. C. "Token object" effect and medical diagnosis: An experimental study. *50th Annual Convention of the Parapsychological Association, Proceedings of Presented Papers*, pp. 95–102.
22. **2006** Parra, A., & Villanueva, J. Exploring psychomanteum as a psi-conducive state of consciousness. *49th Annual Convention of the Parapsychological Association, Proceedings of Presented Papers*, pp. 141–152.

Journal of Scientific Exploration, Vol. 35, No. 3, pp. 639–641, 2021 0892-3310/21

COMMENTARY

Alejandro Parra and Dante's Eighth Circle of Hell

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Submitted June 29, 2021; Accepted June 30, 2021; Published September 15, 2021

https://doi.org/10.31275/20212243

Abstract—This commentary places Alejandro Parra's very long list of plagiarisms and data misrepresentations within the context of Dante's classification of human foibles. The responses from two Argentinean universities are described, along with continuing examples of Parra's misrepresentations.

Questa a peccar con esso cosi venne,
Falsificando sé in altrui forma
(from Canto XXX of Dante's *Inferno*)

It is telling that Dante, in his analysis of humanity, places topographically and morally those accused of fraud and deceit in the eighth lowest circle of hell, surpassed in iniquity only by the betrayers. He found abhorrent, as the quotation above marks, those who fraudulently pass themselves as others. It is not a stretch to surmise that those who trade others' wares as their own would also reside in the "evil trenches" (Malebolge) in this circle. Those so condemned may spend eternity scratching their leprosy lesions, a metaphor for how fraud corrupts, turning something clean into something impure (https://www.oed.com/view/Entry/42035?rskey=GQf5vf&result=2#eid).

Alejandro Parra's repeated, chronic plagiarisms and data misrepresentations (e.g., to duplicate an interview creates false data, doubling the number of observations and making them international), as Michael Nahm (2021) has painstakingly documented, should be taken with all the seriousness they deserve, even if we no longer believe in a literal hell along the lines of what the character Dante saw under

the guidance of Virgil. A plagiarist steals someone else's clean and hard-earned work and passes it off as his/her own, attempting to deceive everyone, and as a result casts doubt on other publications in the field (I agree with Dr. Nahm that all of Parra's work should be considered questionable unless determined to be otherwise). Parra's misdeeds will be injurious to parapsychology, an area of study in which critics will be eager to pounce on the revelations and say something like "I told you so, psi supportive findings are nothing more than errors and fraud," even though the latter is not more common in parapsychology than in other scientific areas (Roe, 2016). And the critics will have a kernel of truth in this particular case because it seems that Parra has had enablers. Nahm wrote that he found out third-hand that some people in the field had had knowledge of Parra's plagiarism for a while. In a recent exchange I had with a past journal editor, s/he wrote that Parra had been "repeatedly warned" about not continuing to plagiarize, which implies that some people knew about it and did not make public his infractions. We ought to get public explanations from those who were aware of Parra's misdeeds and did not act immediately and decisively as was, in my opinion, their ethical and scientific duty.

As of the date of my writing this comment, I am not aware that Parra faces civil or criminal charges, which would not be unheard of (cf https://www.plagiarism.org/blog/2017/10/27/is-plagiarism-illegal), yet his academic free ride seems to be over thanks to the work by Nahm, Braude, and others. When I first found out from various sources about the enormity of Parra's deception, I contacted the Bial Foundation (I am a member of its Scientific Advisory Board) and let them know. They then withdrew a grant offered to Parra. He has also been expelled from the Parapsychological Association (PA), whose Board of Directors rightly concluded that his misdeeds will damage the PA and the field at large (cf Parra, 2021). In addition, four researchers whose work was plagiarized by Parra, including Christopher Kerr, Doreen Westera, and me (in reference to two chapters from a book I coedited, Bentall, 2000; Marks, 2000) wrote in Spanish to the university that granted him a Ph.D. (based on a dissertation with substantial instances of plagiarism) and to the university that was employing him. The authorities of the first one, Universidad de Ciencias Empresariales y Sociales, from Rector O'Donell to Dean Said, did not even acknowledge the two emails we sent them.

The response of the second university, Universidad Abierta Interamericana, was the polar opposite. From the beginning they contacted us and promised to initiate a thorough and serious investigation of the case. While they were conducting it, Parra contacted the legal division of the university, which recommended dismissing him summarily from all programs and activities at the university, something that has come to pass. And future publication of at least some of his books has been cancelled.

So perhaps now Parra would be expected to repent and avoid further damnation? Do not count on it. Heraclitus (535–475 BCE) is now our guide. His fragment 119 (John Burnet, Arthur Fairbanks, & Kathleen Freeman, Trans.; https://antilogicalism.files.wordpress.com/2016/12/heraclitus_fragments_final.pdf) states that "Man's character is his fate." Parra continued lying about one of his submissions to the *JSE* even after being found out (Braude, 2021), and there is more. . . . In an exculpatory letter, Parra (2021) described himself as "victimized" by the investigation of his plagiarism and the ensuing consequences. To make his argument air-tight he cited a supporting message by "Andres Tocalini, MD, Decano de la Facultad de Psicologia y Relaciones Humanas Universidad Abierta Interamericana." The only problem being that Tocalini, a close collaborator of Parra, is not an MD but a priest (according to his LinkedIn profile), and is not nor has ever been a Dean (Decano) of that university, something that of course Parra had to know. An aspect Dante noted in his visit to the eighth circle was the stench coming out of the corruption of its denizens . . .

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Journal of Scientific Exploration, Vol. 35, No. 3, pp. 642–645, 2021 0892-3310/21

COMMENTARY

Parra and the *Journal of Scientific Exploration*

Stephen E. Braude

Submitted June 29, 2021; Accepted June 29, 2021; Published September 15, 2021

https://doi.org/10.31275/20212247

Michael Nahm's report in this issue of the *JSE* deftly presents many of the scholarly offenses perpetrated by Alejandro Parra. Some of those not mentioned had to do with Parra's submissions to the *JSE*, and I feel it's important to add those to the record.

JSE published a retraction notice earlier this year (Volume 35, Issue 1) and provided examples of Parra's plagiarism. Moreover, the *Journal* rejected another paper in which we found substantial plagiarism. But Parra's boldest effort was his submission, under his own name, of a paper by an Argentinian author, Anna Conforte—in fact, a paper Parra had published in his own newsletter. But Parra never indicated that the paper was written by someone else. Several people independently and carefully compared the English submission to the original Spanish. All agreed that Parra apparently simply auto-translated the paper to clumsy English and presented it as his own work.

During an extended email exchange with Parra, I challenged him to account for this. His response to that challenge, and other charges of plagiarism, was not only dishonest, but it betrayed a shocking failure to grasp the seriousness of his actions. On March 9, 2021, I wrote to him:

> Let's focus first on your attempt to deny plagiarizing Anna Conforte's paper. You claim that the two of you worked on the English version together. Nevertheless, the fact remains that Anna is not listed as author anywhere in the paper, and (more seriously) there is no reference in the submitted paper to Anna's original article. Now it so happens that your name is also not on the MS submitted to the *JSE*. That's because the MS was submitted in the

usual way for blind review, with only a title and with no authors listed—a common practice in scholarly journals. Still, there's indisputable evidence that you submitted the paper as if you were the sole author. In the *JSE* online submission system, you listed only yourself as author, even though you had the clear option [a button in bold letters] to list co-authors. We've located the attached screenshot of your submission page, showing clearly only your name listed as sole author, but also showing a link you could have used to add other names.

To make matters worse, in order to complete your submission in the *JSE*'s online system, you were required to check several boxes shown in the 2nd screenshot. One of those boxes required you to certify that the submission had not been previously published. But then it's blatantly false for you to claim that you only realized later that the *JSE* doesn't publish previously published papers. You checked the box stating that the paper had not been previously published! There is no mystery about what you were doing. You clearly attempted to pass off Anna's paper as your own. And it's equally clear that you're lying more now about the matter.

Then on March 19, 2021, Parra wrote me:

Regarding the case of Anna Conforte, as I explained, her article unfortunately derived a chain of confusions, no perspicacy [sic]: The initial purpose was to translate into English and add other sources and illustrations of her original article in Spanish in order to publish it in "Journal of the Society for Psychical Research" (rejected) and then to "History of Human Science" (letter and first page attached) which was rejected by the editor (only one reviewer out of three had accepted it with changes). Finally, I hoped for a third chance in the "Journal of Scientific Exploration." Although Anna finally resigned due to lack of interest and I was "stuck" with an unfair accusation of TOTAL plagiarism because the article had been published in Spanish on my own website . . . Here, due my mistake to updown [I believe Parra meant "upload"] the article in the online platform of the *JSE* (not any hidden reasons), I did not enter the name of the second author, but I have documented the exchange of emails of our agreement to translate the manuscript signed by both.

I replied to Parra on March 21:

> . . . your timeline for the Conforte submission seems to be inaccurate. You claim you submitted that paper to the *JSE* as a third choice, after its rejection by the *JSPR* and *HHS*. That seems clearly to be false. Your submission to the *JSE* is in fact dated March 28, 2020 (and on April 3 we sent you a letter requesting major revisions). But the letter of submission to *HHS* that you sent to us is dated May 1, 2020. So I'm sure you can understand why your version of the events looks to us like another piece of Parra fiction.
>
> Moreover, our correspondence with you about the Conforte paper continued for several months, during which time you apparently sought publication in other journals, a practice widely recognized as improper by the scholarly community (by contrast, books may legitimately be peddled simultaneously to more than one publisher). We even have an email from you dated May 22, 2020, indicating that you were still working on your revisions. Needless to say, I shouldn't have to point out to you the impropriety of your actions. But again, your behavior over that paper and your continued protestations about it only reinforce general suspicions about your scholarly and personal integrity.

JSE Managing Editor Kathleen Erickson provided me with an even more revealing timeline. She noted the following:

> 3/28/2020 He submitted the Conforte paper without her name.
> 4/2 *JSE* sent a decision letter asking him for major revisions.
> 5/22 The Managing Editor sent him an email (not from the OJS submission system) but from the *Journal* email address reminding him about working on a revision.
> 5/22 He responded "Firstly, I am working in the text."
> Then nothing until we started investigating the content of the paper (in late 2020 and early 2021).

I should add to this that I contacted Anna Conforte on February 13, 2021 (almost a year after Parra had submitted her paper to the *JSE*), to alert her to the situation. And on March 8, she replied "I am the ONLY author of the article and it has already been published in Spanish. I hope it is not sent to be evaluated or published in any other Journal."

One of the most astonishing aspects of my exchanges with Parra during this time is his repeated effort to minimize the amount of plagiarism uncovered, as if to say "It's not *that* bad." For example, on

March 31, 2021, Parra wrote

> I counted only ten plagiarized/paraphrased sentences of 33 sentences in the Introduction section (approx. 30%), which it is reduced taking 130 sentences of the total article (taking Introduction, Method and Discussion sections except Results) which reduce to 7.7% of plagiarism . . . really very low.

Of course, no plagiarism is acceptable, and, interestingly, Parra's attempted excuse flies in the face of what he wrote on March 8:

> It should not be necessary to say that plagiarism constitutes a serious contradiction of the most elementary rules of scientific conduct, an execrable crime that must be denounced and condemned by the scientific community. Indeed, given that I am an academically trained scientist, a member of the scientific community, I am certainly a person who should be familiar with the most basic rules of 'good scientific practice'.

Although I hope that we at the *JSE* never encounter another case of plagiarism, we have purchased plagiarism-detection software which we plan to employ liberally.

I should add that I'm pleased by the rapid and coordinated response of the parapsychological community to this affair. The only thing that slowed it down at all was the continued discovery of previously unidentified instances of plagiarism, going as far back as the 1990s.

Journal of Scientific Exploration, Vol. 35, No. 3, pp. 646–661, 2021 0892-3310/21

ESSAY REVIEW

Psychical Physics: On the Borderland of Physics and Psychic Phenomena

Physics and Psychics: The Occult and the Sciences in Modern Britain by Richard Noakes. Cambridge University Press, 2019. 403 pp. ISBN 978-1-107-18854-9.

Reviewed by Carlos S. Alvarado

https://doi.org/10.31275/2021877

In an address presented on August 20, 1891, at the Sixty-First Meeting of the British Association for the Advancement of Science, the President of the Association's Section of Mathematics and Physical Science discussed various scientific developments. The speaker started with brief mentions of Michael Faraday's centenary, and the death of Wilhelm Weber, and then went on to detailed discussions of a binary system of stars, the discovery of ways to achieve color photography, and the importance of professional systematic physics research leaving behind amateur efforts. Then he changed directions and said he was going to discuss a "topic which is as yet beyond the pale of scientific orthodoxy" (p. 551). The topic, the study of psychic phenomena, was called by the speaker the "borderland of physics and psychology," an area "bounded on the north by psychology, on the south by physics, on the east by physiology, and on the west by pathology and medicine" (p. 553).

> "I have spoken of the apparently direct action of mind on mind, and of a possible action of mind on matter. But the whole region is unexplored territory . . . I care not what the end may be. I do care that *inquiry shall be conducted by us*" (p. 555, my italics).

The speaker was English physicist Oliver J. Lodge (1892; see Figure 1), who by that time was well-known for his interest and work in psychical research.[1] The "us" in the last quote above was a reference to the community of physicists. Such interest in the topic by some physicists, of which Lodge was a main player, is the subject of the book reviewed here.

Figure 1. Oliver J. Lodge

Richard Noakes, author of *Physics and Psychics: The Occult and the Sciences in Modern Britain*, is an Associate Professor of the History of Science and Technology at the University of Exeter. For years he has been working on the topics covered in *Physics and Psychics*, writing about subjects such as the reasons behind the interest of physicists in psychic phenomena (Noakes, 2008), and how particular individuals combined physics and psychical research in their actual work (Noakes, 2004). The book reviewed here, an important contribution to the historiography of psychical research, includes this material and much more.

Although the interaction between physics and psychic phenomena has been discussed before by others (e.g., Oppenheim, 1985; Wynne, 1979), this is the first detailed study of what Noakes calls "physical–psychical scientists", or the community of physicists and other physical scientists interested in the phenomena of Spiritualism and psychical research. More than previous writers, Noakes, who focuses on British developments roughly around 1870–1930, argues that these individuals were more interested in the topic than has been previously realized, or emphasized.

In his introduction Noakes makes it clear that the historical discourse has changed, from labelling these topics pseudo-science, to viewing them as alternative ways of knowing that were a reflection of the needs of the times and of attempts to redefine science. Such ideas are conceptually related to work published in the history of science literature about the positive influence of magic, and generally occult beliefs and practices, on the development of science and thinking about human beings.[2] Examples of specific claims of influences presented over the years include the nurturing effects of Platonic, neo-Platonic, and Hermetic teachings on Renaissance science (Debus, 1978), and of

mesmeric phenomena, nineteenth-century psychiatry, and psychology (Ellenberger, 1970). Also related to Noakes' approach is the work of many historians who have questioned the universal application of long-held ideas about modern science. This includes the secularization of the soul and the banishment of magic (Josephson-Storm, 2017), as well as what many still believe was the perennial conflict between science and religion (Lightman, 2019).

Noakes refers to historical work seeing "mesmerism, spiritualism and psychical research . . . as new forms of psychology or sciences of the mind, . . . [that] played significant roles in the nineteenth-century debates about the proper nature and scope of psychology" (p. 11). Some examples are the work of Adam Crabtree (1993), Andreas Sommer (2013), and Régina Plas (2000). In fact, the latter affirms in her study of French developments that various attempts to understand thought-transference supported the existence of the concept of the unconscious mind.

The author also reminds us that some individuals within Spiritualism and psychical research attempted to widen the scope of scientific naturalism to explain the world "by showing how scientific methods could . . . challenge what they perceived to be scientific naturalism's 'materialistic' philosophy, which proclaimed that everything in the cosmos, including life, mind, and spirit, could be reduced to matter and force" (p. 11). However, we are also reminded that not all physicists were strictly materialists. In fact, James Clerk Maxwell and others were "devout Christians who maintained that professionalized physics could fulfill the religious purposes that the sciences had carried for centuries: to evidence a cosmos designed and ruled by divine agency" (p. 17). Some even argued that some ideas in physics supported religious ideas, as did Balfour Stewart and Peter Guthrie Tait (Figure 2) in their controversial and widely read book *The Unseen Universe or Physical Speculations on a Future State* (1875), a work discussed later by Noakes. Stewart and Tait argued for the existence of a universe that could not be perceived by our senses but was connected with the known universe, and for the lack of incompatibility between religion and science. They wrote in the second edition of their book:

Figure 2. Balfour Stewart (left) and Peter Guthrie Tait.

> If in the course of our discussion we are to some extent constructors, and find analogies in nature which seem to us to throw light upon the doctrines of Christianity, yet in the main our object is rather to break down unfounded objections than to construct apologetic arguments . . . The Bishop of Manchester has very clearly described our position by stating that [*from a purely physical point of view* . . .] we "contend for the possibility of immortality and of a personal God." (Stewart & Tait, 1875, p. vii)

Physics and Psychics has six chapters covering a variety of individuals and conceptual issues. It starts with one covering a variety of concepts of force from physics, but also from mesmerism and Spiritualism. Writing about animal magnetism, a universal force popularized by Franz Anton Mesmer and many others, the author states:

> By the late eighteenth century, physical sciences divided the material cosmos into ponderable matter and a host of forces and imponderable (weightless) and invisible fluids such as gravity, mineral magnetism, frictional electricity and heat . . . The apparent discovery of another invisible force or imponderable fluid fitted well within programmes of enquiry in these sciences. The ideas of a universal force or fluid linking the microcosm of animate and inanimate bodies on earth to the macrocosm of celestial bodies and of the therapeutic benefits arising from the manipulation of such a fluid made sense within contemporary scientific and medical discourses. (p. 25)

Such discourses, as seen in a classic of mesmeric historiography, Robert Darnton's *Mesmerism and the End of the Enlightenment in France* (1968), included those developed at a time of interest in the wonders of electricity and in other physical forces. General interest in these ideas helped the popular reception of the mesmeric movement. In Darnton's words, consistent with Noakes': "Frenchmen could read descriptions of fluids very like Mesmer's under the articles 'fire' and 'electricity' in the *Encyclopédie* . . . In fact, there were enough fluids, sponsored by enough philosophers, to make any eighteenth-century reader's head swim." (p. 11)

Soon after, magnetic ideas, sometimes through their transformation into the Od force, affected Spiritualism by providing physical

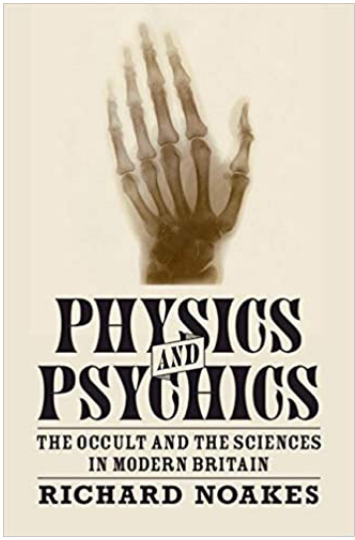
explanations for phenomena, particularly ideas of nervous-vital forces emanating from the medium during séances. Some early examples were applied to explain table turning, as seen in the views of French Count Agénor de Gasparin (1854). He argued for the existence of a fluidic force emanating from the sitters that set tables in movement, a force "similar to terrestrial magnetism, light, heat, electricity . . . under the . . . provisional name of hematonervous fluid" (Vol. 2, p. 407).

Those interested in these unorthodox concepts of force will find much of interest in this chapter and in the book in general. However, even if this is a recurring topic, the purpose of the book is not a history of these specific ideas, but instead of the general ideas and work of British "physical–psychical scientists", which included much about these mysterious emanations from the bodies of mediums and others.

The British spiritualistic literature had many examples of speculations about forces. One was an article by electrician Desmond G. FitzGerald, who wrote about the basis of physical phenomena in séances:

> The moment we have satisfied ourselves that this energy, or 'power,' is derived or 'drawn' from the medium and sitters, it becomes from our point of view almost certain that something material—ponderable matter, or 'psychical matter'—in which potential energy has been previously stored up by the separation of molecules, and through which work may be done by the conversion of energy as those fall together, is actually taken from them by the manifesting agent. (Fitzgerald, 1878, p. 251)

A general history of this topic would include the work of many other individuals who did not have a particular physics background, some of whom are mentioned by Noakes. Some of those individuals and publications that come to mind are French physician Hippolyte Baraduc's *L'Ame Humaine* (1896), English attorney Edward W. Cox's *What Am I?* (1874), German philosopher Eduard von Hartmann's *Spiritism* (1885), and American abolitionist writer Edward C. Rogers' *Philosophy of Mysterious Agents* (1853). These forces, German philosopher Carl du Prel believed, "do not wait for their discovery and baptism to become active; they have been operating for a long time before and give rise to phenomena of unknown physics . . ." (du Prel, 1896, p. 447).[3]



As chronicled by Noakes, such unknown physics developed in the context of more orthodox but still not fully understood topics of nineteenth-century British physics. These were important times when influential physical concepts were developed from previous ideas, such as the all-pervasive ether and its implications for the transmission of signals in space, not to mention its metaphysical dimensions (Cantor & Hodge, 1981). Another important conceptual development were ideas of electromagnetism, and the principle of conservation of energy (Hunt, 1991) which, in addition to having an impact on conceptions of energy, matter, and signal transmission, brought together theory and practice, as seen in many practical applications involving electricity (including telegraphy), and the development of new engines, a process described by Morus (2005).

In the third chapter Noakes presents the community of "physical–psychical scientists," or those who were interested by training in physical aspects of psychic phenomena, without necessarily reducing them to materialistic processes. Because the professions were not strictly defined as they are today, this includes individuals who did not train exclusively in physics, but also those with a background in astronomy, engineering, chemistry, or telegraphy. A long table (pp. 86–92) presents the names and other details of many of these individuals affiliated with the Society for Psychical Research (SPR), including non-British persons (1882–ca 1940), while another table lists non-SPR "physical–psychical scientists" for the same period (pp. 95–103). Among the better-known British persons in the first table are William F. Barrett, William Crookes, Edmund E. Fournier d'Albe, Oliver J. Lodge, Eleanor M. Sidgwick, Balfour Stewart, John William Strutt, and George N. M. Tyrrell (Figure 3), but there are also many others not particularly known for their psychic interests, at least in terms of research and publications (e.g., John Cox, John Herschel, William Ramsay, Joseph J. Thomson, Charles J. Young).

Figure 3. William F. Barrett, William Crookes, Eleanor M. Sidgwick, and John William Strutt (left to right).

Some non-SPR foreign individuals mentioned are Pierre Curie, Fritz Grünewald, Giovanni Battista Ermacora, Amos E. Dolbear, William Gregory, Robert Hare, Dimitri I. Mendeleev, and Francesco Porro.

Interestingly, and mentioned by Noakes (p. 77), it was physicist William F. Barrett, who sent a letter out to several individuals in December 1881 inviting them for a meeting to be held in January. This meeting, to "consider the advisability of having a select Central Society organised, under some such name as the London Psychical Society", led to the founding of the SPR (Barrett, 1924, p. 395).

Like others with no physics training, for these individuals psychic phenomena seemed to express or fulfill needs of a philosophical, religious, and scientific nature. More specifically, and related to their interest in physical processes, was the "belief in the possibility that psychical phenomena represented a possible extension of the knowledge and practice of the physical sciences" (p. 135).

The actual work and ideas of the individuals studied in this book are the subject of Chapters 3–5. This includes actual physical theories, among them ideas of brain waves to account for telepathy, ideas of a psychic force in mediumship, and various other topics involving methodology and the concept of scientific expertise. Regarding the ideas of some of these individuals Noakes writes:

> Most of them were acutely aware, not least from critics near and far, of the risks of applying physical principles, analogies, theories and explanations to psychical puzzles. Despite their increasing caution about the psychical applications of physical theories, they never gave up the hope that some theories and ideas in physics might constitute the basis for more satisfactory interpretations of psychi-

> cal phenomena and this partly depended on new understandings of the physics of the ether, energy and matter as they unfolded in the early 1900s. (pp. 183–184)

Finally, in Chapter 6 the author comments on the lack of success of physical approaches to psychic phenomena, and how the new generation continued speculating. Some of the discussion focuses on the writings of Hereward Carrington, who, without formal training in physics or engineering, fomented public interest in the physical detection of psychic forces and in radio models of telepathy (pp. 317–319). Like Lodge, Carrington was a proponent of laboratory investigations of psychic phenomena. In his book, *Laboratory Investigations into Psychic Phenomena* (n.d.) he gave much attention to concepts of force and to past attempts to instrumentally detect those hypothetical forces. In his view "a whole world of forces and curious phenomena is thrown open to the impartial inquirer calling for exact observation and scientific interpretation" (Carrington, 1917, p. 20).

This chapter also extends the discussion to later individuals and ideas published up to the 1930s. For example, Noakes comments on the wide interest in speculations about wireless communications both in Britain as well as in the United States. While he is clear that the "physical–psychical scientists" did not succeed in finding physical correlates of psychic phenomena, and thus develop a research program based on physics, he points out similarities between the old period he reviews, and more recent developments. But he also reminds us in the conclusion that some figures' orthodox physical interests were probably influenced by unorthodox ideas:

> William Thomson was probably not completely wrong in suggesting that mesmerism informed Crookes's path to the novel idea of matter in a radiant state; Varley's earlier contribution to the pre-history of the electron—his study of the mechanical effect of electrical discharge—was almost certainly fueled by a spiritualist preoccupation with the apparent materiality of immaterial agents; and the problem of the mechanisms of telepathy, telekinesis and survival undoubtedly spurred Lodge's major experimental and theoretical contributions to ether physics. (p. 338)

Figure 4. Cromwell Varley.

It is interesting to see that although many of the "physical–psychical scientists" in question tended to see, at least on occasion, psychic phenomena through the prism of physical processes, very few of them followed this influence in the actual investigation of phenomena. Such influence is seen in the work of William Crookes (1874), who clearly acted like a physicist when he tested D. D. Home's telekinesis in ways to explore physical parameters. For example, Crookes was interested to see if Home's psychic force could affect an accordion even when the instrument was enclosed in a basket surrounded by an electrical current, or when the force presumably had to go through water to exert an effect. A different approach, but still related to physical ideas, was that of Cromwell Varley (Figure 4), who used an electrical current as a means of control to make sure that medium Florence Cook was in a particular location while the materialized form of Katie King appeared in the séance room. According to Varley, "Miss Cook took the place of a telegraph cable, under electrical test" (Varley, 1874, p. 134).

Although much has been published about the relationship between physics and other topics, among them religion (Gregory, 2003), less has been done with psychic phenomena. Noakes' book is the first major effort to study the history of physics and its relation to psychic phenomena. His work expands our knowledge of the interests and motivations of British "physicist–psychical scientists" considerably, which, in turn, helped the development of conceptions about matter, and the role of mind in the physical world. In doing so, Noakes not only has contributed to the historiography of physics (and science in general) but also to that of psychic phenomena and their role in both science and society.

Noakes gives us a generally neglected detailed view of a physically oriented community whose work and ideas complement the usual emphasis on psychology shown by figures such as Edmund Gurney and Frederic W. H. Myers (Gauld, 1968). Furthermore, while there is still plenty of emphasis on individuals such as Barrett, Crookes, and Lodge, whose contributions were essential, the author's discussion of the "physical–psychical scientists" enlarges the cast of characters of this orientation.

I was glad to see generally forgotten figures such as Edmund E. Fournier d'Albe, and Cromwell Varley, among others, brought to the attention of modern readers. But other figures are even less-known to students of psychic literature because they did not publish their ideas. A case in point was civil engineer Samuel Tolver Preston, who speculated privately about physical explanations of telepathy (pp. 172–174). For example, in an unpublished letter to physicist George F. FitzGerald, another interesting figure, Preston mentioned in relation to telepathy the theoretical possibility that the "electromagnetic aether may be found ultimately to be capable of giving a sufficient explanation without looking at anything additional" (Preston, 1890).

Noakes' analysis goes beyond the expression of ideas of members of this group, arguing, on the basis of unpublished correspondence, that some of these "silent" physical scientists provided a nurturing intellectual environment for the speculations and actual research of the more active "physical–psychical scientists." The identification of this invisible college reminds us of the importance of intellectual groups in the construction of knowledge, of the socio-collective aspects of idea development, a topic explored before in other specialties, an example being the role of Oxford physiologists in the work of William Harvey (Frank, 1980).

A major contribution by Noakes is the restoration of a physicalistic tradition that influenced many developments. But he also reminds us that the search for an expansion of physical horizons was not a materialistic quest for many of the individuals involved, as was clear in some of the writings of Barrett and Lodge.

The case of Barrett is interesting. He argued in a paper presented at the British Association for the Advancement of Science in 1876 that thought-transference may resemble "grosser cases of electric or magnetic induction" (Barrett, 1876, p. 87). However, and as discussed by Noakes, Barrett changed his mind later. Writing in the *Proceedings of the Society for Psychical Research*, he affirmed that now he thought that more knowledge about the phenomena in question "will shew the insufficiency of any physical analogy or materialistic explanation, and thus should tend to accelerate the passage of the existing wave of materialism . . . " (Barrett, 1882, p. 62). By 1918 he was ready to say: "The paramount importance of psychical research lies in its demonstration

of the fact that the physical plane is not the whole of Nature" (Barrett, 1918, p. 179). Such change may have been caused by various factors. Two possible ones are Barrett's increased experience with the features of thought-transference and other phenomena, and his interaction with individuals with different ideas, such as Myers.

I also enjoyed Noakes' discussions of the interactions of "physical–psychical scientists" with non-physicists. This includes Myers' influence on Lodge (pp. 294–295). Some conceptual opposition is also covered, as seen in critiques by prominent SPR members of signal transmission explanations of telepathy. Noakes refers (p. 164) to the classic first major work of the Society, *Phantasms of the Living*, which I cite below in greater length:

> Let us use every analogy which helps us, but let us recognize that nothing has been discovered which shows that thought-transference has anything to do with ether or with vibrations. Everything in the universe may be reducible to vibrations, for aught we know; but until some definite experiment, as of reflection, interference, or the like, can be brought forward to connect telepathy with ether-waves, it is surely safer to avoid using that analogy in a way which suggests that it has a prior right over many others which that be proposed. (Gurney, Myers, & Podmore, 1886, Vol. 2, p. 315)

My only critique of *Physics and Psychics* is that, on a few occasions, I wish the author had the opportunity to explore some issues in more detail. I say the opportunity, because, as Noakes informed me, he had to shorten his manuscript, a practical consideration many authors face.

An example in which more information would have been desirable is the discussion of the above-mentioned Hereward Carrington, which omits mention of his interest in vitalistic concepts (Alvarado & Nahm, 2011). That is, regardless of Carrington's belief in the exteriorization of a biophysical force from the human body, he maintained that this force was part of life itself, which was a principle that animated the body, while transcending physical aspects of it. Interestingly, similar ideas presenting physical properties of psychic forces were postulated by many, *while at the same time indicating the existence of a transcendental reality*, as seen in the ideas about ectoplasm of French physician Gustave Geley (1919/1920).

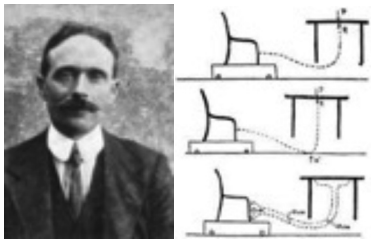


Figure 5. William J. Crawford and drawings illustrating his cantilever ideas (from Richet, 1922, p. 550).

Although Noakes mentioned William J. Crawford (Figure 5) in the book, I wish he had included more details about his physical mediumship investigations. Crawford, a lecturer of mechanical engineering, lived in Ireland, where he conducted physical measurements of table levitations (Crawford, 1916, 1919). In his view most table levitations he studied were caused by an invisible cantilever structure emanating from his medium, Kathleen Goligher, but supported as well by forces emanating from the sitters. He noticed that the medium's weight increased indicating that the weight of the table was transferred to her. But he also reported cases in which there was no increase in weight suggesting other mechanisms, such as a fulcrum on the floor. His research program, based on mechanical principles, is another example of how physical concepts guided some investigators to try to map the hidden physical workings of some phenomena. Crawford in fact wrote: "I desire to help in the discovery of the psychic laws, which are as real as physical ones, so that in the years to come there may be no more mystery" (Crawford, 1919, p. 144).

Another area that could have been explored further are the reasons for the lack of careful empirical studies exploring physical aspects of psychic phenomena. Unlike Crookes and Crawford mentioned above, "physical–psychical scientists" such as Barrett, Fournier d'Albe, Lodge, and Stewart discussed in the book presented much speculation but no empirical work to test for physically based hypotheses or to search for physical correlates of psychic phenomena. For example, regardless of Lodge's studies of telepathy, and mediumship, his published work has little actual research following physical assumptions, an exception being his recording of dynamometric readings of sitters in séances with medium Eusapia Palladino (Lodge, 1894, pp. 326–327).[4]

But these, and other thoughts, are minor points. They show to a great extent my interests and in no way detracts from Noakes' detailed and contextually sensitive study.

Outside the scope of *Physics and Psychics*, Noakes' excellent

study makes me wish for similar examinations of physical–psychic theorization and research conducted in other countries, and sometimes by individuals with no training in physics. Examples of this are the séances held in France at the Institut Général Psychologique with Eusapia Palladino (Courtier, 1908, briefly mentioned by Noakes, p. 288). In these séances researchers documented increases in the medium's weight at the time of table levitations, and the discharge of an electroscope without contact. They also unsuccessfully conducted tests for ionization, temperature changes, and chemical changes in the atmosphere around the medium. Also relevant is German engineer Fritz Grunewald's ideas and measurements of a field in the human body that had "ferro-magnetic properties and can therefore be objectively detectable" (Grunewald, 1922, p. 82). One hopes that studies of such developments will follow Noakes' lead and thus place such research work in the context of each country's traditions of physics, psychical research, and other relevant concerns, studies that could also be guided by the ideas of other fields, among them the biological and medical sciences.

NOTES

[1] Perhaps the most important of Lodge's early contributions was his detailed report of séances with medium Leonora E. Piper, which presents several instances of veridical communications and information about the medium's mentation (Lodge, 1890).

[2] For a bibliography see Sommer (n.d.).

[3] On this literature see Alvarado (2006) and Montandon (1927).

[4] On the assumption that dynamometric measures of grip strength reflected the expenditure of energy in sitters, see Alvarado (2016, pp. 573–574).

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Journal of Scientific Exploration, Vol. 35, No. 3, pp. 662–666, 2021 0892-3310/21

ESSAY REVIEW

Evidence-Based Analysis of the COVID Pandemic

COVID: Why Most of What You Know is Wrong by Sebastian Rushworth. Karneval Publishing, 2021. 130 pp. $18, paper, $9.50 Kindle. ISBN-13: 978-91-88729-83-5.

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https://doi.org/10.31275/20212157

This short book suggests plausible answers to much of what has seemed inexplicable or unbelievable about what governments, the World Health Organization, and popular media have disseminated about the officially declared global pandemic.

The author is a recently graduated Swedish physician who recognized even during his training that many of the generally accepted shibboleths about medical matters are not evidence-based; are often, in fact, contrary to the available evidence.

Irrespective of his suggestions about COVID, several points in this book are important for everyone to know:

1. Modern medicine focuses on the handling of emergencies but says "extremely little about how to avoid chronic disease and maximize long term health" (p. 7).
2. More than half of the widely accepted recommendations about nutrition are nonsense, without any basis in solid evidence (p. 8): to eat more fruit, fish, vegetables, whole-grain cereals, and less salt, saturated fat, or meat.
3. Much purportedly scientific medical information stems from inappropriate use of surrogate endpoints and improper statistical analyses (pp. 34–39): The usual criterion for statistical

> significance ($p \leq .05$) is arbitrary and very weak. The typical marketing ploy of citing relative rather than absolute risks is highly misleading (pp. 40–46).

How deadly is COVID?

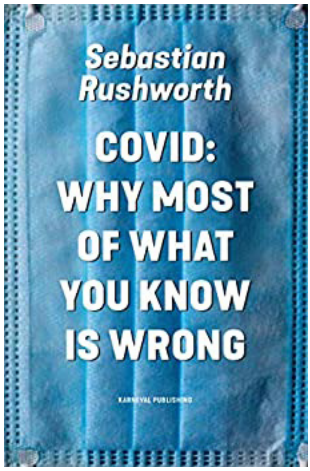
The salient point is that deaths associated with COVID have affected primarily the elderly.

In Sweden, the average age of those dying from COVID was 84; while overall the average age at death (from all causes) in Sweden was 82 (p. 51). This supports the view that COVID, like so many other infections, is particularly dangerous for people with co-morbidities; thus it would be more accurate to talk of deaths *with* COVID than *from* COVID. This point is underscored by a cited study from 2017 which reported that frail elderly hospitalized people died more frequently after suffering "the common cold" (rhinoviruses) than after infection by actual influenza (p. 49)!

The suggestion is, in other words, that deaths with COVID have, in the main, not added an appreciable number of excess deaths, but rather replaced deaths that would otherwise have been attributed to different causes. That suggestion seems strongly supported by the cited data that the overall mortality in Sweden in 2020 was just 5% larger than the average for the previous five years (p. 41), balancing statistically the 5.7% *lower* overall mortality for the previous five years in 2019 (p. 93).

However, data reported by EUROMOMO[1] do show substantial excess deaths for a number of countries, as does the Centers for Disease Control & Prevention for the USA[2] with excess deaths in 2020–2021 considerably more than in the severe "flu" season of 2018. More data are surely needed before we can be quite certain.

Rushworth cites the overall infection fatality rate (IFR) of COVID as 0.15–0.2%, but only half that for people younger than 70. By comparison, the 1918 flu pandemic had an estimated rate of 2.5% and was highly dangerous for young people. However, the death rate is not the only way to measure a society's burden of disease; the average age of death makes it possible also to calculate the overall number of *years of life* lost. From that point of view, the social burden of COVID may be no greater than the burden imposed by a lack of childhood vaccinations for measles, polio, and other common infectious diseases that are avoidable by vaccination (pp. 50–54).



Rushworth suggests also that so-called "long COVID"—debilitating symptoms continuing long after the acute illness is past—may not be a distinct new entity. It is similar to what is experienced by people who have suffered an episode of *any* serious illness with intensive care: Some 60% of people treated in intensive care for any condition still show some cognitive impairment a year later (p. 55). An MRI study of people claiming "long COVID" symptoms did turn up quite a lot of indications of impaired function by various organs, but the lack of a control group renders this quite meaningless (pp. 60–61): A random sample of symptom-free individuals, particularly older ones, would also show all sorts of minor, unimportant deterioration in a number of organs.

The book has an excellent discussion of what COVID tests are and what they can show; and how very misleading the promiscuously disseminated data can be as a result of false-positive and false-negative test results (pp. 62–73). Everyone should read this, over and over until it is fully digested, to appreciate the (possible lack of) significance of the sensitivity and specificity of a test—*any* test, not merely for COVID. Few untutored people know that the significance of test results, the proportion of false-positives and false-negatives, depends not only on the stated sensitivity and specificity of the test but also on the prevalence in the population of what is being tested for. One consequence is that public policies based simply on the number of apparently positive tests could well be misplaced, seeming to indicate that the pandemic continues when in reality it may be already over (p. 70).

Have lockdowns prevented COVID deaths? Rushworth quite properly points out that the widely accepted belief in the efficacy of lockdowns rests on two highly unreliable sources: official statements from China, and statistical modeling, bearing in mind that modeling should never be regarded as sound evidence (pp. 74–75).

Nevertheless, Rushworth concludes that lockdown seems ineffective (p. 88), does not reduce mortality caused by COVID, even that "nothing that various world governments have done to combat

COVID seems to have had any effect whatsoever on the number of deaths" (p. 78).

That conclusion seems less than convincing, however, for several reasons:

1. The data come from only the first few months of the pandemic.
2. Some of the cited studies relied on inappropriate statistical analyses (pp. 77, 79).
3. Perhaps the best-cited study indicated that COVID is "unbelievably infective" (p. 86) through immediate personal contact but that it does not spread readily in or from spaces recently occupied by infected people; and that most infected individuals are not very infectious while a few seem to be "super spreaders" (pp. 83–88).

The conclusion that facemasks do little to stop the spread of COVID seems unconvincing for the same reasons, and also because the cited studies were of the spreading of respiratory infections in general, not of COVID itself (those studies showed a small effect only of facemasks, with N95 masks much better than surgical masks let alone cloth masks).

Since COVID is *unusually* infectious (p. 86), something that might have only a small impact on the spreading of cold or flu viruses might well have a more appreciable impact with COVID. Indeed, the best-controlled cited study (pp. 83–88) showed that strict isolation, distancing, and mask-wearing, together with testing and contact tracing and quarantining, essentially prevented spreading of infection from one platoon of Marine recruits to recruits in other platoons that used the same spaces at different times. Lockdown is surely an extreme case of quarantining, since it ensures the isolation of any super-spreaders and does not require voluntary adherence to guidelines or even mandates for mitigation methods. Anecdotal media reports comparing the experiences of different countries seem to suggest that lockdowns have been somewhat effective; either that, or very early testing, contact tracing, and quarantining seem the only two possible reasons why such countries as Taiwan or New Zealand have suffered almost not at all compared to, say, Britain, Brazil, or the United States.

What else, if anything, reduces risks from COVID? The worst outcomes seem to correlate with obesity, age, and low income (p. 77).

Vitamin D appears to reduce risk, a possible explanation for the greater impact of COVID on dark-skinned people, whose complexion is a barrier to the body's generation of vitamin D by sunlight (p. 91).

As to the safety and effectiveness of the vaccines, the book is equivocal, for well-explained reasons (pp. 112–131).

Rushworth makes a strong case that the virus may be no more "deadly" than other severe respiratory viruses. Nevertheless, COVID generated a disproportionate degree of global hysteria. This book ascribes the highly damaging impact of the disease not to inherent properties of the virus but to misdeeds and dysfunctions in how societies responded. These speculations (pp. 132–316) I find very plausible, indeed at least tentatively convincing.

Not discussed is the possibility that COVID originated in a laboratory, possibly involved in experiments relevant to biological warfare. In that case, it might have entirely unprecedented characteristics.

Also not discussed is that this pandemic surely demonstrates that "ordinary flu" seasons are not handled particularly well. Perhaps, for example, elders, say 65 or older, might be advised during "normal flu seasons" to practice judicious distancing and wearing of N95-masks in public, which would likely prevent more illness than the usual "flu shot."

I recommend this book without reservation as a reliable analysis, based admittedly on only the first months of the epidemic. Endnotes give links to significant cited data. There is no index, but that is not particularly troubling since the chapters are quite short (12 pages long on average) and accurately described by their titles.

NOTES

[1] EUROMOMO.
https://www.euromomo.eu/about-us/history/)
https://www.euromomo.eu/graphs-and-maps#excess-mortality

[2] Centers for Disease Control & Prevention; weekly number of deaths (from all causes)
https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm
Graph is about halfway down the webpage.

Journal of Scientific Exploration, Vol. 35, No. 3, pp. 667–675, 2021 0892-3310/21

BOOK REVIEW

Until the End of Time: Mind, Matter, and Our Search for Meaning in an Evolving Universe by Brian Greene. Knopf, 2020. 448 pp. $26.99. ISBN 978-1524731670.

Reviewed by George Williams

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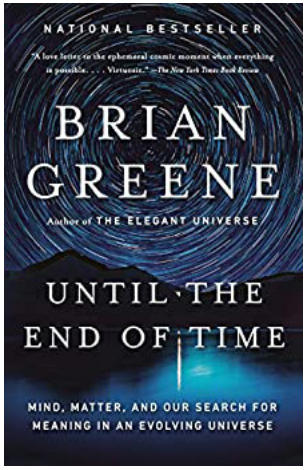
https://doi.org/10.31275/20212079

Brian Greene's *Until the End of Time: Mind, Matter, and Our Search for Meaning in an Evolving Universe*, as the title suggests, is an ambitious work. Greene takes the reader on a vast tour which begins with the birth of the universe and ends with its (likely) dissolution. The staggering timescale that Greene considers here is perhaps unique among science books aimed at a wide audience. And Greene uses the backdrop of the universe's emergence and demise as an effective platform to explore human meaning in a relatively wide range of inquiry. These subjects include consciousness, religion, language, and the arts. It appears significant for Greene that these, as important as they are, all play out in a relatively brief time in the context of the evolution and demise of the universe. At the end of the day, Greene submits that life is likely ephemeral. He provides a quote from Nabokov that characterizes human life as a "brief crack of light between two eternities of darkness" (p. 13).

Greene excels in describing the history of our understanding of our universe's origins, both the theoretical frameworks (which emerged in large part from Einstein's theory of general relativity) and empirical confirmations detected by scientists. According to Einstein's equations, gravity under some conditions might be repulsive, rather than always attractive (as we might think). So as Greene describes, under the right conditions, large clumpy objects such as stars and planets, can drive



things apart. But this aspect of Einstein's framework didn't get much attention until observations revealed that the universe was expanding. Eventually, inflationary theory posited a region of space could be filled with a particular kind of substance (which Greene calls "cosmic fuel") that under the right conditions might be repulsive. Greene walks us through the historical development of a theory of how an astronomically small region might erupt "almost instantaneously stretching to as large as the observable universe, if not larger" (p. 48). However, more impressive perhaps is when this developing theory incorporated quantum mechanics. The resulting prediction involved a distinct pattern of temperature variations across space, a sort of cosmological footprint. And Greene notes that telescopic observations beginning in the early 1990s confirmed the predicted pattern.

How did such a low entropy state as the universe's origin even exist? Greene acknowledges this mystery is likely beyond us, as we are much better acquainted with processes that expand entropy. And Greene is quite adept at vividly describing how the "entropic two-step" leads to the birth of stars. We might imagine the big bang as a colossal explosion of gas and particles evenly spreading out throughout the universe. However, here Greene vividly describes the crucial role of how gravity acts to bring matter together. As he explains, in portions of the universe where energy and particles expand, leading to areas of low energy, gravity leads the central core of these portions to compress. Greene walks us through how this process amplifies and grows stronger, leading to the stars that populate our universe.

Perhaps the singular key in unraveling much of the universe's unfolding and as well its ultimate fate, according to Greene, is the concept of entropy. And Greene is indeed adept at guiding the reader through its subtleties and implications. In the early chapters, Greene fully describes the concept to readers, as well as the history of understanding it. As most readers already know, the entropy of the

universe, according to the second law of thermodynamics, expands over time. Thus, higher quality or relatively ordered states of energy must decline with time. However, perhaps the most important concept here is what Greene calls the "entropic two-step." This is where a process that appears to lower entropy (increase order and raise the quality of energy) is in apparent violation of the second law. However, as Greene explains, such increases in order must come at the expense of raising the level of entropy overall. For example, in order for a biological cell to ingest the nutrients to grow and thrive, it must expel heat into the environment. This leads to one of Greene's key points: that "the dual forces of entropy and evolution are well-matched partners in the trek of the emergence of life" (p. 7).

However, as his book's title suggests, Greene's subject matter is considerably broader than cosmology. In the middle chapters, Greene considers possible explanations for consciousness, how life evolved, the nature of our stories, the roots of our sacred beliefs, and the instinct toward creativity. Perhaps the strongest challenge for a materialist such as Greene is the problem of consciousness. Greene seems to recognize this difficult problem and acknowledges that we likely have a long way to go in explaining it in materialistic terms. Here, Greene does a good job of framing the problem:

> How can a collection of mindless, thoughtless, emotionless particles come together and yield inner sensations of color or sound, of elation or wonder, of confusion or surprise? Particles can have mass, electric charge, and a handful of other similar features . . . but all these qualities seem completely disconnected from anything remotely like subjective experience. How then does a whirl of particles inside a head—which is all that a brain is—create impressions, sensations, and feelings? (p. 125)

Although a committed materialist, Greene presents a relatively wide range of different views to the problem and acknowledges the positions of fairly prominent non-materialist philosophers such as Thomas Nagel and David Chalmers. He also has a clear discussion of the knowledge problem, which concerns a brilliant but color-blind neuroscientist named Mary. In the thought experiment, which helps flesh out the hard problem, Mary understands all there is to seeing,

but she has never experienced the color red. When Mary is given the ability to see color, the question arises how this new knowledge can be reconciled with physicalism.

Greene, however, does arguably put his thumb on the scale to suggest that consciousness will ultimately be explained in materialistic terms. Toward this end, he presents in a favorable light a theory of consciousness developed by neuroscientist Michael Graziano. As Greene clearly explains, Graziano's theory posits that our brain somehow creates very simple mental schemas from attending to the world around us. These mental schemas filter out unnecessary information involving the firings of the brain's neurons and other information processing. And Graziano claims that out of these sorts of simple schema we create something of a simplified schema for our own attention, as well as those of other people and animals we suppose have minds. Thus, Graziano's theory suggests our notion of consciousness emerges from such simplified schemas. While Greene does an excellent job of summarizing Graziano's framework, he fails to consider the more critical questions that critics of materialism might raise. Most importantly, how does such a functionalist approach, which might be characterized in terms similar to a sophisticated robot, generate the "something it is like to be" quality that conscious beings possess? How do the inherently subjective feelings of conscious beings emerge from collections of simplified schemas generated by processes that might be completely described in terms of a sophisticated computer? In my reading, Graziano (2016) characterizes the qualia of consciousness as intuitions that lead us astray about the nature of our experience. But should we characterize the pain of a small child or animal as an "intuition?" Graziano's explanation appears to be close to Daniel Dennett's (1991) rather dismissive take on the reality of subjective qualia.

Such bias comes up again when Greene considers the problem of free will. Here, Greene counsels that no matter what our experience, in the laws of nature (whether classical or quantum mechanical), the world is governed by mathematical laws that leave no room for true free will. However, his arguments on the degree quantum mechanics constrains free will can be questioned. Near the end of his book, he summarizes his position this way:

> Because reality is quantum mechanical, the pronouncements of the laws are probabilistic, but even so the probabilities are rigidly determined by mathematics. Particles and fields do what they do without concern for meaning or value or significance. Even when their indifferent mathematical progression yields life, physical laws maintain complete control. Life has no capacity to intercede or overrule or influence the laws.

But this is not quite right on two counts. First, as Greene has acknowledged earlier, we have no answer to the quantum measurement problem. That is, currently we lack a satisfactory solution for most physicists that explains how quantum superpositions (in quantum experiments) transition into actual experimental outcomes. However, physicist Henry Stapp (2017) argues that the "collapse of the wave function" results from the "choice" of nature in response to the choosing of the experimenter. Thus, Stapp explicitly incorporates a notion of free will in his interpretation of quantum mechanics. Now while few physicists currently embrace this interpretation, we might note that bringing free will into the picture—something we seem to have direct acquaintance with—is arguably more plausible than Everett's "many worlds" style and other interpretations that clash strongly with our direct experience and that (so far) we have no evidence for.

The other problem is with Greene's claim that "the probabilities are rigidly determined by mathematics." Actually, any sort of mathematical equation that determines the Born probabilities within the wave function does not (yet) exist. My reading of the literature suggests that these probabilities emerge holistically as a result of the physical configuration of the experimental setup. And what can we say concerning quantum behavior outside of the lab? Very little. Many might imagine that quantum behavior is negligible outside of the laboratory, and until recently this has been the conventional thinking. However, the growing field of quantum biology has revealed quantum nature in various biological processes. Perhaps one day we might even find quantum links within the brain.

At this point, I'd like to isolate what appears (to me anyway) some fundamental guiding principles that arguably limits some of Greene's thinking. These fundamental principles are: 1) materialism

(or physicalism), 2) reductionism, and 3) the sort of scientism that seeks only explanations that can be expressed in mathematical terms. Thus, when he considers topics such as consciousness, free will, and meaning, he falls back to these guiding principles. When he is considering, for example, whether consciousness might be linked with quantum mechanics, he notes that he hasn't seen the math that might support this, and this fuels his skepticism against the view that the two might be linked. But Greene appears to treat these principles as indispensable axioms, rather than metaphysical assumptions that might be of questionable use in some areas of inquiry.

If we carry into our inquiry a bedrock assumption that everything must be governed by mathematical laws, how can we avoid concluding that free will must be illusory? In such cases, the answer appears to be determined by our assumption rather than the processes of the world we seek to understand. Of course, such assumptions have arguably served science (especially classical science) very well. But what about areas, such as quantum mechanics and consciousness, where significant gaps persist in our understanding? Must we maintain a tight grip on such assumptions, even in the presence of persistent mysteries?

Recently, the philosopher Goff (2019) has argued that science, through Galileo's influence, has developed in ways that, while successful for investigating the physical world, might actually handicap us in areas such as consciousness. That is, Goff notes that Galileo specifically argued for greater focus on the quantitative features of the world, which could be expressed in mathematical language, in order to facilitate scientific understanding of the material world, but arguably at the expense of the world's more qualitative aspects. Given this bit of history in science, we can legitimately question whether fundamental assumptions that have served cosmologists well will continue to serve us in such problem areas as consciousness and free will.

Of course, to be fair, there is nevertheless much in this book to admire and value. Greene's views are an excellent presentation of mainstream science. And his clear exposition on a wide range of scientific research, as well as his ability to discuss respectfully and sympathetically views quite opposed to his own, make this book a worthwhile investment.

But how does Greene fit the search for meaning within such a

materialistic framework? Greene spends quite a bit of time discussing the origin of our stories, sacred beliefs, various kinds of art, and these (as you might expect) are considered within a framework heavily influenced by modern theories of evolution. And Greene does a good job presenting the question and debate on how to reconcile the artistic impulse with evolution (which is oriented around fitness for survival). Ultimately Greene gives weight to explanations that link abilities or dispositions of questionable survival value (such as creating music or poetry) with abilities that are valuable in that sense (pattern seeking or the ability to imagine what others might be thinking). Thus, adaptions that help us survive through better pattern recognition, so the thinking goes, might also give us an appreciation of poetry for free. While Greene does explore alternatives, he seems to favor this class of explanations. Thus, Greene appears to be sympathetic to Steven Pinker's assessment that music and the language arts "amount to nutritionally bankrupt desserts served up to pattern-obsessed human brains" (p. 227).

Greene suggests that this class of explanation may help us understand the origin of religion or sacred beliefs as well. Adaptions in our brain that improved pattern recognition as well as our ability to imagine cognitive abilities in others, might have also led humans to ascribe intelligence to some sort of god or aspects of nature. And the religious institutions that emerged may have facilitated cooperation across groups of individuals, as well as altruistic behavior. While Greene is no believer, he does acknowledge the evolutionary value that religious institutions have likely provided in human history. Another advantage religion arguably bestowed (again possibly resulting from adaptions in pattern recognition) was providing a sense of order or meaning as a buttress against the angst if not fear around our mortality. But Greene has little to say on the role religion arguably played in foundation for ethics and morality, not to mention any serious consideration of connecting with a transcendent reality. That said, Greene does acknowledge how in his personal life, after the death of his father, connecting with his Jewish tradition and practices helped bring some measure of peace.

In the book's closing chapters, Greene turns toward the far future and walks us through various speculative scenarios on the universe's ending. In another five billion years, Greene suggests that the sun

will deplete its supply of hydrogen, which through fusion supplies the energy of our solar system. As a result, the decline in energy pressure will give gravity the upper hand, leading to our sun imploding. But this in turn leads to a sharp increase in pressure and pressure in a relatively thin layer of hydrogen. As a result, another round of hydrogen fusion produces an intense outward push. The sun expands and consumes the inner planets, most likely including our own.

Greene also considers the possibility in the future of other stars venturing close to our own solar system. Due to the gravitational pull from a wayward star, Earth might be flung from its orbit around the sun. In this scenario, the Earth's temperature would plummet and the upper layers of the world's oceans would freeze. But Greene considers that some life might indeed survive deep in the Earth's interior, warmed by the nuclear fission at its core. He speculates that life on the ocean floor might carry on for billions of years as if nothing had happened. In addition, Greene considers that in billions of years the universe will expand at faster rates, where the fabric of space itself is stretched faster than the speed of light. In this case, from any vantage point in the universe, there are fewer stars, as the light cannot travel fast enough to keep up with the extension of space.

However, even as Greene describes various ways the universe might end, he also weaves into his discussion discoveries or breakthroughs in cosmology. His discussion of the expansion of space itself includes recent explorations into *dark energy*, responsible for pushing galaxies apart. Greene also summarizes the development of theories on gravity waves, which originated from Einstein's theory of relativity, and were recently confirmed through observations at the Laser Interferometer Gravitational Wave Observatory, in order to explore their role in nudging the Earth off its orbit (assuming the Earth is still in orbit) and into the sun. Another fascinating journey Greene provides concerns our theoretical understanding of black holes, primarily due to Steven Hawking, that these enigmatic bodies radiate particles. Eventually, Greene argues, time will claim even black holes in the universe as their radiation leads them to waste away.

In the end, the universe, just as our own lives, must come to an end. And according to Greene, attempts to find some sort of deeper or inherent meaning, beyond pure constructions, is unsupported by

science, and therefore likely leads us in the wrong direction. My own view, based on empirical research in parapsychology (which likely does not interest Greene) as well as persistent gaps in our understanding of consciousness, is quite different. Too many questions in these areas remain unanswered to warrant such a confident dismissal of meaning in some deeper, intrinsic sense. But Greene's book presents an admirable and wide-ranging look at how our vast universe unfolded and how it might likely end.

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Journal of Scientific Exploration, Vol. 35, No. 3, pp. 676–681, 2021 0892-3310/21

BOOK REVIEW

The Fall of Ufology: Don't Bother Me with Your Deceit by Geoffrey B. Cox. Outskirts Press, 2021. 210 pp. $18.95 (paperback). ASIN: B08T1QJSGF.

Reviewed by John B. Alexander

https://doi.org/10.31275/20212137

This self-published book is clearly the product of a frustrated researcher. The subtitle alone provides an accurate insight into Cox's thinking. That said, anyone who has been around these fields for any length of time can share a sense of frustration. Listening to any number of self-anointed experts, and even charlatans, who populate the fields of the paranormal, can be exasperating. Yes, tall tales abound. Unfortunately, there are no lower limits to crazy that will not attract a following. Such is the nature of studying unexplained phenomena.

The publication does not appear to have been professionally edited, as one finds both grammatical and contextual errors. Cox contracted with a company called *Outskirts Press*; one that specializes in physically printing self-published books. In checking with them, I found they do offer an editing service. The author would have been better served to have paid for that option, as there are many incomplete sentences and other grammatical errors. As an established author, I believe attempting to edit your own material is fraught with danger. That is the position I believe most frequently published and serious authors would agree with.

Mechanically speaking, *The Fall of the Ufology* appears to be designed for an e-publication, as opposed to a print format. That is because there are many Internet sites that are listed and that I suspect can be directly accessed in electronically published form. The contextual format changes significantly throughout the book. Some of

it is straight nonfiction statements of fact, but that is often followed by side commentary as if one were attending a social gathering.

While the title implies the singular topic is UFOs, it digresses into many other areas. He takes significant liberties in defining, or redefining, terms that have been around for many years, even centuries. Seemingly, Cox does view himself as the arbiter of acceptability of terms. As an example, he proffers "*Anomalogy*" as a new term which he defines "as a person who studies anomalies," as opposed to parapsychology or ufology. In many ways, what Cox puts forth many of us would view as a blinding flash of the obvious. The notion of the interrelationship between various fields in the study of phenomena has been addressed for decades. Several authors, including Jacques Vallé and myself, have written extensively on this matter.

On a hypocritical note, Cox simultaneously admonishes Ufologists who present outlandish opinions at conferences, and then destroys his own credibility by accepting extreme conspiracy theories. While addressing his own UAP (unidentified aerial phenomena) sightings, he states that he believes the craft to be of man-made origin. That, even though he witnessed events that would be beyond our currently known technical capabilities. Specifically, on page 32 he states, "I believe now that somehow we on earth have been given this technology from 'Outside Intelligence.'" Here, I am admittedly biased, but have explicitly eliminated that possibility in my own UFO writings. The notion that the U.S. government has reverse-engineered a crashed UFO is not new. But as I have pointed out, if such technology existed, making small craft that flit about would be trivial compared to the fundamental understanding of an entirely new energy source. Such a capability would undeniably alter our strategic interests and geopolitical landscape forever.

Cox's commentary is even more amazing as he is a 30-year veteran of the U.S. Air Force (USAF) and states that he had considerable experience with many types of aircraft in the U.S. inventory. As such, he should be aware that the troubled F-35 has the most advanced technology available in aviation today. It is understood that there may be some advanced technology under development that has yet to be revealed to the public. However, since the U.S. has been in a state of war since 2001, if we had access to technology that would change the energy landscape of the world it would have been made public by now.

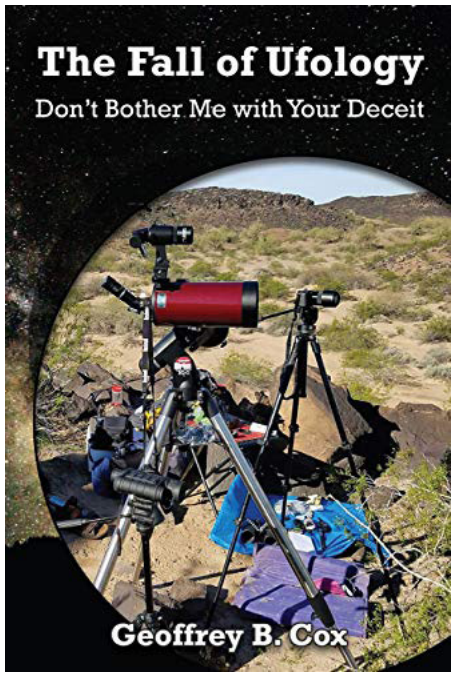
While fluffing, padding, or expanding one's bio happens too frequently, Cox has done so with this book. That is only consequential as he is relying on his background for credibility. Interestingly, in the Prologue he states, "I am going to simplify this as much as I can without writing a thesis for my doctoral degree." That was misleading at best, as he does not appear to hold any advanced degrees. He lists himself as a co-pilot of an F-16, when in reality he was in the backseat as a passenger. And later in the book he claims to be a C-5 co-pilot. While senior enlisted people (Cox was a SMSGT [Senior Master Sergeant]) are extremely important throughout the military, they are not rated as pilots of USAF aircraft. He also lists his studies with Dr. Richard Haines who happens to be a personal friend of mine. When called, NARCAP (National Aviation Reporting Center on Anomalous Phenomena) did not support that claim. Cox notes that the C-5 Galaxy is the "Largest Military Aircraft." As a minor correction, while it is the biggest U.S. military aircraft, the "world's largest" title belongs to the Russian Antonov AN-124, which is 20% larger than the American transporter.

On several occasions Cox does employ, and credit, the work of others. However, I did find at least one example of plagiarism.

> Thin places are places of energy. A place where the veil between this world and the eternal world is thin. A thin place is where one can walk in two worlds—the worlds are fused together, knitted loosely where the differences can be discerned or tightly where the two worlds become one. Thin places aren't perceived with the five senses. Experiencing them goes beyond those limits. (p. 17)

Those words are found on page 17 of his book and they are also taken word for word, without attribution, from the podcast of a travel agency (Thin Places Travel Podcast, 2015) and is the entirety of his commentary on the topic.

In Chapter 10 titled "God Has No Religion," Cox diverges into almost unintelligible discussion regarding religions and UFOs. In one paragraph he states, "The mysteries of parapsychology, astrology, UFOs/UAP's crossing over, life after death, and numerous cults were occults 'in these times' are considered the norm while Christianity is considered 'out of place' or possibly criminal." In that chapter Cox goes



on to explain his understanding of the interrelationships among UFOs, angels, demons, and what he calls the *final invasion*. His notion is supported by a full page of biblical references that I suspect many readers will have problems with. Cox questions whether those events are "really demonic spirits that are playing games with us." He notes, "It is either extraterrestrial, from another planet, who are looking down and observing us, or is it just demons masquerading as friendly aliens trying to come to us as Angels of Light."

Throughout the book Cox handles information about related phenomena in a very uneven manner. Crop circles are brushed over in three pages followed by 24 pages addressing animal responses to UFOs. This is mostly a compendium of anecdotes and materials from other sources. Included are ten pages of material by Joan Woodward. That is a summarization of the original 2005 paper titled *Animal Reactions to UFOs: A Preliminary Investigation from the Animals' Perspective* (Woodward, 2005). Of concern to some SSE readers might be his chapter on alternatives to medicine which he addresses in less than two pages. Then, cryptozoology, another complex subject, is covered in three pages.

The author is prone to interjecting his opinions which often include huge leaps over logic, without scientific foundation. As an example, on page 127, in a short chapter titled *Mutes* (referring to animal mutilations), he states, "My theory, until proven wrong, is that the blood is taken from these animals (normally bovines) as a food source for the Greys." From personal experience, I can state that cattle mutilations do occur and in some of the cases defy traditional explanation. However, his proposition is so far beyond the pale that

that should serve as a warning for other opinions throughout the book. For the record, exsanguination has been observed in a few cases of cattle mutilation, but hardly enough to be considered a "food source" for any contingent of alien entities.

Cox discusses orbs in several sections of the book and does mention known causes such as ball lightning. In reality, orbs are both controversial and a complex topic as they have been reported in many UFO cases, but they are also observed in association with other phenomena. In a chapter titled *Great Balls of . . . Light*, he informs the readers about some of the characteristics attributed to them. He goes on to classify them, including noting the different colors of some orbs and what that might imply. As an example, he states an amber orb means, "watcher from above" while a white orb means "general reconnaissance." While little of that makes any sense, Cox claims that his classification of orbs is based on studies of 10,000 case reports. He notes that by his classification he is showing his appreciation for clarification of questions he, and other researchers, had about orbs. According to Cox, the information provided through the orbs, "is taught to them by the Greys themselves."

Cox rightfully raises concerns that might be found in the reporting of UFOs inside the Air Force. For decades it has been known that this is not a career-enhancing topic to discuss. On page 131 he addresses the Personal Reliability Program (PRP), which is administered to ensure the psychological stability of all airmen involved in certain sensitive programs. He incorrectly states that if one reported seeing such objects to their commander or to the Office of Special Investigation (OSI), they "would automatically be transferred out of the program." Because of the case at Bentwaters Air Force Base in the UK, we know that is not accurate. Many of the USAF observers in that incident were participants in the PRP. While some were harassed, they were not transferred.

Other, seemingly random topics include a cursory overview of kinesics, known to most people as nonverbal communication, and a two-page recanting of the mythology of orbs that he ascribes to various indigenous people. There is also a semi-conspiratorial chapter called *Dugway—You Can't Handle the Truth*. Those eleven pages cover a brief description of events at Dugway Proving Grounds, including mention of the infamous nerve agent accident that killed a number of sheep in

1968 and a few additional incidents that do not seem to be related to the main topic.

As an experienced field investigator, Cox does include material on what he believes are the qualities needed to enter into UFO research. He rightfully suggests that fundamental understanding of astronomy would be useful. Regarding equipment and other personal gear, he suggests what should be available to field researchers. Those pages appear to be quite similar to content in *The MUFON Field Investigator's Manual*. There are also form letters and reports that he suggests be followed during an investigation.

The most egregious flaw, in my view, is the author's castigation of fellow ufologists, while elucidating conspiracy theories that are at least as scientifically implausible as any of theirs. Therefore, unfortunately, my conclusion must be that this book would not be a benefit to the members of the SSE.

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Journal of Scientific Exploration, Vol. 35, No. 3, pp. 682–686, 2021 0892-3310/21

BOOK REVIEW

Divine Mania: Alteration of Consciousness in Ancient Greece by Yulia Ustinova. Routledge, 2018. ISBN 978-0367594268.

Reviewed by Michael Grosso

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https://doi.org/10.31275/20212127

What role did altered states of consciousness play in the life of ancient Greek society? With consummate skill and scholarship, Yulia Ustinova answers this question in her book *Divine Mania: Alteration of Consciousness in Ancient Greece*.

It appears that the secret of the extraordinary creativity of the ancient Greeks was their receptivity to, and approval of, a particular altered state of consciousness they cultivated. *Mania* is the name for this but it must be qualified as "god-given." *Mania* is a word that touches on a cluster of concepts: madness, ecstasy, and enthusiasm, or *engoddedness*, to use Ustinova's more vivid coinage.

It seems a paradox that this special, strange, and often quite frightening state of dissociation should be so closely linked to one of the most creative civilizations. Unlike the Roman and Egyptian, the Greek approved and recognized the value of god-inspired mania. Plato makes Socrates say in the *Phaedrus* that through *mania* we may obtain the "greatest blessings." Whereas resistance to divine ecstasy can end in disaster, as Euripides illustrates in *The Bacchants* when Pentheus, a repressive authoritarian, tries to inhibit a posse of women from their ecstatic mountain dances. He is torn to shreds by his mother and her maniacal cohorts. This mindset of the ancient Greeks may have long ago petered out, but similar tendencies are constants, expressed in one form or another, throughout history.

The Introduction starts with Socrates in the *Phaedrus* talking

about the blessings of madness. Socrates himself is an illustration of what this book seems to want to underscore. Generally viewed as the archetypal founder of rational dialectic, Socrates yet was periodically prone to ecstatic seizures, as the records make clear. Periodically, he also interacted with a daemonic intelligence, a spirit guide we might say. The author leads us through the texts that tell the story. So, Socrates was a rationalist *and* a spiritualist.

Ustinova makes a crucial point about the difference between Greek and Roman attitudes toward ecstatic cults. The Romans, because of their history and culture, looked askance (rather like the current American empire) on the wildness and unsettling anarchy of mania; however, whenever the Romans, like Americans today, found themselves in more permissive environments, they surrendered to the raptures of divine mania.

Chapter One covers prophetic mania. Divination was widely practiced, even in the lives of generals and statesmen. They believed the gods were the source of supernormal knowledge of the future. The question was how to obtain that knowledge. There were priests who practiced prophecy, and seers, often of no special standing, who became voices of the gods. To access this prophetic knowledge, one must be inspired, radically dissociated from mundane life. A person in such a mental place may appear crazy, manic, maniacal. Another difficulty for common sense, prophetic mania and its effects appear to subvert the common belief that a cause always precedes its effect, but there seem to be exceptions to this once in a while, an anomaly called precognition that turns cause and effect upside-down.

The second chapter examines telestic (ritual) mania and its relationship to the near-death experience. The general idea that seems to emerge: The extraordinary experiences that spontaneously arise during near-death states are similar to, if not identical with, the kinds of transcendent experiences claimed to characterize the ancient mystery rites. Modern near-death research seems not only to help us understand large swaths of religious experience, but also may offer insights on how to consciously induce and study the phenomenon of near-death transformation from the inside, so to speak.

Bakcheia is the title of the next chapter and takes us into the possibly dangerous cult of Dionysus, which is slanted genderwise toward

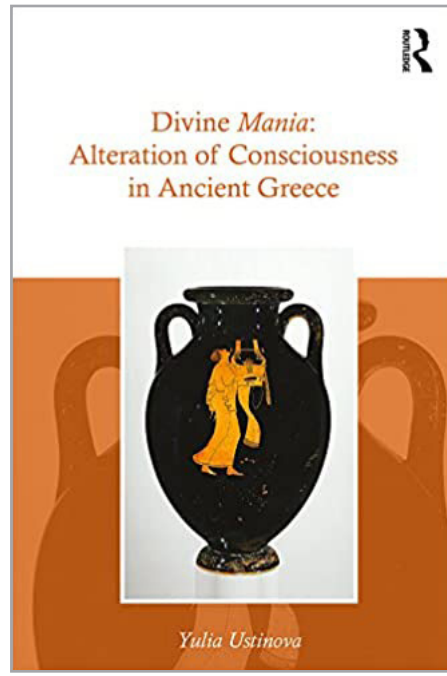
women. The ambiguity of ecstatic mania is here explored, its creative and destructive powers, its individual and its collective potentials. The author describes the absurd dialectic of Dionysian ecstasy: the maenads (madly inspired women) who surrender to Dionysos and escape all harm and flourish; Pentheus, the male authority figure who resists the ecstasy, is destroyed.

This is the great theme of Euripides' masterpiece, *Bacchae*. Euripides is telling us, writes Ustinova, that "ecstatic states are inherent to human nature and it is sheer folly to suppress them" (p. 197). An important question might be posed: What is the role of ecstasy in the mental health and creative well-being of a given society? Are we an ecstasy-deprived civilization?

The fourth chapter is an exploration of mania on the battlefield. If mania is a state that takes you out of your ordinary self, beyond your ordinary fears, it could make you a star on the battlefield, for it may arouse in you invincible *furor*—maniacal rage. This chapter explores the way the mania that takes you beyond yourself can also blind and destroy you. Divine mania is not easy to control and is always a struggle to be with. The mania that comes from power cannot help straddling between the malign and the benign, forever between bane and boon. The history of crime and tragedy is littered with tales of mania turned baneful.

Chapter 5 is titled "Nympholepsy"—think (for comparison) "narcolepsy," being taken over by sleep. Now think of being taken over by the Nymph Calypso who offers you sexual bliss and immortality. Well, it happened to Odysseus, but he got bored, missed home and family, and had to escape from his enchantment. Nympholepts were alienated from the habitats and routines of city life, lived in solitary and abandoned places, and so were more susceptible to psychic and imaginal forces and seizures, more open to visions and hallucinations of Pan and the nymphs; more prone to mad rage and ecstatic dance. We hear of seizures from Pan. A panolept is taken by a Pan-spawned imaginal form. As with much faery lore, it's hard to avoid seeing some kind of analog with UFO abduction stories. The intriguing gist of this chapter is that certain places or landscapes are conducive to being carried away in mania-induced states of consciousness.

Among the ancient Greeks, mania, or divine inspiration, was the



touchstone of authentic poetry. Plato was emphatic about poetry depending on a state of mind distinct from prosaic rationality. Poetry was linked to oracular and prophetic modes of discourse. The pre-Socratic philosophers Empedocles and Parmenides wrote in poetic styles and traditional meters. Poetry is what happens to language when it is shaped by divine mania. The author details a range of instances that connect inspired use of language with altered states of consciousness, quoting the words of the French poet Arthur Rimbaud: "The idea is to reach the unknown by the derangement of all the senses." The senses keep us riveted to blooming, buzzing everyday reality; mania rips our consciousness free and sweeps it away to other worlds of consciousness.

Chapter 7 elucidates the ins and outs of erotic mania, including a lucid discussion of the Platonic philosophy of love. There is a pandemic form of sexual love that culminates in reproduction—sex in service to the species. But there is another form of erotic possibility that sublimates the energies of desire into ecstatic love of beauty wherever found, a transcendent mode of consciousness. Ustinova notes that the word *eros* (as used in the Greek texts) is not just about things sexual; it's an active force that can and does turn us on to all kinds of things, from the most gross to the most ethereal. Eros is a general intensifier of consciousness. A fully erotic life is possible without a trace of sexuality. Likewise, a fully sexual life is possible without a trace of the erotic. It's nice to see the two come together.

Now the last place we might associate mania with would be the philosophers who are supposed to be friends of sober rationality. And yet it turns out that a certain form of mania flows like a steady

stream through Greek philosophy. Begin with the archaic, borderline-shamanic sages like Epimenides, Aethalides, and Hermotimus; then on to Socrates' daemon and Plato's mystical experiences; and, finally, the pre-Socratic thinkers like Pythagoras, Empedocles, and Parmenides. Mania and altered states are with the philosophers all the time.

The author shows in great detail the uniquely original and creative place of altered states of consciousness in ancient Greek culture. The common thread running through the history of this creativity is a peculiar state of mind—*mania*—a liminal state hovering on the edge that permits an influx of inspiration. Mania is versatile and may assume a form that is prophetic, possessed, bacchic, spiritual, poetic, erotic, musical, iatric, heroic (furor), mystical, and philosophical (and in various combinations). Mania, as I read Ustinova's account, would seem to be a facilitator of all the high forms of creativity that imply an expansion of consciousness into some new path, niche, or channel.

The author opens a new perspective on understanding classical Greek civilization, one that differs from E. R. Dodds' *The Greeks and the Irrational*, also a groundbreaking study of the Greek psyche. She argues that Dodds and other scholars have failed to fully acknowledge how central the reality of mania-induced inspiration was to the higher Greek achievements. The ancient Greeks had the dour Delphi oracle, *nothing in excess*, or a starker oracle—*best of all things is never to have been born; second best is to die young*. But the same people seem to have excelled in raising their consciousness into transcendent modes of being. The paradox of combining unflinching realism with transcendent creativity is notable.

In the Epilogue, Ustinova again calls attention to the historic exceptionalism of the Greeks in their uniquely creative relationship to the psychic syndrome named *mania*. In the end, even ecstasy has to deal with politics. Let the author have the last words:

> As a consequence of the absence of priestly authority and lack of ability or desire to interfere on the part of political powers, the Greeks made the most of the alterations of consciousness that many of them experienced, and developed mechanisms that allowed them successful exploitation of these phenomena. (p. 373)

Journal of Scientific Exploration, Vol. 35, No. 3, pp. 687–692, 2021 0892-3310/21

BOOK REVIEW

Silicon: From the Invention of the Microprocessor to the New Science of Consciousness by Federico Faggin. Waterside Productions, 2021. 290 pp. ISBN-13: 978-1-949003-41-3.

Reviewed by Rosemarie Pilkington

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https://doi.org/10.31275/20212205

I was a little apprehensive about reviewing this book because I know little about engineering or the inner workings of the computer, but in the interest of full disclosure, I wanted to know more about Federico Faggin. Twenty years ago, returning from an afternoon trip during the SSE conference in San Diego, I sat next to him on the bus and mentioned that since we last met I had lost the vision in my right eye, which I was still adjusting to physically and emotionally. He volunteered that he had lost the vision in his left eye when he was a youth in Italy and lightly commented that depth perception, which concerned me, was only an issue for six or seven feet. His admission and attitude were not only a revelation, but an inspiration for me: If this eminent gentleman had made world-changing inventions, was a successful businessman, and had a happy social and family life despite monocular vision; *I* certainly could get on successfully with my life as well.

Silicon is the fascinating story of Federico Faggin's remarkable life, but it is also his personal journey from scientific materialism to an awakening to a deeper level of consciousness. He divides his narrative into his four "lives."

His first life took place in his native northern Italy where he was a brilliant student with a wide range of interests. He became interested in computers and transistors, which had been recently invented, and he

read all he could independently since it was not taught in his school. His fascination deepened and he got a job with Olivetti where he learned much more than he could have at school and which become pivotal to his subsequent career.

He did, however, wisely return to academia to learn advanced physics, math, and quantum mechanics, "the somewhat mysterious theory that explains how semiconductors like germanium and silicon behave," (p. 14) but also because he recognized that he might not get far at Olivetti without a university degree.

After graduation he was hired by CERES, a startup company run by his old boss from Olivetti. CERES was the Italian representative of General Microelectronics, the first MOS integrated circuit company based in Silicon Valley. He was sent to California to learn about this technology. His job there ended, but with his new knowledge he was hired by the Italian subsidiary of SGS-Fairchild near Milan where he developed their first MOS process technology and designed their first two integrated circuits.

Two events marked the beginning of his "second life": his being sent to Silicon Valley for six months in an exchange of engineers and his falling in love with California, and his marriage to the one and only love of his life, Elvia, in 1967.

Combined with the account of his career adventures, throughout the book is his personal story: his happy marriage, adjusting to the American way of life, building a home, having a family, and eventually evolving spiritually. The book is really a joint chronicle of personal development and the development of Silicon Valley, a new frontier. Faggin notes:

> Few of our neighbors could claim to have been born in California and this fact brought us together and made us feel even closer to each other. We were all pioneers, even if we arrived in a Boeing instead of a horse-drawn wagon. (p. 45)

Even though I knew nothing of the technology, Faggin's clear narrative was easy to follow, and I could grasp the difficulties he encountered, the significance of his experiments, the resistance of "superiors," and his indefatigable striving to solve each problem and attain his goals.

There is drama, too, in the treachery of stolen ideas, others getting patents on his inventions, and other frustrations of working for large established firms. He did not just become angry, he became wiser, and on the silicon design that was "the essence of the first microprocessor," he etched his initials, "F.F." which proved useful later when he left Intel, for whom he was working, and they tried to "disavow" his "paternity" of it. It was proof of his authorship "reproduced millions of times and present in every chip produced—A claim that could not be erased" (p. 71).

His negative experiences with them led him to start his own company, Zilog, and his "Third Life." The story of his hard work, his setbacks, and his euphoria when in January 1971 at his age of 29 the world's first microprocessor was born, makes for an exciting read.

Never content to rest on his laurels, he pursued other things. "The microprocessor was like a child to me, a kid who had come a long way in the world and could now take care of itself" (p. 140). Onward to new challenges!

He took his family on an extended vacation to Italy and considered that time of self-reflection and self-examination the first step on a spiritual journey. He was free from financial care, but free to do what?

His interest in Artificial Intelligence led him to study biology and neuroscience, but dissatisfied with reductionist materialist explanations he became interested in consciousness, which he realized was a "fundamentally unsolved problem" (p. 155), and he decided that it could be studied only through first-person experiences. Therefore, he decided to study it using himself.

By the late 1980s, financially secure, his home life happy, he still felt dissatisfaction and questioned further the meaning of his life and whether or not death was the end of everything. But, Faggin reports,

every time he despaired he would perceive a "point of light," which gave him enough hope to want to live.

One night in December of 1990 on a holiday trip to Lake Tahoe, he had a profound life-changing peak experience whose essence was love. In his attempt to explain what is most probably an ineffable occurrence, he declares, "This experience contained an unprecedented force of truth because it felt true at all the levels of my being. At the physical level, my body was alive and vibrant like I had never felt before. At the emotional level, I experienced myself as an impossibly powerful source of love, and at the mental level I knew with certainty that all is 'made of' love" (p. 160).

Faggin's outpouring reminded me of a similar one in an interview I did in Rome with another north-Italian–born genius, Emilio Servadio in 1985, just five years before Faggin's epiphany. Once during an experiment with Eileen Garrett in which they took LSD, Servadio had the same sort of peak experience during which he declared, "For the first time in my life I know what Love with a capital L is." He had another later in India while walking in a field near sunset when "like a thunderbolt" he had an ineffable "cosmic experience" that lasted for only a couple of minutes but was unforgettable (Pilkington, 1987, 2010, p. 92).

The next phase of Faggin's story he dubs "Living a Double Life," for at this time he was continuing his life as an astute businessman and creative inventor and entrepreneur but at the same time searching for meaning and exploring his inner emotional self.

His team at Synaptics developed the touchpad and touchscreen technology, which took off when Apple developed the iPhone, creating a market, and his company benefited by producing touchscreens for other companies and PCs. Meanwhile he continued his "peak experience" by further opening the door to other experiences. He engaged a transpersonal therapist who helped him open up to his inner self, recover repressed memories, and to have a deeper understanding of himself. As he says, "with the same dedication I had showered into technological and scientific research, I committed to discovering the truth about myself, beyond the perceptual distortions fostered by prejudices . . . " (pp. 177, 178).

During this period he had an Out of Body Experience, before he

had ever heard of an OBE. This event filled him with even more wonder and curiosity about the nature of reality and consciousness.

Eventually he gave himself over completely to his "Fourth Life," devoting himself to "developing a model of reality based on the assumption that consciousness is irreducible" and that it is "an irreducible property of nature" (p. 192).

Faggin explores the meaning of consciousness and the qualia, the physical sensations and feelings, emotions, thoughts, and spiritual feelings that we experience. He argues that the prevailing belief that consciousness "emerges from unconscious atoms and molecules" cannot account for the "existence of our inner conscious experience and knowing" (p. 195).

Here he delves into the realms of Quantum Field Theory and Entanglement, electromagnetic energy, and general relativity. As a non-physicist I found these last chapters difficult and, as the author suggests, read them over a few times to try to absorb some of these new (to me) concepts. For the past several years I have believed that a true understanding of psi phenomena, especially large-scale physical phenomena, will only be understood by future discoveries in the quantum and bio-quantum areas of science.

In the final section Faggin illustrates the differences between computers/objective knowledge and living organisms/subjective knowing, i.e., the difference between man and machines as well as the fundamental limitations of the scientific method in exploring inner reality. He postulates the existence of "nousym," a holistic and dynamic "substance" forming both the quantum and classical world "in which it appears as physical energy" (p. 230). He explains that the classical world has only an outer aspect (bits), while the quantum world has both outer (entangled qubits) and inner aspects (entities with consciousness and free will).

He expresses the concern that if we don't take the primacy of consciousness and free will seriously we run the huge risk that "the entrenched materialism, reductionism, and the information technology based on them will become enslaving idols" (p. 231).

Faggin, who has added so much to our technology, maintains that it must help us discover our true nature:

> Just like the invention of the engine amplified our human muscular power, so, too, computers, robots, and AI can amplify our *mechanical* intellectual power and free us from monotonous, repetitive, and dangerous jobs. This great potential, however, must be placed at the service of the spiritual, mental, emotional, and physical progress of *each* human being. (p. 233)

A bibliography is provided as well as five appendixes, the last one explaining his theory of "One and the Consciousness Units."

Federico and Elvia Faggin have created a foundation supporting various programs to advance the understanding of consciousness through theoretical and experimental research. http://www.fagginfoundation.org/

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JOURNAL OF SCIENTIFIC EXPLORATION
A Publication of the Society for Scientific Exploration

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