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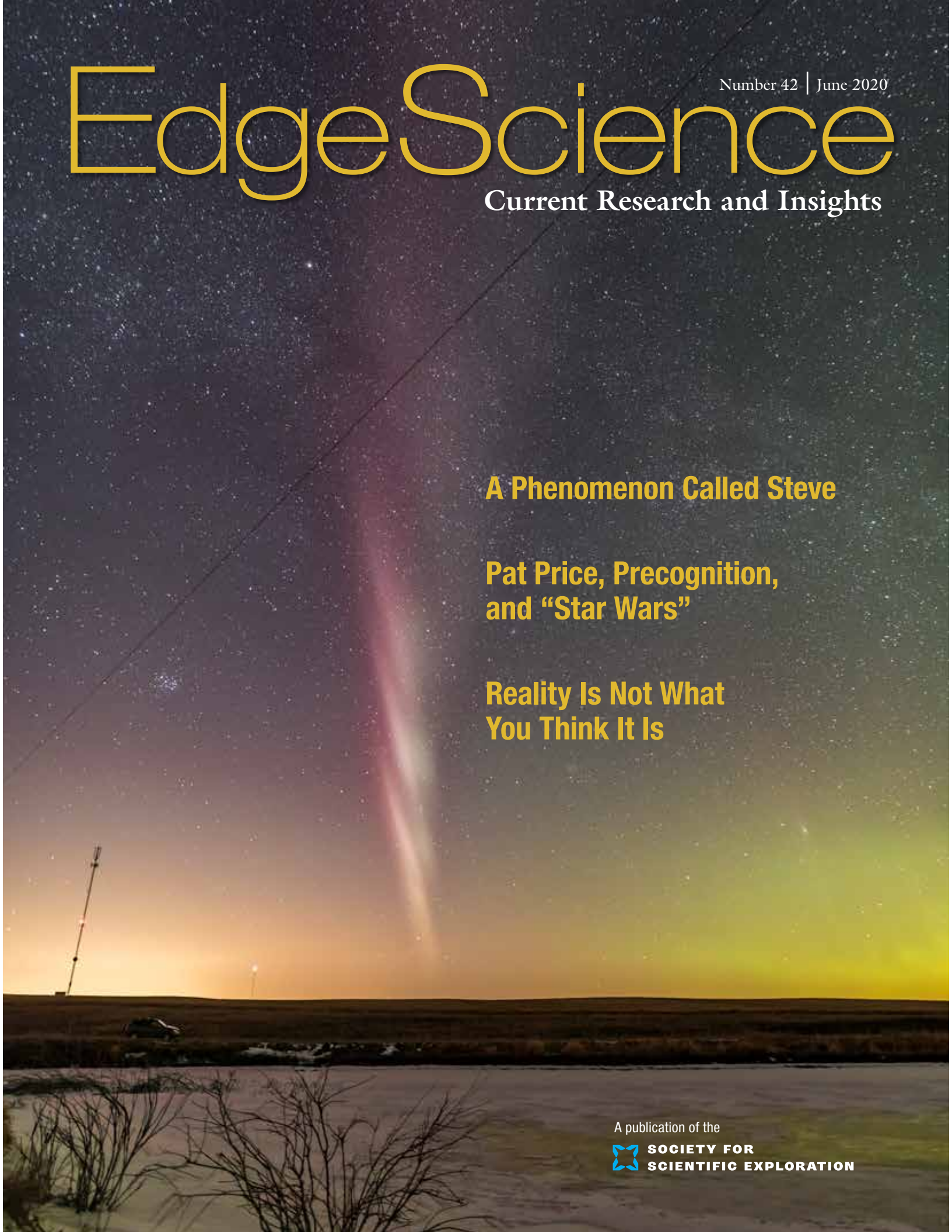

A Phenomenon Called Steve

Pat Price, Precognition, and "Star Wars"

Reality Is Not What You Think It Is

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Why EdgeScience? Because, contrary to public perception, scientific knowledge is still full of unknowns. What remains to be discovered—what we don't know—very likely dwarfs what we do know. And what we think we know may not be entirely correct or fully understood. Anomalies, which researchers tend to sweep under the rug, should be actively pursued as clues to potential breakthroughs and new directions in science.

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The Society for Scientific Exploration (SSE) is a professional organization of scientists and scholars who study unusual and unexplained phenomena. The primary goal of the Society is to provide a professional forum for presentations, criticism, and debate concerning topics which are for various reasons ignored or studied inadequately within mainstream science. A secondary goal is to promote improved understanding of those factors that unnecessarily limit the scope of scientific inquiry, such as sociological constraints, restrictive world views, hidden theoretical assumptions, and the temptation to convert prevailing theory into prevailing dogma. Topics under investigation cover a wide spectrum. At one end are apparent anomalies in well established disciplines. At the other, we find paradoxical phenomena that belong to no established discipline and therefore may offer the greatest potential for scientific advance and the expansion of human knowledge. The SSE was founded in 1982 and has approximately 800 members in 45 countries worldwide. The Society also publishes the peer-reviewed *Journal of Scientific Exploration,* and holds annual meetings in the U.S. and biennial meetings in Europe. Associate and student memberships are available to the public.To join the Society, or for more information, visit the website at scientificexploration.org.

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Donald Hoffman

Reality Is Not What You Think It Is

Or Why Evolution Hides Objective Reality

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Your eyes will save your life today. With their guidance, you will not tumble down stairs, leap before a speeding Maserati, grab the tail of a rattlesnake, or munch on a moldy apple.

Why are our eyes, and all of our senses, reliable guides? Most of us have a hunch: they tell us the truth. The real world, we assume, consists of cars and stairs and other objects in space and time. They exist even if no living creature observes them. Our senses are simply a window on this objective reality. Our senses do not, we assume, show us the whole truth of objective reality. Some objects are too small or too far away. On rare occasions our senses are even wrong—artists, psychologists, cinematographers, and others can cook up illusions that fool them. But normally our senses report the truths we need to navigate safely through life.

Why do our senses exist to reveal the truth? Again, we have a hunch: evolution. Those of our ancestors who saw reality more accurately had an advantage over those who saw it less accurately, especially in critical activities such as feeding, fighting, fleeing, and mating. As a result, they were more likely to pass on their genes, which coded for more accurate perceptions. We are the offspring of those who, in each generation, saw objective reality more accurately. Therefore, we can be confident that we see it accurately. Our hunch, in short, is that truer perceptions are fitter perceptions. Evolution weeds out untrue perceptions. That is why our perceptions are windows on objective reality.

These hunches are wrong. On the contrary, our perceptions of snakes and apples, and even of space and time, do not reveal objective reality. The problem is not that our perceptions are wrong about this or that detail. It’s that the very language of objects in space and time is simply the wrong language to describe objective reality. This is not a hunch. It is a theorem of evolution by natural selection that wallops our hunches.

The idea that our perceptions mislead us about objective reality, in whole or in part, has a long history. Democritus, around 400 BCE, famously claimed that our perceptions of hot, cold, sweet, bitter, and color are conventions, not reality.[1] A few decades later, Plato likened our perceptions and conceptions to flickering shadows cast on the walls of a cave by an unseen reality.[2] Philosophers ever since have debated the relation between perception and reality. The theory of evolution injects new rigor into this debate.

How can our senses be useful—how can they keep us alive—if they don’t tell us the truth about objective reality? A metaphor can help our intuitions. Suppose you’re writing an email, and the icon for its file is blue, rectangular, and in the center of your desktop. Does this mean that the file itself is blue, rectangular, and in the center of your computer? Of course not. The color of the icon is not the color of the file. Files have no color. The shape and position of the icon are not the true shape and position of the file. In fact, the language of shape, position, and color cannot describe computer files.

The purpose of a desktop interface is not to show you the “truth” of the computer—where “truth,” in this metaphor, refers to circuits, voltages, and layers of software. Rather, the purpose of an interface is to hide the “truth” and to show simple graphics that help you perform useful tasks such as crafting emails and editing photos. If you had to toggle voltages to craft an email, your friends would never hear from you. That is what evolution has done. It has endowed us with senses that hide the truth and display the simple icons we need to survive long enough to raise offspring. Space, as you perceive it when you look around, is just your desktop—a 3D desktop. Apples, snakes, and other physical objects are simply icons in your 3D desktop. These icons are useful, in part, because they hide the complex truth about objective reality. Your senses have evolved to give you what you need. You may want truth, but you don’t need truth. Perceiving truth would drive our species extinct. You need simple icons that show you how to act to stay alive. Perception is not a window on objective reality. It is an interface that hides objective reality behind a veil of helpful icons.

“But,” you ask, “if that speeding Maserati is just an icon of your interface, why don’t you leap in front of it? After you

die, then we'll have proof that a car is not just an icon. It's real and it really can kill."

I wouldn't leap in front of a speeding car for the same reason I wouldn't carelessly drag my blue icon to the trashcan. Not because I take the icon literally—the file is not blue. But I do take it seriously: if I drag the icon to the trashcan, I could lose my work.

And that is the point. Evolution has shaped our senses to keep us alive. We have to take them seriously: if you see a speeding Maserati, don't leap in front of it; if you see a moldy apple, don't eat it. But it is a mistake of logic to assume that if we must take our senses seriously then we are required—or even entitled—to take them literally.

I take my perceptions seriously, but not literally. Evolution hid objective reality and endowed us instead with an interface of objects in space and time.

Conscious Experience

The greatest unsolved mystery in science is your experience of the taste of dark chocolate, the smell of crushed garlic, the blare of a trumpet, the sensual feel of plush velvet, the sight of a red apple. Neuroscientists have found many correlations between such conscious experiences and brain activity. They have discovered that our consciousness can be split in half with a scalpel, and the two halves can have different personalities, with different likes, dislikes, and religious beliefs: one half can be an atheist while the other believes in God. But, despite all this data, we still have no plausible story about how brain activity might generate a conscious experience. This stunning failure suggests that we have made a false assumption. Hunting for a culprit led me to look more closely at how our senses are shaped by natural selection.

A clear example of this shaping is our sense of beauty as seen through the lens of evolution. When you glance at another person, you immediately and unconsciously pick up dozens of sensory clues, and run them through a sophisticated algorithm, forged by evolution, that decides one thing: reproductive potential—the likelihood that this person could successfully raise offspring. Your algorithm, in a fraction of a second, summarizes its complex analysis with a simple feeling ranging from hot to not. Men are attracted to women with larger eyes that have larger irises, larger pupils, slightly bluish scleras (the whites of the eyes), and distinctive limbal rings—the dark border between the iris and the sclera. What women want is more complex, and it's a fascinating story that needs to be examined more closely.

Many experts in evolution and neuroscience claim that our senses evolved to report truths about objective reality. Not the full spectrum of truth —just what we need to raise kids. A decade before his death, I exchanged a series of letters with Francis Crick, who discovered, along with James Watson, the structure of DNA. He argued that our perceptions match reality, and that the sun existed before anyone saw it. In his classic book *Vision*, David Marr, a professor at MIT who combined insights from neuroscience and artificial intelligence to transform the study of human vision, contends that we evolved to see a true description of objective reality. Marr was my doctoral advisor until his death at age thirty-five; he influenced my early ideas, and those of the entire field, on this topic. Then we have Robert Trivers, an insightful evolutionary theorist who maintains that our senses evolved to give us an accurate view of reality. Philosophers have long wondered, "Can we trust our senses to tell us truths about reality?" Many brilliant scientists answer, "Yes."

Now let's look at the case for "No." The startling "Fitness-Beats-Truth" (FBT) theorem states that evolution by natural selection does not favor true perceptions—it routinely drives them to extinction. Instead, natural selection favors perceptions that hide the truth and guide useful action. The new field of evolutionary game theory allows Darwin's ideas to be transformed into precise mathematics that lead to this shocking theorem. Computer simulations of evolutionary games confirm the predictions of the FBT theorem. Further confirmation comes from simulations of genetic algorithms, in which perceptions and actions coevolve.

The FBT theorem tells us that the language of our perceptions—including space, time, shape, hue, saturation, brightness, texture, taste, sound, smell, and motion—cannot describe reality as it is when no one looks. It's not simply that this or that perception is wrong. It's that none of our perceptions, being couched in this language, could possibly be right.

At this point, our intuitions falter: How could our senses be useful if they don't report the truth? Space, time, and physical objects are not objective reality. They are simply the virtual world delivered by our senses to help us play the game of life.

"Well," you might say, "if you claim that space, time, and objects are not objective reality, then you are straying into the turf of physics, and physicists will be happy to set you straight." Eminent physicists admit that space, time, and objects are not fundamental; they're rubbing their chins red trying to divine what might replace them. Some say that spacetime—a union of space and time required by Einstein's theories of relativity—is doomed. They say that it is a hologram, made out of bits of information. Others say that reality differs from one observer to another, or that the history of the universe is not fixed but depends on what is observed now. Physics and evolution point to the same conclusion: spacetime and objects are not foundational. Something else is more fundamental, and spacetime emerges from it.

Spacetime as a Data Format

If spacetime is not a foundational, preexisting stage on which the drama of the universe unfolds, then what is it? What if spacetime is just a data format—much like data structures in your mobile device—that serves to keep us alive. Our senses report fitness, and an error in this report could ruin your life. So our senses use "error-correcting codes" to detect and correct errors. Spacetime is just a format our senses use to report fitness payoffs and to correct errors in these reports.

Let's look at color. From the refreshing blue of clear skies to the vibrant green of spring grasses, our rich world of light and color is a welcome gift, compliments of four kinds of

photoreceptors in the eye. But *Arabidopsis thaliana*, a small weed that looks like wild mustard, has eleven kinds of photoreceptors.[3] The lowly cyanobacterium, which has colonized the earth for at least two billion years, boasts twenty seven.[4] It turns out that color is a code for messages about fitness used by many species, a code that excels at compressing data much as you might compress a photo before texting it to a friend. Colors can trigger emotions and memories that enhance our fitness by guiding our actions. Corporations harness the power of color as a tool for branding, and will go to great lengths to defend a color as intellectual property. But, as potent and evocative as color may be, "chromatures," which are textured colors, prove far more versatile and powerful than colors alone, and for good evolutionary reasons. Chromatures can be designed to trigger specific emotions and associations. If you understand our codes for fitness, then you can intelligently hack them for your benefit.

But evolution is not done with our sensory codes for fitness. It still experiments with novel interfaces for our enterprising species. Four percent of us are "synesthetes" who perceive a world that differs from the norm. Like Michael Watson, who felt with his hands what he tasted with his mouth: when he tasted spearmint he felt tall, cold columns of glass; angostura bitters feel like "a scraggly basket of hanging ivy." Each taste had its own 3D object, which he created in the moment of taste and destroyed when he stopped tasting. Some synesthetes see a unique color for each number, letter, day of the week, or month of the year—and excel at discerning colors.

Perception may seem effortless, but in fact it requires considerable energy. Each precious calorie you burn on perception is a calorie you must find and take from its owner—perhaps a potato or an irate wildebeest. Calories can be difficult and dangerous to procure, so evolution has shaped our senses to be misers. One consequence is that vision cuts corners: You see sharp detail only within a small circular window, whose radius is the width of your thumb held at arm's length. If you close one eye and hold out your thumb, you can see just how tiny it is. We think we see the whole field of vision in great detail, but we've been duped: each place we look falls into that small window of sharp detail, so we mistakenly assume that we see everything in detail. Only within that small window does your sensory interface construct a detailed report of fitness payoffs. That crucial report is formatted as the shape, color, texture, motion, and identity of a physical object. You create a suitable object—your description of payoffs—with a glance. You destroy it and create another with your next glance. Your wide field of vision guides your eyes to attend where there are vital payoffs to report, and thus an object to create.

If our senses hide reality behind an interface, then what is that reality? I don't know. Could conscious experiences be fundamental? When you look at yourself in a mirror you see skin, hair, eyes, lips, and the expression of your face. But you know that hidden behind your face is a far richer world: your dreams, fears, politics, love of music, taste in literature, love of family, and experiences of colors, smells, sounds, tastes, and touches. The face you see is just an interface. Behind it is the vibrant world of your experiences, choices, and actions.

Perhaps the universe itself is a massive social network of conscious agents that experience, decide, and act. If so, consciousness does not arise from matter. Instead, matter and spacetime arise from consciousness as a perceptual interface.

I offer you the red pill.[5] If you can accept that the technology of virtual reality will one day create for you a compelling experience that is nothing like your experience when you take off the headset, then why be so certain that, when you remove the headset, you're seeing reality as it is? It's time to take off the "headset" you didn't know you were wearing all along.

This article was excerpted with permission from The Case Against Reality: Why Evolution Hid the Truth from Our Eyes, *published by W. W. Norton & Company, 2019.*

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Andrew May

A Phenomenon Called Steve: A Discovery for Citizen Science

Amateur photographers and "citizen scientists" had known about it for years, and they gave it the suitably proletarian name of Steve. It was the most exciting development in atmospheric physics for decades, yet mainstream researchers were the last to hear about it.

"Citizen science" is a relatively new term, but the basic concept—enthusiastic amateurs supplying data and observations to the formal scientific community—goes back a long way, particularly in aesthetically attractive fields like natural history and astronomy. The change in recent years has simply been one of scale. In today's connected world of apps and social media, millions of people around the world can make valuable contributions through initiatives like iNaturalist, Galaxy Zoo, and Planet Hunters.

Less well known—unless you happen to live more than 60 degrees north—is Aurorasaurus, a NASA and NSF-funded project to collect and analyze sightings of the aurora borealis by the general public. One of the most spectacular and enthralling sights on the planet, the aurora is archetypal citizen science material. It's scientifically important, too, because the visual display is caused by the interaction of fast-moving electrons ejected from the Sun—the solar wind—with the Earth's upper atmosphere, and a bad solar storm can disrupt electronic communications. Fortunately, the Earth is protected most of the time by its magnetic field—except near the poles where the field emerges, allowing solar electrons to stream in and create auroras.

One characteristic that distinguishes Steve is its mauve hues, which are different from the typically green, purple, blue and yellow beams of auroras. Mauve streaks are caused by the heating of charged particles higher up in the atmosphere, similar to what causes light bulbs to glow. (May 6, 2018) © Alan Dyer/ Amazingsky.com

So the mechanics of auroras are well understood. That's fine in the context of citizen science, where the aim is to amass large quantities of data for professional scientists who don't have the time or resources to collect the data themselves. If they're lucky, the citizen scientists might discover an unknown species of butterfly, or a previously uncharted comet—but that's not "new science," just an incremental addition to well-understood science. It would be the same if the aurora enthusiasts had discovered a new form of aurora. But that's not what happened with Steve, because it isn't an aurora at all. It isn't created by solar wind particles impinging on the atmosphere. What the citizen scientists discovered was a brand new, hitherto totally unsuspected phenomenon.

Enter Steve

Central to the Steve story is the contrast between the amateur and professional approaches to science. If you take astronomy, for example, amateurs tend to focus on the way celestial objects—planets, galaxies or whatever—look, while professional scientists are more interested in understanding how these things work. It's the same with auroras.

Typical of academic aurora scientists—and one of the chief protagonists of our story—is Eric Donovan, an associate professor at the University of Calgary's department of physics and astronomy. For the last 20 years he's been using an array of cameras across Canada to photograph auroras. But he's not interested in the images per se, or even auroras per se, so much as what they can tell him about the Earth's otherwise invisible magnetosphere. As important as this work is scientifically, it's hardly glamorous from an outsider's point of view—a fact Donovan freely admits. "Unless you're interested in something like how pitch angle diffusion of 10 keV electrons by lower band chorus near the inner edge of the plasma sheet causes patchy pulsating auroras," he says, "then what I do is not very interesting."[1]

The turning point came in early 2016, when the Calgary scientists hosted a talk by the creator of the Aurorasaurus citizen science program, Liz MacDonald of NASA's Goddard Space Flight Center. To Donovan's surprise, the talk was attended by dozens of people he'd never seen before, who

turned out to be members of a local Facebook group called the Alberta Aurora Chasers. They may never have heard of him, but they'd certainly heard of Liz MacDonald, who is something of a folk-hero in the amateur aurora-following community.

After the talk, the group showed Donovan some of their aurora photographs. Belying their "amateur" status, these were of stunning quality—decidedly more beautiful than the images from Donovan's own cameras, he admitted. Then one of the amateur photographers, Neil Zeller, happened to say "I took a picture of a proton arc last night." This was no big deal for him—it was a sight the group had been photographing for years, and they always called it a proton arc. What they meant was an aurora caused, not by electrons from the Sun, but by protons.

"No, you didn't," Donovan replied, even before he'd seen the picture. His rationale was that everyone in the scientific community "knew" that proton auroras were much too faint to be visible. This sounds like the kind of blinkered dogmatism that mainstream scientists are often accused of, where they refuse to look at concrete evidence because it conflicts with an established theory. Donovan, however, did look at the evidence—but it didn't change his view. This wasn't a proton aurora, or any other kind of aurora. It was something much more interesting than that.

An aurora is a wispy, shimmering curtain of light—often red or green—seen in the far north. The thing the amateur enthusiasts had been calling a proton arc was a thin band of light, pink or purple in color, stretching across the sky from east to west. Sometimes, but not always, it was accompanied by a more typical green "picket-fence" aurora. Most significantly, both these phenomena occurred further south than an aurora had any right to be. They could be seen high in the sky as far south as Calgary or London (both around 51 degrees latitude).

For Eric Donovan, it was an exciting moment. "I didn't know what it was, but I knew it wasn't a proton aurora," he says. "This was fundamentally different from any phenomenon I had ever seen before in the night sky."

If Donovan, as an expert in upper atmospheric physics, didn't know what the photographs showed, then he was pretty sure no one else in the scientific community knew either. He did know one thing, however. There was no way the aurora chasers could go on calling this thing a proton arc, because it simply wasn't one. He told them to think up a new name.

A week later, a post appeared on the Alberta Aurora Chasers Facebook page from one of the members, Chris Ratzlaff, saying "Why don't we call it Steve?" This may sound pretty arbitrary, but there was a rationale behind it. As Donovan explains, "The reason why he suggested we call it Steve has to do with a children's movie called *Over the Hedge*, where these animals wake up after hibernating and find the hedge. They're scared of it, they don't know what it is, but if they call it Steve it's a little bit less scary."

Steve the atmospheric phenomenon may not have been particularly scary, but it was certainly mysterious. Donovan was determined to uncover its secrets. As spectacular as the amateur photographs were, they only contained a limited amount of information. The data from Donovan's scientific instruments potentially held more clues, but he wasn't sure exactly what he was looking for. So he and his team spent hours scouring the data for hints of Steve. "We found this signature," Donovan says, "this ethereal luminous feature that we thought was promising."

The green "picket-fence" aurora that sometimes accompanies the Steve phenomenon. (September 2, 2016)

Donovan's plan was to wait for another night when this particular signature cropped up in his data, and then see if anyone spotted Steve that night. The plan worked like a dream. Just a few weeks later, he spotted the telltale signature from a camera in Saskatchewan—and at exactly the same time one of the aurora chasers, Song Despins, snapped a photograph of Steve over Vimy, Alberta.

Donovan's luck didn't end there. A European Space Agency satellite—one of three, called Swarm, designed to monitor the Earth's magnetic field—happened to fly right through the area at just that moment. It provided the strongest clue yet as to the true nature of Steve. As Donovan explains, "It corresponds to a river of very fast moving gas that's moving at 7 kilometers per second from east to west, and it extends all the way from Hudson Bay in this instance all the way over to Alaska. If you were to look at this from space it would look like someone had reached in with a purple felt pen and drawn a line on the globe thousands of kilometers from east to west."

In just a few months, the scientific community had gone from being blissfully unaware of Steve's existence—despite the fact that amateur enthusiasts had photographed it for years—to

having a reasonably complete physical description of it. "This was a revolution from my perspective," Donovan says. "This represents the fact that we are in a fundamentally new era—enabled by this information technology explosion—but the new thing and the fundamentally different thing is the social media connection between these truly phenomenally talented amateur watchers of nature and scientists who tend to focus on things that we already know are there."

Belatedly, Steve was added to the list of things scientists "already know are there." They knew what it looked like, they knew where it appeared, they knew what it was composed of. But there was another crucial question they still needed to answer: what causes it?

From Steve to STEVE

It wasn't until March 2018 that scientists felt the phenomenon was sufficiently well understood to publish a "discovery paper" on it, in the journal *Science Advances*. Like most such papers, it has a long string of authors, led by Liz MacDonald and Eric Donovan—and including, further down the list, a couple of members of the Alberta Aurora Chasers. The paper's title doesn't mince words about their contribution either. It's called "New Science in Plain Sight: Citizen Scientists Lead to the Discovery of Optical Structure in the Upper Atmosphere."

By this point, a link had been made with a previously postulated, but unobserved, phenomenon called sub-auroral ion drift (SAID). "Sub-auroral" means occurring at lower latitudes (not lower altitudes) than conventional auroras, while "drift" is something of an understatement, given that the speeds involved can reach several kilometers per second. Quoting from the paper itself:

> Observations from the Swarm satellite as it crossed the arc have revealed an unusual level of electron temperature enhancement and density depletion, along with a strong westward ion flow, indicating that a pronounced sub-auroral ion drift (SAID) is associated with this structure. These early results suggest the arc is an optical manifestation of SAID, presenting new opportunities for investigation of the dynamic SAID signatures from the ground. On the basis of the measured ion properties and original citizen science name, we propose to identify this arc as a Strong Thermal Emission Velocity Enhancement (STEVE).[2]

Actually, that metamorphosis of Steve into a more respectable-looking acronym wasn't new. As early as December 2016, at a meeting of the American Geophysical Union, Eric Donovan suggested Steve needed a "backronym." It was a member of the audience on that occasion, Robert Lysak of the University of Minnesota, who suggested "Strong Thermal Emission Velocity Enhancement."

A second study, led by Toshi Nishimura of Boston University and published in April 2019, clarified the situation still further by delving into several years' worth of data collected by various satellites. One of the study's key findings—which helps explain why STEVE was overlooked for so many years—is that the green picket-fence feature commonly associated with it really is "just an aurora." STEVE, on the other hand, is a separate phenomenon caused by different physical processes.

As one of the study's co-authors, Bea Gallardo-Lacourt—a member of Eric Donovan's team in Calgary—explains, "Auroras are defined by particle precipitation—electrons and protons actually falling into our atmosphere—whereas the STEVE atmospheric glow comes from heating without particle precipitation. The precipitating electrons that cause the green picket fence *are* an aurora—though this occurs outside the auroral zone, so it's indeed unique."[3]

The Nishimura paper also makes the point that, as fascinating as STEVE is to academics—and as alluring as it is to photographers—it has a solid practical value too. By helping scientists understand the movement of charged particles in the upper atmosphere, it casts light on the way disturbances in this region can interfere with radio communication and degrade GPS signals. As with STEVE's original discovery, this insight won't come from the academic community alone. Quoting Nishimura, "As commercial cameras become more sensitive, and increased excitement about the aurora spreads via social media, citizen scientists can act as a mobile sensor network, and we are grateful to them for giving us data to analyze."

Bea Gallardo-Lacourt also acknowledges the value of amateur contributions. "Although scientists are doing the research for STEVE, this really is a discovery by the photographers," she says. "For me, this is the most romantic way of doing science."[4]

Was it there all along?

Back in 2018, when the first academic papers were appearing on the subject of STEVE, Gallardo-Lacourt remarked that "Right now, we know very little about it. And that's the cool thing, because this has been known by photographers for decades. But for the scientists, it's completely unknown."[5]

This raises an interesting issue. It seems inconceivable that STEVE is a newly evolved phenomenon, even in the few decades that amateur enthusiasts have been photographing it. Surely—like the aurora itself—it must have been around since time immemorial? This thought prompted a group of researchers, led by Mark Bailey of the Armagh Planetarium, to scour a variety of historical records for sightings that might retrospectively be identified as STEVE. In the resulting paper, published in the journal *The Observatory* in October 2018, they write: "Some previously unidentified atmospheric, meteoric or auroral 'anomalies' can now be recognized as examples of STEVE, and therefore as part of a broad spectrum of occasional auroral features that may appear well below the region of magnetic latitudes represented by the traditional auroral oval. This highlights the contributions of 'citizen scientists' dating back hundreds of years."[6]

In all, the paper lists over 50 observations, from antiquity to the early 20th century, that might, with varying degrees of certainty, be ascribed to STEVE. Here are just a few examples:

- England, March 1717: "Around 11 pm, a long, narrow streak of light extending east and west, initially shining very bright but fading after 8 or 9 minutes."

- Eastern USA, March 1781: "Auroral arch stretching from nearly due east toward the west-north-west."
- England, March 1847: "A brilliant band of light suddenly appeared, extending from the western horizon upwards across the zenith to at least 20 or 30 degrees beyond."
- Ontario, Canada, August 1916: "Immense arc or ribbon of light."

These reports, from the last few centuries, were made by amateur astronomers in relatively sober scientific terms. Going back to pre-scientific times, the language becomes more fanciful. Here are two examples from 12th century England: "A flying fire from the east toward the west, like no small city" (1101) and "A light shone from east to west ... some affirmed they saw a fiery dragon at the same hour with a crisped head" (1177). And one from Italy, from as far back as 204 BC: "At Setia a torch was seen to be stretched out from the east to the west."

Such accounts are reminiscent of the lists of strange things seen in the sky complied by Charles Fort—the 20th century's notorious "prophet of the unexplained." Yet with the benefit of hindsight, it's possible to see how they might be garbled descriptions of STEVE. It leads one to wonder how many other anomalous sightings have perfectly natural explanations just waiting to be found—by citizen scientists if not by mainstream science itself.

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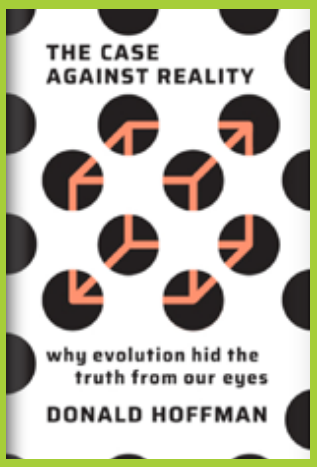

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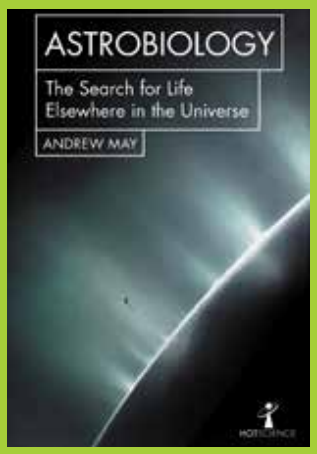
By Donald Hoffman
W.W. Norton & Company, 2019



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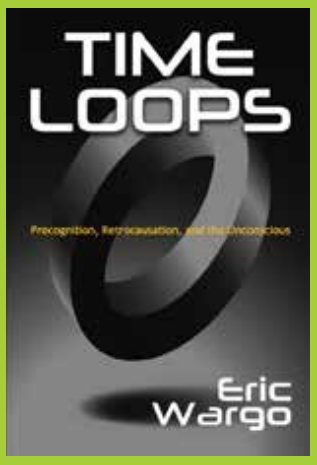

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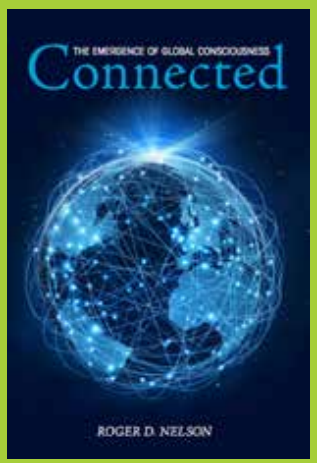

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Eric Wargo

Pat Price, Precognition, and "Star Wars"

A Reexamination of a Historic Remote Viewing Case

Baikal-1 reactor facility, Semipalatinsk Test Site, Kazakhstan. Credit: Institute of Radiation Safety and Ecology[1]

Remote viewing is the purported ability to describe or draw locations or objects that are at a distance in space or time, or otherwise hidden from the senses.[2] It was formalized in the 1970s by government- and privately funded researchers at Stanford Research Institute (SRI) in Menlo Park, as a means of gathering potentially useful information, especially for intelligence purposes. Over the course of several years beginning in 1972, SRI researchers Hal Puthoff and Russell Targ, working initially with psychic artist Ingo Swann and then a growing roster of other trained individuals, amassed considerable experimental evidence for remote viewing and developed methods to teach the skill to ordinary people.[3] However, theoretical questions—namely, how does it work?—were never adequately answered.

It has always been natural to think of remote viewing as a variant of the classic ESP modality clairvoyance, which had been studied by J.B. Rhine at Duke University beginning in the 1930s in experimental tasks using hidden cards or drawings as targets. Remote viewers emphasize that, despite the term "viewing," impressions may not always or only come to them visually but may involve other senses, feelings, and so on, and indeed may be idiosyncratic to the individual remote viewer.[4] The less intuitive possibility that remote viewing may involve—or actually be—precognition of information the psychic will come to learn in the future, for instance in the form of feedback after a task, has always lingered in discussions of its possible mechanisms.[5]

Evidence for precognition and its variant, presentiment ("future feeling"), is robust and clear across many types of studies[6]; and with other ostensible forms of ESP like clairvoyance or telepathy, there is frequently no way to rule out precognition. There is almost always, as Edwin May and Sonali Bhatt Marwaha put it, an "answer book" ahead in the ostensible clairvoyant's or telepath's future.[7] Small studies by the SRI researchers even suggested that feedback was important if not essential to remote viewing performance.[8] May and Marwaha have lately argued that precognition is possibly the only form of psi, able to explain telepathy, clairvoyance, micro-PK, and even survival evidence.[9]

Following his work at SRI, Russell Targ went on to write articles and several books about his experiences.[10] His writings are some of the most exciting and accessible introductions to the topic of remote viewing and the fascinating chapter of American ESP research that he played a central role in. In his books, he has repeatedly emphasized the important role played by feedback, at the very least in training ESP abilities.[11] However, Targ ultimately rejected the "precognition only" possibility, partly on the basis of one case he personally witnessed and that does *seem* at first glance very much to defy it. The case is Pat Price's 1974 remote viewing of a facility near Semipalatinsk, Kazakhstan, named Baikal-1, at the time designated by the CIA as URDF-3 (Unidentified Research and Development Facility 3) and by Air Force Intelligence as P-NUTS (for possible nuclear underground test site).

Pat Price

URDF-3 was the first operational remote viewing

assignment the CIA gave the laboratory at SRI, whose work it was secretly funding. It is frequently cited as one of the most compelling cases in the annals of remote viewing, because not only did Price nail the description of a very distinctive gantry crane at the secret facility thousands of miles across the globe, but he also allegedly described activity at the site—the creation of an enormous metal sphere—that appeared to be confirmed in an *Aviation Week & Space Technology* article published three years after the session and *two years after Price's death.* These unusual circumstances appeared to make it the perfect natural experiment capable of falsifying the precognition-only hypothesis, since as Targ argued, there was no way the remote viewer could ever have received feedback.[12]

The benefit of historical hindsight, as well as archival evidence that has lately come to light, present a more ambiguous—but in some ways even more interesting—picture of Pat Price's operational remote viewing of the Baikal-1 site in Kazakhstan. On the basis of a reexamination of evidence, including newly available session transcripts, I argue that this case does not falsify the precognition-only view but, if anything, supports it.

I begin, in Part 1, by taking a fresh look at what Price described during the four days of sessions: July 9, 10, 11, and 15, 1974. Then in Part 2, I place the famous *Aviation Week* article that supposedly confirmed Price's impressions within the larger context of the lead-up to Reagan's "Star Wars" program and the flawed intelligence that was used to justify that major defense boondoggle. In Part 3, I suggest that this fascinating episode of Cold War psychic espionage raises important questions about remote viewing as an intelligence-gathering tool, highlighting the potential for unwitting self-deception when we misunderstand—or are insufficiently precise about—the nature and mechanisms of ESP.

Part 1: Rashomon in Menlo Park

Pat Price's psychic exploits during the year he was at SRI are legendary. His 1973 accidental penetration (along with Swann) of the secret NSA facility at Sugar Grove, West Virginia, which got SRI in trouble with the intelligence community, is probably the most famous.[13] But like all legends, the stories have grown in the telling. The more you read about Price, his illustrious career as a remote viewer, and his untimely mysterious death while on a trip to Las Vegas, the more it calls to mind the classic Akira Kurosawa film *Rashomon*, about a fatal encounter between a samurai and a bandit on a lonely Japanese road, told differently at a trial by four different witnesses.[14] Each witness—the bandit, the samurai's wife, a woodsman who watched the incident from a safe distance, and the dead samurai's spirit (via a medium)—has a radically different account of what happened; it is hard to know whom to believe, since each witness has a distinct bias.

The Rashomon effect is particularly strong around Price's descriptions and drawings of the Baikal-1 site, made over the course of a week in July, 1974. It is most famous from published accounts by Targ, beginning with a 1996 *Journal of Scientific Exploration* (*JSE*) article, "Remote Viewing at Stanford Research Institute in the 1970s: A Memoir."[15] Targ could be called the First Witness in our Rashomon tale. Of those who have told their versions of the story at any length, he was the only true eyewitness, having been in the room with Price during most of the sessions. His story is also the most dramatic, painting a picture of Price as a true psychic superman, effortlessly journeying halfway around the planet to spy on a remote Soviet test site with his roving consciousness. (In *Do You See What I See?* Targ wrote of Price: "He is the only person I have ever known who functioned continuously day in and day out as an obvious psychic being."[16])

Yet even Targ acknowledges that Price was not psychically omniscient. His and Puthoff's initial reports of the Semipalatinsk assignment noted that the signal came amid noise.[17] The CIA contract monitor Ken Kress, who discussed Price in a retrospective assessment of his involvement in parapsychology for CIA house journal *Studies in Intelligence* in 1977—and who could be considered the Second Witness in our Rashomon tale—was more guarded in his assessment of Price's remote viewing, noting the preponderance of false or useless information despite one or two clearly impressive psychic hits, such as the famous crane.[18] Further doubts about Price crept in as the years passed. In a 1999 Postscript when republishing his article in *JSE*, Kress added that "It is a demonstrable fact that psychics could convince professional intelligence operators of the genuineness of their powers."[19] He worried that this could have biased him and his CIA colleagues when working with Price.

The Third Witness, whom even many aficionados of remote viewing lore will be less familiar with, was a Los Alamos physicist and expert on Semipalatinsk, "D. Stillman," who in 1975 provided the CIA with an independent review of the case materials. Of all the accounts, Stillman's now-declassified report is the most detailed by far, and also the most critical. He found little of real intelligence value in what Price described and drew over the four days of sessions, the crane notwithstanding. Were it not for that crane, in fact, it would almost seem as if Stillman was describing a completely different event than what Targ described.[20] (It is important to note that despite Stillman's ultimately low valuation of the exercise, he was not a knee-jerk psi skeptic: He admits his personal bias was in favor of remote viewing being real—because he himself badly wanted to know what was going on at Baikal-1.)

It may seem that Stillman is the witness at the greatest remove, having been limited to assessing hard-to-follow tapes and transcripts of the sessions over a year after they took place. However, Targ's most detailed accounts were written at a remove of more than two decades, and the famous malleability of memory may have played a distorting role in his recollections.

There is also a Fourth Witness: the deceased remote viewer himself—whose voice from the beyond, as it were, can now be "heard" in transcripts of the last two days of sessions that exist in the new "Archives of the Impossible" at Rice University in Houston.[21] Although not a complete record of "Project Atlas" (as the assignment was called by the SRI experimenters), these 79 pages of typed transcripts cover the most interesting and

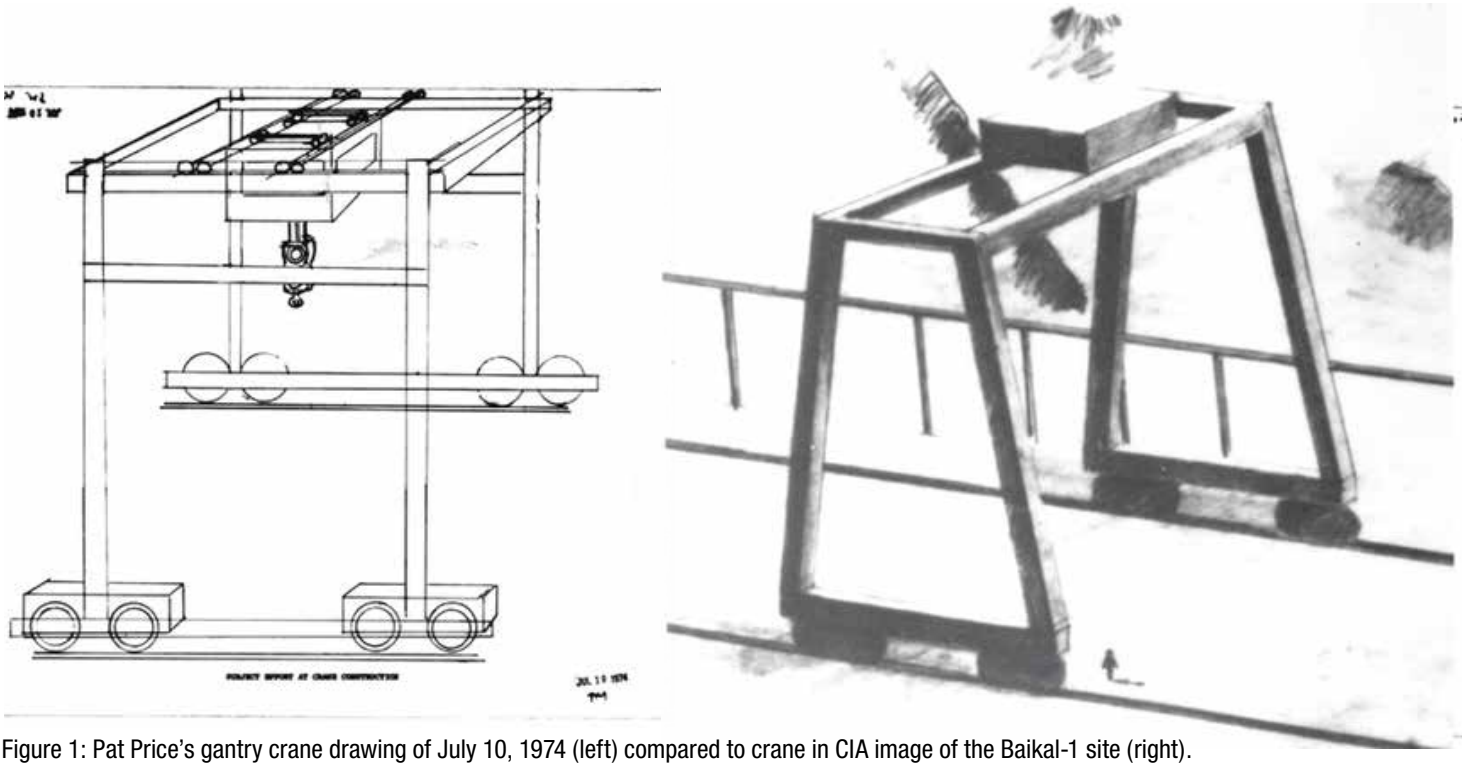


Figure 1: Pat Price's gantry crane drawing of July 10, 1974 (left) compared to crane in CIA image of the Baikal-1 site (right).

controversial portion, July 11 and 15, which includes the business of the sphere(s) supposedly later confirmed by the magazine article.[22] As we will see, this witness, while even more bold in his assessment of his own psychic abilities than Targ was, didn't see things quite the same as they have been portrayed by Targ. As in the film *Rashomon*, the dead man disagrees with all the other witnesses on key points of the story . . . yet in this case, the dead man also gives the impression of being the most unreliable of the four narrators.

The obvious place to begin our Rashomon tale is with what all four witnesses agree on . . . mostly: that "damned big crane."[23]

Targ's accounts will lead readers to believe that Price saw the crane immediately on the first day: "Armed with a slip of paper bearing the coordinates, Price and I climbed to the second floor of SRI's Radio Physics building and locked ourselves into a small electrically shielded room which we had been using for our experiments." Targ says that Price ritualistically polished his eyeglasses, closed his eyes, and fell silent for a minute; after cracking a joke, he described looking up at a huge gantry crane from the roof of a multistory building. "As I drift up in the air and look down, it seems to be riding on a track with one rail on each side of the building."[24]

Targ appears to have been condensing things in the interest of telling a good story. Stillman says both Puthoff and Targ sat with Price. The experimenters began by giving Price the coordinates along with the *Times of London World Atlas* and told him that the target was a "scientific military research and test area," and that it was a real as opposed to a sample target.[25] All the sources agree that this is all Targ and Puthoff knew about the target either, during this double-blind phase of the experiment. (Only Kress and his branch chief, who were at SRI but waiting elsewhere, knew the target's identity.) Price's first impression, according to Stillman, was not of a crane, but of rockets: "[T]hey (the Soviets) have done a lot of rocket launching and recovery out of that area."[26] He also described a complex with low-one-story, partially sunken buildings, a huge (500-foot-tall) antenna, and a large "swimming pool." The pool, whose dimensions Price gave as 60 feet by 150 feet, was, he said, used for "underwater testing and orientation studies."[27] He also described "a guy in a very peculiar type of helmet" and said he shifted his attention to cosmonauts then in orbit, to compare the helmets.[28]

Although Price's initial impression of low, partially sunken buildings did conform to what was known of the target from satellite images, most of the rest of his description, including the enormous antenna, the overall layout, and his claimed age of the facility (2-3 years—in reality it had been there over a decade) did not. Nor did the rockets and presumptive cosmonauts doing underwater training in a swimming pool. Yet among the descriptions of the site's structures, Price did briefly mention a few cranes, including a gantry crane for lifting heavy objects onto some low-boy trucks.[29] Stillman says that during a phone call that evening, Puthoff (evidently having conferred in the meanwhile with Kress) asked Price for more information on the crane.

Price claimed to roam the world psychically every night, and since night in California was daytime in Kazakhstan, it was thought that his nocturnal journeying could perhaps yield a better sense of activity at the target location.[30] The next day, July 10, Price was given a pencil and ruler, with which he made his famous drawing of a rail-mounted gantry crane (Fig. 1). He said he had greatly underestimated the crane's size the previous day.

This widely reproduced drawing, juxtaposed with a CIA

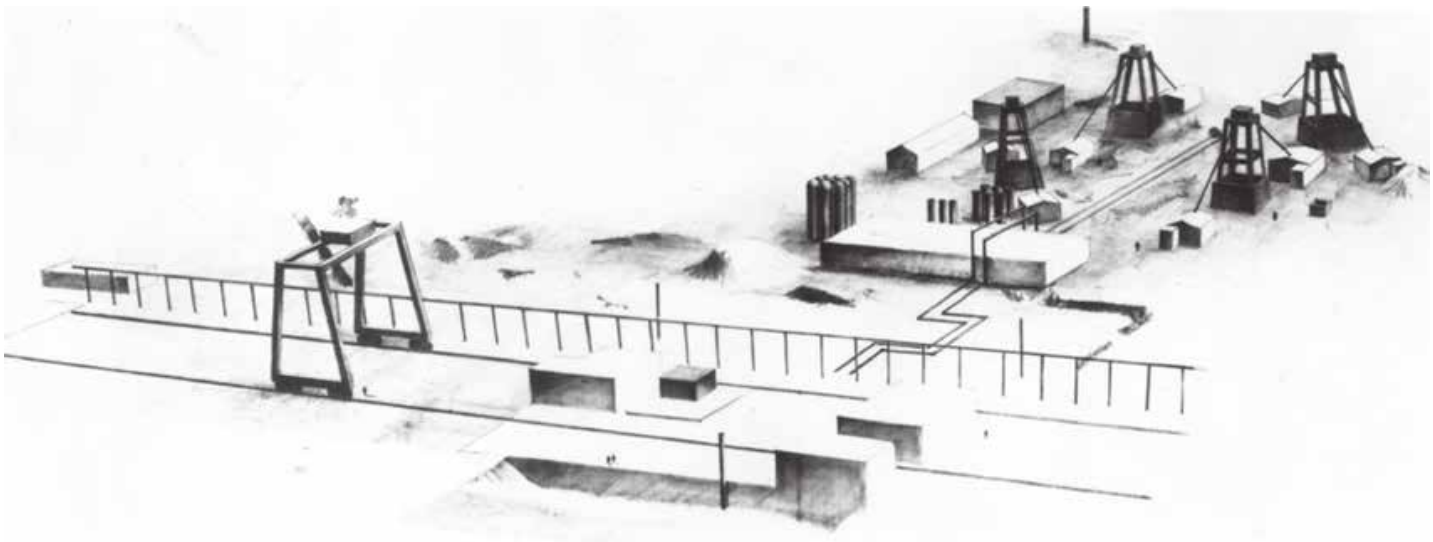


Figure 2: CIA drawing of Baikal-1 site made on the basis of satellite surveillance.

drawing of the target site (Fig. 2) made on the basis of satellite photos, has become part of the iconography of remote viewing. It also the most clear-cut "hit" over the four days of sessions. Price was cued to look for and describe a crane—and since the CIA already knew about it from their surveillance, he would naturally assume it was a big one[31]—but its shape and structure are highly distinctive, and all of the witnesses agree that his drawing is remarkable. Stillman writes:

> It seems inconceivable to imagine how [Price] could draw such a likeness to the actual crane at URDF-3 unless:
> 1) he actually saw it through remote viewing, or
> 2) he was informed of what to draw by someone knowledgeable of URDF-3.[32]

Stillman mentions possibility number 2 "because the experiment was not controlled to discount the possibility that Price could talk to other people—such as the Disinformation Section of the KGB." Stillman provisionally discounts that notion, however, "because it seems distasteful and unpopular." There is no evidence (that I am aware of) to suggest that Pat Price intentionally worked with the KGB.[33]

Although Kress reports that he and his branch chief had serious reservations given Price's failure to describe other distinctive features of the site, namely four derricks visible in the upper right of the CIA image, it was decided to proceed with phase 2 of the experiment on the basis of the crane.

The CIA ultimately was not interested in things it could already see from space. Targ writes in *The Reality of ESP* that after Price made his drawing they went straightaway to show Kress, who unrolled the famous drawing from satellite imagery and said "It looks like you're looking at the right place. Now can you tell us what they are doing in the building under the gantry crane? That's what we'd really like to know."[34] Again, no doubt in the interest of telling a rousing story, Targ's accounts here give a condensed version of what in reality appears to have been a more drawn-out, hit-and-miss process.

The transcripts show that the second, intelligence-gathering phase of the exercise, with Kress present to probe Price directly with the help of the CIA drawing, began after lunch on the third day, July 11—the day after he had made his drawing. Stillman has less to say about this session or the final one on July 15, both because he had trouble following the discussion from the transcripts he was sent (for instance, there was a lot of reference to maps and drawings he could not see) and because he was in less of a position to evaluate Price's impressions of machinery and activities not even the best American experts on the site knew about. But Kress, in his account, provides a suitably dramatic detail that evidently occurred before the tape recorder was turned on: He says he began by asking if Price knew who he was. Price correctly identified him—"Ken Kress…Works at CIA." It was a significant statement, given that Kress was a covert employee of the agency.[35] He also says that at this point, he asked Price to sign a secrecy agreement (making him "witting").

After the tape recorder was activated, Kress said "it looks like…you've gotten to the right place"[36] (just as Targ reported) and unrolled the CIA drawing showing the prominent crane in the foreground. (Note that this was an important source of feedback—something we'll come back to later.) After some discussion of the site's overall layout and its significant differences from what Price had drawn during the sessions thus far, Kress asked Price why he hadn't seen the four derricks. Price explained that only one was still standing—"Well, I'll tell you what, there's only one structure out here.… This is the one that's left. These [three] are not there."[37] Since the drawing was based on data that was a few months to a year old at that point, Kress could not argue the issue. But Stillman confirmed in his report that the four derricks were still intact at the time of the session and thus should have been visible. (They can be seen on the right side of the color panoramic photo on page 10.) This was thus a major "miss" from Stillman's point of view.

As Targ indicated, the CIA was especially interested in a large subterranean building that the crane tracks went directly over. Targ's condensed account suggests that Price obligingly descended into this building right after Kress pointed to its location on the CIA image. But both Stillman's version and the transcripts differ from Targ. Stillman records that Price never saw a crane going over any building; his crane went up to what Price described as a large multi-story building (which didn't actually exist) but not over it. And the transcript shows that Price still didn't see the subterranean building on July 11, even after being repeatedly cued to do so by Kress. Pointing to the CIA image, Kress asked the remote viewer about the four visible structures in the foreground along the crane tracks and whether they could be parts of a single underground structure. Price insisted that they were separate small buildings erected on a concrete apron with "nothing subterranean right in that particular area."[38]

For Stillman, this miss was even more important than the failure with the derricks, since it was known already that those structures were indeed parts of a single large subterranean building where the most interesting activity was probably occurring: "This description is the most negative evidence yet and tends to discredit Price's ability to remotely view URDF-3,"[39] he wrote.

Again, Stillman found little worth mentioning in the July 11 and 15 sessions—just wide-ranging and scattershot impressions about heavy machinery, none of which corresponded to anything verifiable. His bottom-line assessment was that: "After careful analysis of all the data presented, I have concluded that Price's remote-viewing experiment of URDF-3 was unsuccessful."[40] The earliest report by Targ and Puthoff, "Perceptual Augmentation Techniques (Final Report)," mentions that "a number of specific large structural elements were correctly described" (namely the crane) but acknowledges that there was "noise along with the signal."[41]

And that is where matters might have remained but for a dramatic development three years after the sessions that was taken by Targ, Puthoff, Kress, and evidently others in the intelligence community as evidence that Price's descriptions of Semipalatinsk were closer to the mark than had previously been thought.

Price died exactly a year after his remote viewing of Semipalatinsk, on July 14, 1975. Two years after that, in the main feature of the May 2, 1977 issue *Aviation Week & Space Technology*, "Soviets Push for Beam Weapon," the magazine's Military Editor Clarence A. Robertson, Jr. described Semipalatinsk as a site where the Soviets were probably developing charged particle beam technology, which would involve the capture of energy from small nuclear explosions inside huge steel spheres:

> In a nearby building, huge, extremely thick steel gores were manufactured. The building has since been removed. These steel segments were parts of a large sphere estimated to be about 18 meters (57.8 ft.) in diameter. Enough gores for two complete spheres were constructed. U.S. officials believe the spheres are needed to capture and store energy from nuclear-driven explosives or pulse-power generators. The steel gores are believed by some officials to be among the earliest clues as to what might be taking place at the facility.[42]

In his 1996 *JSE* article, and then subsequently in books, Targ recalled that after Kress asked Price about activities in the large subterranean building, the remote viewer "described a large interior room and said, 'There's a lot of activity. They're trying to make a giant steel sphere. It looks like it's going to be about sixty feet in diameter. They are making it out of 'gores' . . . like sections of an orange peel."[43] It would indeed be an astonishing correspondence to the magazine article, if Targ's recollection were accurate. Targ also recalled that Price said the engineers were having difficulty: "[T]hey were having trouble welding it all together, because the pieces were warping. Price said that they were looking for a lower-temperature welding material."[44] Said welding troubles appeared to be confirmed by the *Aviation Week* article:

> Initially, some U.S. physicists believed there was no method the Soviets could use to weld together the steel gores of the spheres to provide a vessel strong enough to withstand pressures likely to occur in the nuclear explosive fission process, particularly when the steel to be welded was extremely thick. U.S. officials later discovered that the Russians invented a process called flux welding and had been using it for years in producing pressure spheres. The flux welding process, according to some U.S. officials, makes the bonded material weld as strong as, or stronger than, the steel walls.[45]

For Targ, Price's psychic impressions corresponding to what was in *Aviation Week* three years later provided clear evidence that the remote viewer was actually seeing the site in real time. Since Price died before that article came out, Targ believed there was no possibility of Price ever receiving feedback about spheres, "gores," or the difficulties the Soviets were having welding these metal segments together.[46]

However, these spheres and gores carry us even farther into Rashomon territory, because the transcripts tell a very different story from what Targ recalled in his accounts—which were, remember, written over two decades after the sessions.

Much of the discussion on July 11, after Kress showed Price the CIA image, centered on Price's process with remote viewing and his attempts to reconcile what Kress's image showed with the things he had described and drawn over the previous two days. He also described boilers, forges, a compressor, 8-foot tanks, furnaces, and preparations being made in and around the aforementioned pool to receive a piece of heavy equipment being constructed in a large interior room. In that room he described "a lot of activity"[47] (as Targ recalled) . . . but the activity was not the creation of a sphere.

The room in question seemed to Price like an iron foundry, and the dominant thing in the room was an

enormous—60-foot-long—impeller turbine hanging from a crane and being carefully balanced at either end with weights. Over the course of that afternoon and the final session on July 15, Price repeatedly described this giant impeller with a big stator unit being assembled in that large interior building as the major focus of activity. He felt it was designed to capture and transmit some kind of hot vapor or steam. He told Kress and the experimenters that there was already another similar impeller unit operational on another part of the site.

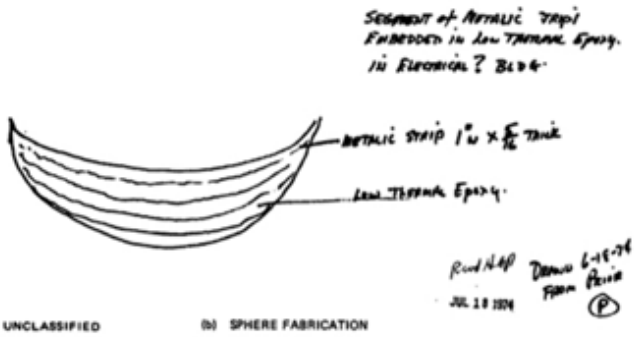
These turbines corresponded to nothing known or suspected to exist at the Baikal-1 facility. However, amid these discussions, Price did describe, late in the afternoon on July 11, a smaller "electrical building"—one of the small visible portions of the subterranean building under the tracks—where he said wires were being carefully laid into the inside surface of orange-peel-like fiberglass sections—he called them "segments" and "wedges," not "gores"—using epoxy:

> They're building some segments in there, and they look like a segment of an orange. They're in a fiberglass housing, and they're laying in electrical wires and like an epoxy. You lay them in and then the epoxy gets built up and they lay more in. They're wedge-shaped—just like taking a segment out of an orange.[48]

Price described the "wires" as flat strips, 1" wide and 5/16" thick; those same dimensions are also hand-noted next to the drawing of the segments (Fig. 3) that is commonly reproduced as evidence of Price's accuracy.[49] Importantly, neither in the transcripts nor in that drawing does Price ever state the dimensions of the wedges themselves or of the finished product. There is no sense, nor even possibility, that they are as big as the 60-foot impeller. Price never uses the word "sphere" either, even though such a shape is implied.

In other words, it very much appears that in his recollections, Targ conflated the implicitly spherical objects Price briefly mentioned being assembled from orange-peel-like segments in the electrical building with the 60-foot turbine and associated mechanical energy-transmission system that was the dominant theme of Price's descriptions.

Another thing Price does not mention is any difficulty assembling the orange-peel-like segments into a sphere, let



(U) DETAIL GENERATED BY REMOTE VIEWER ON CYLINDER CLUSTER AND GORES FOR SPHERE FABRICATION

Figure 3: Pat Price's drawing of segments used for fabricating spheres.

alone anything about low-temperature welding material.[50] Next to the drawing, however, along with the dimensions of the strips, is handwritten "Segment of Metallic Strips Embedded in Low Thermal Epoxy in Electrical ? Bldg." Epoxy resins are commonly used in electronics to bond printed circuits and transistors to a substrate such as fiberglass. "Low thermal epoxy" probably refers to an industrial epoxy with a low coefficient of thermal expansion that can withstand high temperature stresses . . . but it is impossible to imagine an epoxy withstanding the stresses of nuclear fission. It seems possible that Targ may have misremembered "low thermal epoxy" (used for attaching metal strips to the inner surface of the sections) as "lower-temperature welding material" (for welding them together).

Price's description of the spheres did converge slightly on what Targ later described and what appeared in *Aviation Week*, however. In the fourth and final session on July 15, Puthoff appears to have sat with Price alone, and while most of the discussion focused on other matters such as the site's security fence and the purpose of the impeller, Price modified his description of the objects being assembled in the electrical building as the creation of powerful bombs:

> Okay, the wedge shaped pieces that originally I felt were an electrical application are in fact enriched material laid in in a particular pattern fit together sequentially in segments. That goes together and in fact does make a bomb.[51]

He also changed his mind about their composition, now describing the material of the segments as steel or titanium (instead of fiberglass), and the enriched-material strips as giving off a "green haze" (he had originally thought they were just copper). He indicates that the segments were cast in the site's foundry, which contains "rolling equipment, drop forging, die stamping…"[52] He also says "they have a logistical problem bringing in raw materials . . . certain types of metal, various iron ores and other components that are coming off the southern Urals …"[53] But there is still no mention of the thickness of the metal segments or of any problems in welding the segments together.[54]

Without being able to listen to tapes of the first two days' sessions, there remains the possibility that Targ's recollection of a 60-foot sphere was drawn from something Price mentioned on those days. In Stillman's lengthy summary and analysis of those sessions, he notes that at times only one of the experimenters was heard, communicating by phone with Price inaudible at the other end. However, Stillman never mentions any conversation about a sphere, and Price was never asked to elaborate about the construction of a large metal sphere in the 79 pages of transcripts covering the July 11 and 15 sessions. If Targ's chronology is right—that Price described the sphere construction *after* being prompted by Kress about activities within the buildings—then it would have had to be on July 11, when Kress was present.

Again, it seems very much that the implicitly spherical bombs being assembled in the electronics building are what

Targ was remembering, and that in his recollection he conflated these objects with the massive 60-foot impeller unit being assembled and prepared for installation by the pool.

Other witnesses' memories of this session also appear to have been biased by the *Aviation Week* article. Kress, whose retrospective assessment was written late in 1977, listed "spherical tank sections" along with the crane as evidence of Price's remote-viewing accuracy.[55] Presumably those sections would not have stood out as noteworthy were it not for Robertson's article. The same is true for Puthoff and two other coauthors in a 1983 report for the Defense Intelligence Agency, "Project Grill Flame: Operational Tasks," where it is stated that the remote viewer made drawings indicating both "the presence of a large crane, correctly identified as to size [and] Assembling of large spheres from metallic gores."[56] Since Price himself never used the term "gores," that bit of engineer jargon operates as a tracer here: The only two listed citations are Kress's article and his own (with Targ) "Perceptual Augmentation Techniques" final report, neither of which use the term "gores" either. The authors thus appear to have been conforming the data to fit the (uncited) magazine article.

The bottom line is that the famous 60-foot steel sphere appears to be mythical, a chimera reflecting various disparate impressions Price mentioned on July 11 and 15, 1974 and distorted in hindsight by that attention-getting *Aviation Week* article.

On the other hand, even if the specifics don't jibe, the general sense of Price's descriptions as it emerges from the transcripts is indeed of some kind of atomic research being conducted at Baikal-1, involving the capture of atomic power: His impeller assembly had something to do with moving some kind of fine material, probably nuclear in nature. "I feel quite sure," Price says at one point on July 11, "that what they're constructing in the overall, is a nuclear powered generation system of quite a magnitude. I feel pretty goddamn confident."[57] And again, a few days later, in the final session with Puthoff, he came to feel the objects being constructed from orange-peel-like sections were weapons. He then also described the impeller-and-stator assembly as being intended to blow fine dusty material between high-power electromagnets. As we will see, it may not have been just Targ, Puthoff, and Kress who saw the *Aviation Week* article as significant confirmation of what Price saw in his out-of-body visits to Kazakhstan; the correlation may have made an impression in Washington as well.[58]

But as if this whole storied affair couldn't get any more *Rashomon*-y, everything Clarence Robertson wrote in that famous *Aviation Week* article also turned out, with the benefit of hindsight, to be wildly wrong. There were no particle weapons being studied or built at Baikal-1. Subsequent revelations about activities at the site, as well as reconsideration of the bizarre role that one magazine article played in the endgame of the Cold War, cast the accuracy of Price's viewing, the (im)possibility of his ever receiving feedback, and even the historical significance of the entire psychic escapade in a completely different light.

Part 2: A Rorschach Blot in Kazakhstan

The weird story of Semipalatinsk was chronicled by space security expert John Pike in a 1992 article for the Federation of American Scientists[59] and by *Washington Post* writer Michael Dobbs in a 1999 summary of the intelligence failures that led to Ronald Reagan's costly and ultimately unworkable Strategic Defense Initiative (SDI), or "Star Wars."[60] Blurry satellite photos of the Baikal-1 site were, as Dobbs put it, a "giant Rorschach blot onto which American intelligence analysts projected their worst nightmares."[61]

Soviets Push for Beam Weapon

USSR developing charged-particle device aimed at missile defense, exploring high-energy lasers as satellite killer

First page of article by Clarence A. Robinson, Jr., in *Aviation Week & Space Technology*, May 2, 1977.

Pike explains that "[t]he primary source of confusion over the Semipalatinsk facility was the predilection for worst-case assessments by some elements of the American intelligence community. As had been the case in previous episodes such as the bomber gap, the missile gap, and the mine shaft gap, such worst-case assessments were supported by those whose programs would benefit by additional funding and expanded political influence."[62] The consequences of overestimating enemy capabilities and intentions can be great. There are, Dobbs writes, "few more striking examples of the twisted consequences of faulty intelligence than the controversy surrounding the Kazakhstan facility."[63]

It is first necessary to appreciate the quiet but important role *Aviation Week & Space Technology* then played (and no doubt still plays) in U.S. defense policy and culture. The magazine, which under various names has been in print since 1916, is well-known as an Intelligence-friendly conduit of "secret" information about advanced aerospace research, such that its readers affectionately call it "Aviation Leak and Space Mythology." It would be the height of naivete to assume that leaked information (or "you heard it here first"-style reporting) in the defense-industry space is innocent, lacking some deeper agenda. "Follow the money," as Deep Throat said.

Throughout the Cold War and ever since—and undoubtedly back to the earliest history of war profiteers competing for contracts from wealthy nation-states—defense spending has been driven by alarmist leaks from spies and insiders. Whispered secrets about the "real" capabilities of our enemies emanating from Intelligence-friendly sources are an effective way of manipulating the public and leaders who hold the purse strings of huge defense appropriations. When such leaks are deliberately false or misleading, we call it "disinformation." It remains unclear to what extent that term applies in the Semipalatinsk case; the only slightly less alarming term misinformation (or perhaps "propaganda") might be more apt, as we will see.

In his 1977 article, Robertson wrote that Semipalatinsk had been under observation for about 10 years by the time of publication (i.e., since about 1967)—and that's what Kress suggested to the SRI experimenters and Price. But Dobbs' sources revealed that satellite imagery of the "P-NUTS" site had captured the interest of Los Alamos scientists even earlier, in the early 1960s, because of its resemblance to their own facility. The site's layout of pipes and the presence of mysterious big pits dug in the ground suggested that its purpose could have mirrored that of Los Alamos at that time: conducting low-yield nuclear tests to evade the Nuclear Test Ban Treaty that President Kennedy had signed into law in 1963.[64] This was not a consensus interpretation of the site, however; others thought a new missile was being constructed at the facility, according to Dobbs. And then there was the really off-the-wall idea that the place was being used to research and build "death beams."

The latter view was fiercely—indeed obsessively—championed by former head of Air Force Intelligence General George J. Keegan. It is Keegan, the main source for the *Aviation Week* article and quoted widely throughout it, who believed that the real purpose of Semipalatinsk was to build a particle beam weapon that could shoot down American warheads and thus make the USSR immune to an American attack. It was a far-fetched idea, but very scary if true: Such a missile shield would have given the Soviets the strategic advantage in the Cold War, enabling them to effectively "checkmate" the United States (Keegan's term), because our nuclear arsenal would no longer work as a deterrent.

Keegan had built his career on these kinds of alarmist overestimations of the Soviet threat. According to journalist Fred Kaplan, in the late 1950s, the Air Force's "master showman" perpetuated the notorious "missile gap" fiction through "briefings, charts, diagrams, photographs *proving* that the Russians were already fielding ICBMs but that they were hiding them—in barn silos, medieval monasteries, mysterious-looking buildings out in the middle of nowhere."[65] According to Pike, Keegan turned his attention to the mysterious buildings at Semipalatinsk in 1973, and then tried to convince the intelligence community of his ideas in 1975. After his retirement from the Air Force in 1977, Keegan went public with his "findings."[66]


General George J. Keegan

Importantly, while it may have alarmed *Aviation Week* readers, Keegan's argument was not initially convincing to other defense experts at the Pentagon and CIA.[67] Nor did President Carter believe his assessment of the threat. Yet Keegan's public crusade ultimately had the intended effect of winning the support of many influential offices of government, and boosting funding for U.S. particle beam research that ultimately laid the foundation for Reagan's SDI the following decade.[68]

So essentially, by serving as a platform for Keegan's alarmist interpretation of Semipalatinsk and going so far as to editorialize strongly on behalf of the view that the U.S. needed to immediately put resources toward closing the "death beam gap," *Aviation Week* played a decisive early role in Reagan's $50 billion missile shield program. The latter was a famous failure: As far as you or I know, there are still no anti-missile energy weapons in orbit (whatever other secret technology it no doubt spun off).

It was not the first time the magazine allowed itself to serve as a conduit of alarmist misinformation (if not disinformation) during the Cold War. There was also the famous "bomber gap." An *Aviation Week* article in 1954 asserted that a new Soviet bomber called the Bison had an 8,000-mile range, thus able to drop nukes on U.S. mainland targets. This, along with other intelligence suggesting the USSR was manufacturing Bisons in huge numbers, was used by the Air Force to justify massive spending to build up the U.S. long-range bomber fleet to nearly 3,000 aircraft (almost 2,000 B-47s and more than 750 B-52s). It later turned out that the Soviets only ever built 20 of the Bisons and that their range had been way overstated by *Aviation Week*. The Bison could never have posed a threat to the mainland U.S.—a journalistic "oops" that surely was not lamented by Boeing.

Another oops moment came for the magazine in 1992, following the collapse of the Soviet Union, when Russian scientists invited their Western colleagues for a tour of Semipalatinsk. It became immediately apparent to the visitors that, contrary to Keegan and Robertson back in the 1970s, the Baikal-1 facility had never done any death beam research. It did house nuclear reactors—it's what was really inside that mysterious subterranean building—but their purpose was to develop

technology for nuclear-powered spaceflight, atomic rockets that could potentially be used on a Mars mission.[69] The U.S. had conducted similar research, including the NERVA program, which ran from 1963 until 1973.

That Semipalatinsk was actually developing nuclear rockets was news even to many within the former USSR, which evidently had a lot of *Aviation Week* readers. The Keegan "death beam" notion had so captivated their imaginations that it reportedly hurt morale of Soviet scientists assigned to the site when they learned they would not be working on such exotic weaponry.[70] (Evidently Mars rockets were just not as sexy.)

Pike pulled no punches in his assessment of this mistake: "it is now clear that General Keegan's misidentification of the Baikal-1 nuclear rocket test facility must rank as one of the major intelligence failures of the Cold War."[71] But here again, while it may have been an intelligence failure, it paid off handsomely for, in this case, Hughes Aircraft, Lockheed, Martin Marietta, McDonnell Douglas, Rockwell International, and numerous smaller firms that were awarded the precious SDI contracts in 1985.[72] The American taxpayer will reliably pay for exorbitant new weapons systems when their mortality fears are properly stoked.

In hindsight, the Cold War was really fought with this kind of mis- or disinformation, scary fictions about enemy strength and motives purveyed by respectable "insider" sources. The contractors got rich. The taxpayer, in this case, got nothing. "It is actually rather stunning to contemplate," Pike wrote of SDI in 1998, "but there is simply no precedent in the annals of Pentagon waste for a program consuming over fifty billion dollars over fifteen years and producing not a single workable weapon."[73]

Oddly enough, this larger context of Star Wars and its 1970s backstory feeds directly into our understanding of Pat Price and his 1974 remote viewing of Semipalatinsk. The reason: It is conceivable that a mistaken belief in remote viewing as a clairvoyant rather than precognitive psi modality could have contributed, at least in a small way, to the distorting echo-chamber of bad intelligence about the site that scared American policymakers into funding Reagan's orbital pipe dream.

Targ believed that nobody in the intelligence community in 1974 knew about spheres at the site being constructed from "gores" or orange-peel-like segments. But Dobbs revealed in 1999 that the spheres described in the *Aviation Week* article, along with a lot of other intelligence about the site (apart from its purpose), had actually been known about for several years. The spheres themselves had been photographed being constructed and then buried in the ground during the 1960s.[74] And since they were never built to collect charged particles from nuclear explosions, but only to store liquid hydrogen, they did not have to be made of thick segments. The 1992 site visit revealed the segments were of thin steel.[75] There was no real-world correlate to the "welding troubles" reported in the *Aviation Week* article.[76]

The 1992 revelations about Baikal-1 further lessen the accuracy of Price's remote viewing—that is, as long as we accept the notion that he was mentally visiting Kazakhstan and not instead psychically previewing things he would see or learn in his own near future. Such feedback could well have consisted of, or been informed by, inaccurate beliefs or hypotheses about the purpose of the site, possibly even an early draft of the *Aviation Week* article.[77] The editorial by Robert Hotz says that *Aviation Week* itself had been following the story "for more than a year" and had refrained from publishing because of "legitimate matters of intelligence security" that, it says, no longer existed.[78]

Targ's recollection in his 1996 *JSE* article also implies that he and Puthoff (at least) were briefed about the supposed nature of the site not long after the sessions: "After several days, we completed the remote viewing. We were astonished when we were told that the site was a super-secret Soviet atomic bomb laboratory at Semipalatinsk, where they were also testing particle beam weapons."[79] This is a highly significant detail, if true. Although Price's metal spheres were not 60 feet in diameter, he did come to feel by the end of the experiment that they were bombs. If the CIA was already in 1974 describing the site as an "atomic bomb laboratory," and if the death-beam hypothesis under investigation was in fact conveyed to Targ and Puthoff at this point, then these things could have been directly or indirectly conveyed to Price too—if not by Targ and Puthoff themselves then by his CIA contacts over the subsequent year. In the spring of 1975, Price moved to West Virginia and worked for the CIA directly, undertaking a series of operational assignments until his untimely death in July 1975.[80]

Part 3: Echo Chambers

Although years of mythmaking have centralized the crane and spheres in the Pat Price Semipalatinsk story, the vast bulk of the psychic's impressions were either definitely inaccurate or were never verified. Most of the 79 pages of transcripts for July 11 and 15 concern boilers, coal-burning furnaces, a foundry, a nonexistent water tower, lathes for grinding glass pellets, the aforementioned 60-foot-long turbine, and other things with no clear connection either to what was described in the *Aviation Week* article or (as far as we know) to what was later learned about the site's real work on nuclear rocket engines. By the final day, July 15, Price had arrived at the firm conclusion that uranium ore was actually being mined from directly under the site, refined and enriched in the foundry, and then put to use in purposes running the gamut from medical research to those spherical bombs. Price's scattershot impressions gave Stillman the sense that the psychic was casting a wide net of guesses hoping something would be a hit.

Yet even Stillman, the most skeptical witness of the bunch, admits that there was a there there. In the end, it is Price's startling accuracy with specific above-ground features of the site that he viewed in the first two days that remain some of the best evidence of his psychic ability. And feedback was clear in these cases, in the form of the CIA picture that Kress showed Price on July 11. Significantly, the strongest hits were three objects prominently in the foreground or center of that picture.[81]

The crane is plain enough: As Targ is recorded saying in the transcripts shortly after Kress unrolled the image, Price's

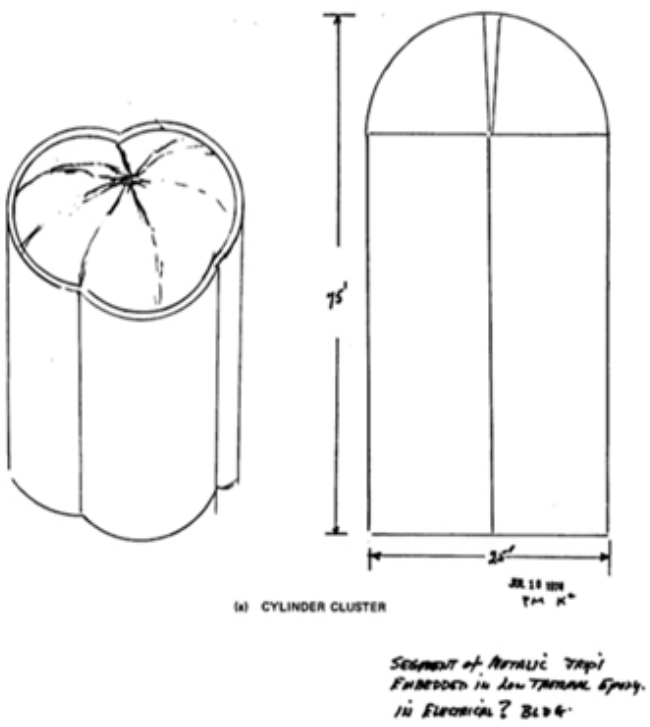


Figure 4: Pat Price's drawing of cylinder cluster ("cloverleaf tower")

drawing is a "dead ringer" for the real thing.[82] Kress and Stillman certainly agreed, as did another reviewer cited by Kress, a photo interpreter named W. T. Strand, whose report remains unavailable.[83] According to Stillman, Price said on July 10 that he adjusted his estimation of the scale of the crane when he psychically saw a man walking by one of its huge wheels—a point he reiterated the following day: "I said Jumping Jesus, that guy's only coming up half way up the crane [wheel]."[84] A tiny human figure is visible by a wheel of the crane in the CIA picture. The specific angle of view in Price's drawing is also nearly the same as in the CIA picture. Both of these details suggest it could have been that drawing that he was seeing in his mind's eye and not the actual crane thousands of miles away in Kazakhstan.

Notably, during a phone call between Targ and Price on July 10, Stillman says Price also described a concrete silo looking like three cylinders overlapping or merged together, a bit like a cloverleaf (Fig. 4). There is a cluster of what Stillman described as "tall cylindrical shaped tanks or towers" distinctly visible near the center of the CIA picture (as well as in the center of the color photo on p. 10). Although not exact, Price's drawing of this tower definitely captures a gestalt here, especially since he accurately pegged its location relative to the crane. In most ESP experiments, his drawing of this structure would be marked as a hit too.

Another hit is arguably Price's immediate and persistent impression of a "swimming pool" at the site. Targ doesn't mention this; and Stillman, focused literal-mindedly on the functional description, simply dismisses Price as wrong. But right in the foreground of the CIA image, alongside the crane tracks, is an elongated rectangular depression that does give every bit the appearance of something like an Olympic-style swimming pool with one sloping end. (This basin is in fact an exposed side of the subterranean building underneath the crane tracks that Price failed to identify.) Although Price situated his pool elsewhere, nearer the silo and nonexistent water tower, I suggest that the pool could also be considered a hit.

In 1974, the possibility that Price could have been precognizing precisely that unrolling of the CIA image (and his accompanying gratification at seeing how spot-on his crane drawing had been[85]) does not seem to have occurred to Targ or Puthoff or Kress (even though SRI did later conduct some small experiments investigating the role of feedback in remote viewing[86]). Nor did the possibility of precognition occur to Price, whose understanding of his own psychic ability as his consciousness flying free of his body had been shaped by his Scientology training and experiences. At one point on July 11, Price describes his psychic awakening that occurred in the context of an out-of-body experience:

> I was 50 years old, and pretty much entrenched in the society as it stands and is viewed by the average individual, before I had the foggiest idea that I could in fact get out of my body, go somewhere and look. My concept that time is that there was a thing that could get out of this body. This could drop on the floor like a piece of wet spaghetti. That was really a construct to have.[87]

Throughout the transcripts, Price's descriptions of his psychic point-of-view scanning the site from various angles and altitudes, as well as allusions to motion sickness and vertigo as he does so (and even brief jaunts into orbit to check what cosmonauts' helmets look like, as Stillman mentions), reinforce a picture of psi as a manifestation of what many parapsychologists nowadays call nonlocal awareness or nonlocal consciousness, and of mind as transcendent of the physical body.[88] It is a view that challenges the materialist view that sees all aspects of mind as emergent from (and totally dependent on) brain activity. Targ, drawing upon the Dzogchen tradition, has also called it "limitless mind."[89]

A link between psychic ability and proneness to out-of-body experiences is well-known, but what psi feels or seems like to the experiencer and what it *is* may be very different things. Given how few of Price's visual impressions matched anything that would have been visible at the site, a much humbler picture of psi emerges from this famous case: Instead of a psychic superman flying across Central Asia with his nonlocal consciousness, it looks much more like many classic ESP experiments that have utilized drawings for targets and where the psychic arguably is previewing imminent rewarding feedback.

In the experiments of Rene Warcollier,[90] for instance, or the informal experiments conducted by Upton Sinclair and his wife Mary Craig Kimbrough in *Mental Radio*,[91] or the SRI experiments with Uri Geller,[92] the psychic captures some distinct shape or perhaps an overall gestalt, but elements may be transposed or displaced, and a clear sense of identity or function of objects is often lacking. I argue that these kinds of experiments do not

support a nonlocal-consciousness view of psi.[93] The classic juxtaposed targets and psychics' drawings really resemble visual memory tasks, where subjects draw pictures of stimuli they have been briefly exposed to previously.[94]

There is much circumstantial evidence for psi as precognition, and for precognition as a kind of "memory for things future"[95]—that is, for things the individual will later see or learn in the course of life, typically sooner than later. The famous "Feeling the Future" studies of Daryl Bem, which inverted the order of stimulus and response in standard psychological paradigms like priming and facilitation of recall, support such a model, for example,[96] as does work with psychic dreams.[97] Although seldom mentioned other than in passing, in standard telepathy or clairvoyance experiments using drawings, the ultimate comparison of the psychic's sketch with the target picture is a rewarding and frequently immediate form of feedback for the subject.[98] Discrepancies between a psychic's description and an ostensible target event or object sometimes act as tracers, forensically revealing that the source of psi-acquired information was more likely the feedback or confirmatory learning experience in the psychic's own future, not the event or object itself.[99]

Certainly no one case study can "prove" (or falsify) the hypothesis that remote viewing is really precognition in disguise—it remains to be tested much more extensively than it has in the past, for instance through paradigms where feedback in remote viewing exercises is subtly manipulated to create those kinds of tracers. But I think it can at least now be stated that, despite claims made by Targ and others, the Semipalatinsk case is not a falsification of the precognitive hypothesis of psi. If anything, it tends to support it: Amid a mass of mostly erroneous and inconsistent impressions, Price's clearest hits look like previews of things that he would shortly be shown in a picture. And even with his spherical "bomb," it is possible he was precognizing inaccurate intelligence about Semipalatinsk already being shared in the intelligence community.

It is when attempts are made to apply ESP, whether for humble self-insight or for national security, that parapsychology's famous "lack of a compelling theory" becomes problematic and potentially dangerous.

Remote viewers sometimes claim that it ultimately does not matter where the information comes from or exactly how they get it. But given the possibility of feedback to be manipulated or false, it makes an enormous difference whether the source of a piece of remote viewing data that might be acted upon comes from across space, from a real event in the present time, versus from a feedback experience in the viewer's future that could be mistaken or even deliberately faked. Not being absolutely clear about the nature of psi leaves it wide open to error. It also leaves it wide open to a kind of echo-chamber effect of self-confirmation, or more scarily, even manipulation. When there is a lot at stake, as in an operational remote viewing session of a mysterious target in the homeland of a global adversary, the consequences of misunderstanding the signal channel of psi are potentially huge.

Consider: The CIA's reason for giving the Baikal-1 assignment to SRI's nascent psychic spy program in 1974 was surely to supply evidence one way or another about precisely the beam weapon question. The site had been an important question mark for years, as we saw. And according to Dobbs, by the end of 1977, the CIA reversed its initial skepticism about particle weapons being built at Semipalatinsk. On the basis of what evidence did it reverse its skepticism? Dobbs could not ascertain it.[100] Surely it wasn't only a popular magazine article. Could the data from Pat Price and SRI have contributed to the CIA's change of mind?

No single intelligence source is ever relied on by itself—and in 1974, certainly not a barely tested (and mostly distrusted) methodology like remote viewing. But it is not inconceivable that Price's descriptions of the spheres with enriched material inside could, in light of Keegan's publicized claims, have been taken as a relevant datum, one that implicitly validated the idea that the spheres already known to exist at the site were for collecting charged particles from nuclear fission and not some more benign purpose like storing liquid hydrogen. If so, then Price's *precognitive* viewing (if that is what it really was) could indeed have turned those spheres into echo chambers helping amplify Keegan's wildly wrong theory.

It is not enough to prove psi exists—which has already been done, abundantly.[101] Targ is right that the experiments done at SRI with Price, Swann, and many other subjects constitute some of the most interesting evidence for the miraculous powers of mind. What is needed is focused research into just how those powers work, including their limitations. Again, in the interest of moving beyond materialistic reductionism, the "signal transmission" metaphors of previous eras have given way to consciousness-centric views, oftentimes inspired by quantum nonlocality. The predictive power of such models is questionable, however; at the same time, there is a compelling case to be made that what looks like nonlocality in physics may really be retrocausation.[102] Especially given recent stunning advances in quantum computing showing indeterminate causal order on the smallest scales, a robust theory of psi will benefit from more nuanced thinking about temporality.[103] The brain may well turn out to be a kind of quantum computer in which information can propagate in retrograde, defying time's entropic arrow. Mind may not be "limitless," but it may be four-dimensional.

It's important to figure it out. Without knowing for sure whether psi could really be (or even just involve) precognition of information that the psychic will later be exposed to, there is the palpable risk of creating exactly the kind of echo chambers that Price and the CIA may have inadvertently helped a paranoid former Air Force General create around a cluster of mysterious buildings—and a damned big crane—in the Kazakhstan steppe.

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ENDNOTES

1 "Semipalatinsk Test Site, Present State," National Nuclear Center of Kazakhstan, Institute of Radiation Safety and Ecology, Kurchatov 2018, pp. 4–5.
2 Smith, 2020.
3 Targ & Puthoff, 2005[1977].
4 Smith, 2020.
5 Smith, 2005.
6 Honorton & Ferrari, 1989; Mossbridge et al., 2012.
7 May & Marwaha, 2015.
8 Puthoff et al., 2018[1978]. But see May et al., 1996.
9 Marwaha & May, 2016.
10 Targ, 1996; 2004; 2010; 2012.
11 Targ, 2004.
12 Targ, 2012.
13 Schnabel, 1997; Targ, 2012.
14 Price's death in Las Vegas in 1975 was widely suspected to be an assassination—but by whom? The CIA? The KGB? Jim Schnabel, in one of the earliest histories to be written after the remote viewing program was declassified, also reported rumors that Price's death was faked (Schnabel, 1997; see also Mungia, 2019).
15 Targ, 1996. This article has been quoted widely by other writers including Jim Schnabel in *Remote Viewers* (1997) and Paul H. Smith in *Reading the Enemy's Mind* (2005); Targ also elaborated upon his narrative in later books, as well as in the 2019 documentary by Lance Mungia, *Third Eye Spies*.
16 Targ, 2010, 127.
17 Puthoff & Targ, 2018[1975].
18 Kress, 1999[1977].
19 Ibid., 83.
20 Stillman, 1975.
21 "Pat Price Remote Viewing Transcripts, July 1974."
22 The tapes of the first two days, when Price was asked to describe known above-ground features of the site to assess his remote viewing accuracy, never resurfaced after being sent to the CIA for analysis; SRI staff wrote to the CIA in 1986 requesting those materials but their request was denied (Endersby, 2017). An internal CIA memorandum suggested that the data "has been destroyed or has receded into the mists of OTS archives" (Central Intelligence Agency, 1986).
23 Kress, 1999[1977], 75.
24 Targ, 1996, 82.
25 Stillman, 1975.
26 Ibid., 5.
27 Ibid., 5.
28 Ibid., 5.
29 Stillman, 1975.
30 For more on Price's nocturnal psychic scanning, see Wilhelm, 1976.
31 A point made by Endersby, 2017.
32 Stillman, 1975, 24.
33 Questions did later arise about Price's true loyalties following the discovery that he had shared secret information about his remote viewing activities with his church (Kress, 1999[1977]; Mungia, 2019). In conversation with Elizabeth Lloyd Mayer, Puthoff said that these revelations forced him to reexamine the experiments SRI conducted with Price, but that in the end it didn't alter his assessment of their value, of Price's psychic abilities, or of the possibility of deception (Mayer, 2007).

The SRI research was sometimes criticized for having inadequate controls (e.g., Grill Flame Scientific Evaluation Committee, 1979)—although short of placing a remote viewer under confinement and constant surveillance over the course of days or weeks, it is hard to imagine how such doubts wouldn't always be present in a lengthy operational assignment like Project Atlas.
34 Targ, 2012, 53.
35 Kress, 1999[1977].
36 "Pat Price Remote Viewing Transcripts, July 1974," Tape 1, Side 2, p. 1.
37 Ibid., Tape 1, Side 2, p. 10; Tape 2, Side 1, p. 13.
38 Ibid., Tape 2, Side 1, p. 15.
39 Stillman, 1975, 27.
40 Ibid., 3.
41 Puthoff & Targ, 2018[1975], 99–100. This was also the assessment included in a report of a committee that scientifically evaluated the activities of SRI's Project Grill Flame: "Price . . . provided a great deal of information, but typically there was a mix of signal to noise; good data co-mingled with spurious" (Grill Flame Scientific Evaluation Committee, 1979, 13).
42 Robertson, 1977, 17.
43 Targ, 2012, 53. See also Targ, 1996.
44 Targ, 1996, 82.
45 Roberston, 1977, 18.
46 In *The Reality of ESP*, Targ writes:

> [H]e had made his perception of the sixty-foot spheres and "gores" without any feedback, which is usually an important element of remote viewing. This shows that Price's remarkable perception was by virtue of a *direct experience of the site*. He was not reading the mind of the sponsor, because no one in the United States knew anything about "spheres" or "gores" at the time. Nor could Pat have been looking precognitively at his feedback from the future, because he died before the details of the sphere he saw were independently confirmed. And, in fact, no one in the West has ever seen the gores. So, to the best of my knowledge there is nowhere Price could have obtained his information, except at a Soviet nuclear test site in Semipalatinsk . . . [italics in original] (Targ, 2012, 55.)

In his summary of this case in his detailed history of the Star Gate program, *Reading the Enemy's Mind*, remote viewer Paul Smith reiterates this point and adds to its potential significance:

> If it is ever proved that remote viewing success *does* involve precognitive perception of future feedback, Price's case would show something even more remarkable than remote viewing. It would be evidence that human consciousness *does* survive physical death, and that it maintains some kind of perceptual link with the physical world. (Smith, 2005, 77.)

47 "Pat Price Remote Viewing Transcripts, July 1974," Tape 1, Side 2, p. 26.
48 Ibid., Tape 2, Side 1, p. 17.
49 As blogger Andrew Endersby (Endersby, 2017) notes, the dates of this drawing are ambiguous. Hand-noted is the date 6-18-74, which would place it four weeks before the sessions. The drawing is date-stamped 7-18-74, however—more than a week after the session in which Price mentioned these objects and three days after the final session with Puthoff.
50 The only mention of welding during the last two days' sessions is a separate mention of men arc-welding some 8-foot tanks elsewhere at the site. On the same day he mentions that the 8-foot tanks may go in the pool. Stillman also mentions that Price described welding occurring outdoors, during a taped session on July 10.
51 "Pat Price Remote Viewing Transcripts, July 1974," "Interview with originator Price by Puthoff at SRI, Project Atlas, July 15, 1974," p. 7.
52 Ibid., p. 7.
53 Ibid., p. 7.
54 During the morning session on July 11 (before Kress's appearance, and possibly only with Hal Puthoff questioning Price), Price did describe that the "pool" was going to receive "some massive, very heavy weight," and mentioned the thickness of steel plates on the bottom of the impeller hanging from the crane in the foundry:

> I've concluded that the object that I saw the crane straddling [the impeller] is in fact going to go into this pool. And I can see some steel anchor points that fit. When I looked at the bottom of that unit, I saw some very heavy plate—it looked like about 4". Very high carbon steel, cause the density was very dense—damn near to steamless [sic; stainless, seamless?]—and it had the anchor bolts/patterns in the bottom, and seemed to coincide with the pattern that I could see on the floor of this. ("Pat Price Remote Viewing Transcripts, July 1974," Tape 1, Side 1, p. 4.)

55 Kress, 1999[1977], 78.
56 Salyer et al., 2018[1983], 362.
57 "Pat Price Remote Viewing Transcripts, July 1974,"Tape 2, Side 1, p. 7.
58 Targ claims that the correspondences between Price's psychic impressions and the *Aviation Week* article were so strong that he and Puthoff were summoned to the nation's capital for a formal investigation by the House Committee on Intelligence Oversight "to determine if there had been a breach in national security" and that no breach was found (Targ, 2012, 56).
59 Pike, 1992.
60 Dobbs, 1999.
61 Ibid.
62 Pike, 1992.
63 Dobbs, 1999.
64 Ibid.
65 Kaplan, 1991, 167.
66 Keegan even aired his views on TV. Dobbs writes:

> In 1978 he told CBS's "60 Minutes" that the Soviet Union had embarked on "the most gigantic scientific program of its kind in history" and that "time was running out for the United States." Standing in front of an artist's rendition of the particle beam project allegedly underway in Kazakhstan, Keegan described how the Kremlin was working on weapons that would "simply eviscerate" incoming U.S. warheads. (Dobbs, 1999.)

67 Pike, 1992.

68 Pike writes:
> [T]he furor created by General Keegan's charges provided the political impetus for a significant expansion of the American directed energy program by the Carter Administration. A major space-based laser effort was initiated under the auspices of the Defense Advanced Research Projects Agency (DARPA). Work began on the ALPHA chemical laser project in 1978. Contracts for the TALON GOLD targeting system were awarded in 1979. And the Large Optics Demonstration Experiment (LODE) started in 1980. These activities subsequently formed the basis for the Strategic Defense Initiative. (Pike, 1992)

69 Dobbs, 1999; Pike, 1992. According to Dobbs, the first Bush administration even considered a joint Mars mission with Russia, using the technology developed at Semipalatinsk, but the project was scrapped under Clinton due to its expense.
70 Pike, 1992.
71 Ibid.
72 Bernstein, 1985.
73 Pike, 1998.
74 According to Dobbs: "Fears about particle beam research at P-NUTS were first aroused in the late '60s when satellite pictures showed Soviet workers assembling several steel spheres nearly 60 feet in diameter. The balls—four in all—were then lowered into underground chambers that had been excavated out of rock" (Dobbs, 1999).
75 Pike writes:
> The Baikal-1 nuclear rocket test facility included three large underground tanks for storage of liquid hydrogen. These were fabricated on-site out of large "orange-peel slice" metal gores, and situated underground to provide structural support. The gaps between the spherical holes in the bedrock and the tanks were filled with concrete. *This permitted the use of relatively thin metal segments.* In 1982, one of the tanks developed a leak, and became unusable. [my emphasis] (Pike, 1992.)

76 The detail of the thin sphere sections also reduces the possibility that Price was somehow seeing the sphere construction in the past. Retrocognition is a claim Targ has made for other of Price's viewings, such as the Rinconada Park swimming pool complex in Palo Alto, which included two large tanks that had only been present at the site decades earlier (Targ, 2012).
77 We should not forget Price's immediate impression that Semipalatinsk had to do with the launching and landing of Soviet rockets, which (one could argue) may have derived from the site's real (and truly unknown) purpose in designing nuclear rocket engines. On the other hand, anyone who knew anything about Soviet science and technology in 1974 might have guessed that a remote research site in Kazakhstan would have to do with the country's space efforts. This was Stillman's assumption: that the location itself cued Price to describe work associated with the Soviet space program. And Price's impressions of the site's purpose covered many bases—space, bombs, mining and enriching uranium, even a mention of medical research—over the four days of sessions.
78 Hotz, 1977.
79 Targ, 1996, 82.
80 Kress, 1977. Jim Schnabel describes these assignments in *Remote Viewers* (Schnabel, 1997).
81 In the transcripts, Kress explains that the picture had been drawn from a model rather than directly from the reconnaissance images, in order to conceal the true resolution of the CIA's surveillance capability; that fact explains the oblique perspective of the drawing, which would not be possible from orbit.
82 "Pat Price Remote Viewing Transcripts, July 1974," Tape 1, Side 2, p. 4.
83 Kress, 1999[1977].
84 "Pat Price Remote Viewing Transcripts, July 1974," Tape 1, Side 2, p. 5.
85 The fact that Price had just been made witting as a CIA asset on the basis of this drawing could have made this moment especially salient and rewarding for Price. Reward plays an important role in precognition (Wargo, 2018).
86 Pufhoff et al., 2018[1978].
87 "Pat Price Remote Viewing Transcripts, July 1974," Tape 1, Side 2, pp. 27-28. According to John Wilhelm (Wilhelm, 1976), Price's construct-altering out-of-body experience occurred during an early exercise in Scientology training in which participants sit across from each other without speaking.
88 Targ, 2012.
89 Targ, 2004.
90 Warcollier, 2001[1948].
91 Sinclair, 2001[1930].
92 Targ & Puthoff, 2005[1977].
93 Wargo, 2018.
94 Bartlett, 1995[1932].
95 Feinberg, 1975; Wargo, 2018.
96 Bem, 2011.
97 Dunne, 1952[1927].
98 The *Mental Radio* case is particularly interesting and is the subject of a work in progress.
99 This is a conclusion pointed to originally by J. W. Dunne's informal study of his own precognitive dreams (Dunne, 1952).
100 Dobbs (1999) writes:
> By going public with his warnings, Keegan may have exerted a much greater influence on the intelligence debate than he ever had in private. Recently declassified National Intelligence Estimates show that his views about particle beam weapons eventually gained acceptance. By the end of 1977, for example, the CIA had reversed its earlier skepticism and reported that "the evidence"—precisely what evidence is unclear—now suggested that the Soviets were indeed engaged in extensive particle beam weapons research.

101 Utts, 1995.
102 Price & Wharton, 2015; 2016.
103 Wargo, 2018.

RESEARCH REQUEST

Seeking Participants for an Experiment in Human Consciousness

According to the fundamental statement of analytical psychoanalysis, founded by psychoanalyst C. G. Jung, all human consciousness connects in the collective Unconscious. Can it be experimentally verified? Applying the synchronicity principle, formulated by C. G. Jung, along with the philosophical, cosmological model of the I Ching, a series of experiments aim to better understand the interconnectedness of Human Consciousness.

Synchronicity, as a principle, stipulates that two events may be linked together not only by a causal chain but also because they create meaning. The I Ching (aka Yi Jing) is a cosmological and philosophical system more than three thousand years old that's used to improve the decision-making processes by integrating non-rational dimensions, which may be assimilated to a kind of precognition into evaluating various options.

The hypotheses to be tested are:

1. If several people are working on the same issue with the I Ching, i.e. as a single archetypal, collective dimension, how do the obtained hexagrams reflect that collective concern?

2. Does the whole set of obtained hexagrams indicate a significant deviation from what the laws of statistics allow? A recognizable and repeatable violation of the statistics would provide experimental evidence for the interconnectedness of Human Consciousness.

To run this series of experiments, Dr. Chantal Toporow, senior member of the Society for Scientific Exploration, and Dr. Gabriel Felley seek volunteers willing to participate. Easy instructions will be emailed to participants. All that is needed is access to the website, three coins, and be willing to do a once a month I Ching session, consisting of one question posed per the brief instructions. Basic I Ching knowledge is not needed. The results will be presented at a future SSE conference.

For more details, contact Dr. Gabriel Felley at gabriel.felley@yintelligence.ch.

GABRIEL FELLEY studied Theoretical Physics at the Swiss Federal Institute of Technology Zurich. For decades, he has been dealing with the I Ching to rehabilitate it as a sophisticated, holistic methodology to understand the logic underlying the processes of change in a generic way and to promote it as a tool for the support of managerial decision-making processes. He has written numerous articles and lectured on topics related to I Ching in Switzerland as well as in Germany, China, Vietnam and the USA. Contact: gabriel.felley@yintelligence.ch

‘BACKSCATTER’

Roger Nelson

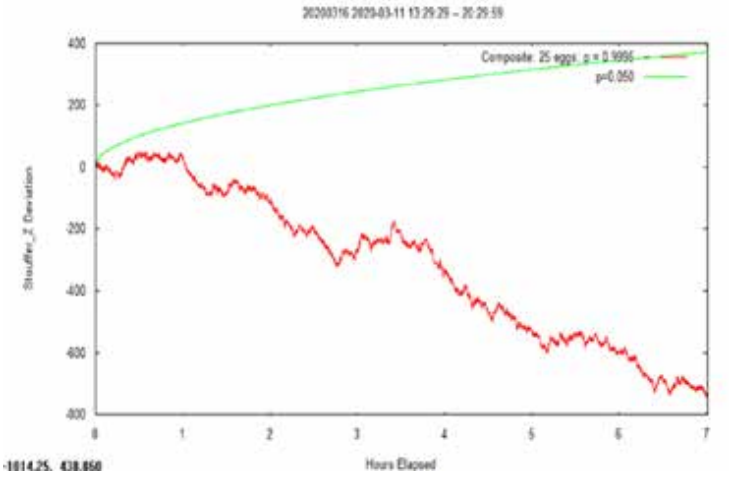
Global Consciousness and the Coronavirus: A Snapshot

In late February and early March 2020, the news was filled with concerns about a novel coronavirus first identified in Wuhan, China. In the intervening weeks we recognized that we were dealing with a pandemic, likely to infect a large proportion of the world population. There was also another “viral” effect—on the world’s economies, with serious and continuing disruptions of business as usual. These are globe-spanning effects, disrupting our shared, though unconscious, perceptions of a stable world.

The Global Consciousness Project (GCP) network is designed to capture effects of shared experiences that produce or enhance unconscious interconnections. These connections are fostered by resonant or coherent emotions felt by large numbers of people responding synchronously to events. We test the hypothesis that major events in the world will correspond to changes in data from a network of random number generators (RNG) placed around the world. Over two decades of testing we have found that normally random output from our network becomes correlated during “global events” that bring us into resonance.

Understandably, many people have asked about GCP readings of the pandemic, but the technology is designed for focused events and cannot generally be applied to long-lasting turmoil such as the slowly developing coronavirus crisis. Only sharply defined events can be distinguished from the complex background of our very active world. For a continuing crisis, we can only take snapshots, preferably when there is a notable moment that represents the general trend. We defined probes to assess the GCP response to our shared coronavirus experience marked also by extreme shifts of the stock markets. To implement the sampling, I looked at several hours (the trading period of the US stock exchange) on several days beginning with March 11, 2020 when the WHO officially declared the pandemic. The results cannot be interpreted rigorously, but they are striking. Of the five days identified, four have strong departures, one upward and three downward. The fifth case shows typical random variation. Overall, these probes say unequivocally that the GCP network was not producing normal random data.

The coronavirus timeline published by *The New York Times* notes that on March 11, the World Health Organization declared the coronavirus a pandemic, and the graph here shows the GCP result for that day. The figure doesn’t require much explanation beyond a general description. The jagged line represents the day’s history of variations in our measure, which is a calculation of the correlation between RNGs in the network. This should vary up and down but show a basically level trend. What we see instead is a pronounced slope indicating substantial correlation among the RNGs. (The 1-tailed probability for this strong trend is p = 0.0004, meaning odds of about 4 in 10,000 that it is just chance or random variation.)



GCP Network Variance on 11th Mar 2020, 09:30 to 16:30 EST.

As interesting and suggestive as such a graph looks, we are careful not to make strong claims. It doesn’t necessarily demonstrate that there is a “global consciousness” reacting to the coronavirus pandemic. Yet, the scientific abstraction suggesting global interconnection is worth considering as we work our way toward the future. Optimally, indications of direct effects of shared consciousness mean that we can be actors in our destiny, not just passive observers. We can manifest the future of our choice if we become more aware of the power that rests in our unconscious connections. We need to help ourselves, and I think we can do that. When we bring our unconscious interconnections up into awareness, we will be able to change the world. Cooperation and collaboration are a birthright that is more powerful than we know, and the evidence suggests it is ready to claim now.*

ROGER NELSON is the Director, Global Consciousness Project (global-mind.org) and the author of *Connected: The Emergence of Global Consciousness* (ICRL Press, 2019).

*More recently, another powerful and widespread engagement has developed from intense and continuing protests responding to the death of George Floyd in police custody. It has grown into full-throated demands for social justice and equality. I have probed the data for this concurrent crisis, and again there is clear indication of a global consciousness response. A brief report is available at http://global-mind.org/papers/pdf/George.Floyd.Murder.pdf