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Highly Unlikely Conspiracies

17–21 minutes

[Lost NASA footage from the moon landing](#)

A year and a half ago the British PM Theresa May stunned the world by introducing into international relations a new, rather casual standard of proof—“highly likely”—in regard to the very strange case of the Sergei Skripal poisoning. It is part of a technique that is applied as follows. Make an unsubstantiated accusation of some party being “highly likely” to have committed a certain crime. Demand that the accused party confess to the crime, disclose all relevant information and agree to pay reparation. If this demand is not met, impose punishment.

It is “highly likely,” the British government claimed, that a couple of Russian tourists secretly employed by a nonexistent Russian government agency called “GRU” smeared some poison gas on the doorknob of the front door of the house occupied by Sergei Skripal, a former Russian officer who had been caught spying, did time in Russia and was released in a spy swap deal. This heinous act of smearing poison gas on the doorknob occurred after Skripal had left his house, never to return. So badly was the doorknob contaminated with poison gas that the entire roof of the building had to be replaced.

The name of the poison gas in question, called “Novichok,” was borrowed from a British television series. “Novichok” (which is

Russian for “newbie”) was imputed to had been designed by the Russians (the Soviets, actually) who had once made it in a factory outside of Russia that was subsequently destroyed by the United States. Russia (as opposed to the USSR) never had a chemical weapons program (or so said international inspectors) but the British still do, and have kept samples of “Novichok” at a facility just down the road from where these events took place. They used their samples in order to identify the gas that was smeared on the doorknob, declaring it to be very pure.

Skripal and his daughter Yulia were found in great distress on a park bench and were rushed to a hospital with the help of the UK’s chief army nurse who just happened to have been strolling by just then. Although “Novichok” was designed to kill thousands of soldiers on a battlefield, it failed to kill Skripal or his daughter, whom the British have been keeping prisoner at a secret location ever since that event. Yulia appeared in a single staged interview where she read out a Russian translation of an obviously English script that had been handed to her and bore signs of a tracheotomy (which is pretty damned useless on somebody who has been paralyzed by a nerve agent).

This takes care of means and opportunity, but what about the motive? Well, clearly, Putin ordered this retired former spy to be murdered by a couple of bumbling tourists on a hookers and weed tour of London who took a side trip to look at a cathedral using an exotic poison gas in order to make sure that the FIFA World Cup championship, which Russia was hosting and which was just about to start, would go off without any international embarrassment. It is rather untraditional to assassinate spies exchanged in a spy swap because it undermines future spy swaps, but Putin, being a former spymaster himself, probably

wouldn't have known that and nobody at the mythical "GRU" knew either.

In any case, it is "highly likely" that this is exactly how and why all of this happened, and if you don't believe that then you are a conspiracy theorist and your conspiracy theories need to be subjected to a thorough, lavishly funded debunking campaign. Elements of this campaign include accusing you of lack of patriotism and of aiding and abetting the enemy, paying "experts" to browbeat you with their superior acumen and knowledge (including secret knowledge to which you are not privy because of national security concerns) and feeding you false information as bait in order to discredit you once you take the bait and try to run with it.

The highly likely outcome is that you will end up making yourself look ridiculous. You are highly likely to come to be seen as a deranged person who quests for some exotic truth but doesn't realize the far more basic truth of what's good for you: keeping your head down, your mouth shut, and just going with the flow. After all, what's more important, telling the truth or getting rich? "If you're so smart, why aren't you rich?" is a frequent rejoinder. And, as everyone knows, getting rich usually involves telling a lie or two or three and looking the other way when others do the same. If you refuse to play ball, your career and life prospects dim appreciably. It may be honorable and noble to quest after the truth but, chances are, your wife and children won't thank your for it—just ask Julian Assange.

Nevertheless, most people who have a functioning neuron or two between the ears find it rather humiliating, demeaning and generally unsatisfying to settle for a load of bullshit like the preposterous Skripal saga outlined above. To avoid such negative emotions, we need a mechanism for defeating the

process by which we are force-fed lies that doesn't involve any sort of quixotic, self-defeating quest for the ultimate truth.

In order to develop this mechanism, we need to first defeat a certain other mechanism, which is almost innate: when we find out that X is not the truth, our minds immediately ask, But what is the truth?—and if no answer is immediately available we start making assumptions and jumping to conclusions because persisting in a state of partial ignorance and balancing several mutually contradictory notions causes mental discomfort.

The ability to defeat this mechanism is something we can look for when we try to tell the sheepdogs from the sheep. As soon as we question the dominant narrative, the sheep among us, whose minds are primitive, immediately ask: “So what’s the real story?” And when you say, “I don’t know,” they immediately respond with “Well, let me know once you find out.” Don’t feel defeated when that happens; just write “baa” next to their name and move on. Life is too short to waste any of it conversing on complex subjects with people whose motto is “Certainty in Ignorance.” Of each person, ask, What is this person’s usefulness? Sheep aren’t worth talking to, but they are good to eat, save money on mowing and make fine socks and sweaters.

Once we filter out the sheep and train our minds so that we can remain comfortable while maintaining a skeptical view of all facts at our disposal, conspiracy theory becomes a very useful sport. In fact, it is quite a popular sport. Cornell University professor David Collum recently tweeted the following:

I am a “conspiracy theorist.” I believe men and women of wealth and power conspire. If you don’t think so, then you are what is called “an idiot.” If you believe stuff but fear the label, you are what is called “a coward.”



I pretty much agree with Collum, although in place of “believe stuff” I would say “are skeptical of the official story” because what’s key here is not what you believe but what you refuse to accept as the truth unquestioningly. Like it or not, nobody is going to present you with “the truth, the whole truth and nothing but the truth” on a silver platter tied with ribbons and bows accompanied by a bit of fanfare. Instead, the best you are ever likely to obtain is limited, skewed, distorted knowledge leavened with a bit of outright falsehood.

I suppose I am a “conspiracy theorist” too. Whenever I write something that questions the veracity of some official narrative, someone (probably a troll) pops up and asks me what I think of 9/11. Here is what I typically reply:

I totally believe that it was possible to knock down three steel-framed buildings using two flying aluminum cans loaded with kerosene, luggage and meat. I have proven that this is possible by throwing two beer cans at three chain-link fences. All three fences were instantly swallowed up by holes in the ground that mysteriously opened up right under them and in which they were instantaneously incinerated into fine oxide powder that coated the entire neighborhood. Anybody who does not believe my experimental results is obviously a tin-foil-hat crackpot conspiracy theorist.

Lots of people read this and ran away bleating; a few people bust a gut laughing because this is (trust me on this!) actually quite funny. Some people took offense at someone ridiculing an

event in which thousands of people died. (To protect their tender sensibilities they should consider emigrating to a country that isn't run by a bunch of war criminals.)

But if you do see the humor in this, then you may be up to the challenge, which is to pull out a useful signal (a typical experimentalist's task) out of a mess of unreliable and contradictory data. Only then would you be in a position to persuasively argue—not prove, mind you!—that the official story is complete and utter bullshit.

Note that everything beyond that point, such as arguing what “the real story” is, is strictly off-limits. If you move beyond that point you open yourself up to well-organized, well-funded debunking. But if all you produce is a very large and imposing question mark, then the only way to attack it is by producing certainty—a very tall order! In conspiracy theory, as in guerrilla warfare, you don't have to win. You just have to not lose long enough for the enemy to give up.

When calling bullshit some techniques are more powerful than others. Pointing out physical impossibilities is the best. The poisoning victim left his house never to return before the perpetrators smeared the toxic gas on the doorknob of its front door. Beyond that there is the preponderance of evidence technique: pointing out a very large number of incongruous details that cast doubt on the official story, forcing the debunkers to tackle each and every one of them by providing plausible explanations for each one.

Short of demonstrating physical impossibility, there is an almost equally powerful technique: pointing out (using physics and math, if possible) that the event, as described, was highly unlikely. There is a common saying: “If it sounds too good to be

true, it probably is.” Analogously, if something is highly unlikely, it probably didn’t happen. The burden of proof then rests with whoever claims that it did happen.

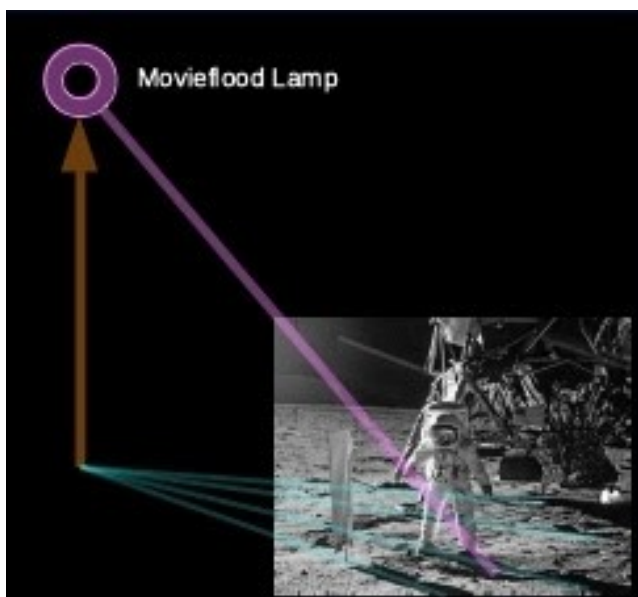
Let’s work through an example. Some people still claim that American astronauts landed on the moon. (Their name is a bit of a giveaway: they are “astro”-nauts, and so perhaps their exploits took place within the astral plane.) About a quarter of Americans didn’t believe that the moon landings happened at the time they were said to have taken place. Five decades later the doubters form solid majorities within many parts of the world.

The Apollo mission story was never particularly believable. The preponderance of evidence technique has been used to poke lots of holes in it. Here’s a very much shortened list of the incongruities:

First, there are multiple signs of forgery. There are multiple indications that the official Lunar landing photographs were shot in a studio. In all of the photos lunar dust the wrong color: flat gray instead of reddish. Quite plausibly, the studio simulated the cratered lunar surface by filling it with Portland cement and throwing rocks and pebbles at it. Shadows don’t run parallel but converge to a point, indicating that the source of the illumination was a studio light rather than sunlight. The claim that the photos were shot on the Moon using a film camera is implausible because temperatures on the lunar surface are too cold for film to work at all in the shadow and hot enough to melt the film in sunlight with nothing in between. In any case, since the Moon lies outside the Van Allen belts, solar and interstellar radiation would have at least fogged, and probably ruined the film.

Astronauts, who had cameras strapped to their chests and wore cumbersome pressurized gloves, couldn’t have plausibly framed, focused and exposed virtually all of the shots to

produce perfect studio quality. In some official photos the shadows run in different directions because multiple studio lights had been used. The video of astronauts cavorting on the lunar surface appears to also have been shot in a studio on Earth and shown in slow motion. There is no crater under the lunar lander which would have been formed by the engine during descent. The dust under the lander is undisturbed except for footprints. Clearly, the lander was placed on the scene using a crane. In all of the photos the sky is completely black instead of being filled with brilliant stars, planets and galaxies.

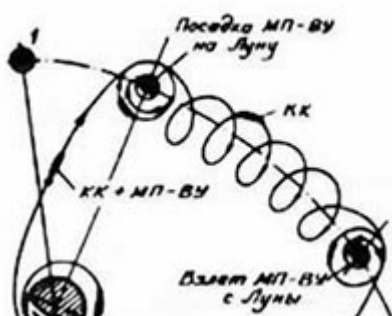


Second, there are multiple signs of cover-up and guilty demeanor. All of the magnetic tapes from the Apollo missions have been destroyed along with most of the plans. In particular, blueprints of the lunar lander are nowhere to be found. The astronauts, when asked to swear on a Bible on camera that they have been to the moon, reacted rather strangely and refused. The lunar rocks that were supposedly retrieved from the Moon and given out as presents have turned out to be either missing, indistinguishable from asteroids that have been collected by Antarctic expeditions, or fossilized wood from the Nevada desert. Also, the Apollo missions being the crowning achievements of human space exploration, we would expect a

huge deal to have been made of the 50th anniversary of Apollo 11, which was just a few days ago, but nothing of the sort happened.

All of this is quite puzzling but rather inconclusive and open to counterargument and rationalizations. On the other hand, it is difficult to argue that the Apollo missions were outright physical impossibilities. But it is quite possible to argue that they were highly unlikely—so highly unlikely that the chance of all of them conspiring as described is sufficiently negligible as to be discounted entirely. Sure, the suicide stabbed himself in the back through the heart 10 times over a five-year period—and survived. A likely story!

First, a bit of probability theory: in evaluating the probability of success of a sequence of events, the probabilities of each step in the sequence multiply. As was correctly pointed out by the Nazi-American rocket scientist Werner von Braun, a simple version of a single multistage rocket that flies to the Moon, lands and flies back, would have required a rocket of such ridiculously huge dimensions that it was unthinkable. But probably unbeknownst to von Braun, a more complicated and more doable version of the mission had already been worked out by the Russian scientist Yuri Kondratyuk back in 1919, and which the Apollo program adopted. It made it possible to limit the starting payload size to 100-140 tonnes—something that Saturn V rocket could handle. The problem with Konratyuk's version is that it introduced many new potential points of failure.





Let's enumerate the steps of Kondratyuk's method. A multiple-stage rocket lifts the payload to near-Earth orbit. The orbital module separates from the last stage of the rocket, turns around and docks to the lunar module. Then the last stage of the rocket fires again, accelerating to Earth boost velocity and driving it toward the Moon. Then the rocket stage disconnects and crashes into the Moon along a ballistic trajectory. Then the lunar modules brake and enter lunar orbit. Then the lander undocks from the orbital module, descends and lands on the Moon. Then, once the mission on the surface is completed, the ascent module disconnects from the lander, fires its rocket to enter lunar orbit and docks to the orbital module. After the crew is transferred to the orbital module, the ascent module is disconnected. Then the orbital module fires its rocket to fly back to Earth. Before reentry, the crew is transferred to the descent module, the service module separates and the descent module plummets through the atmosphere.

Count the steps: there are 13 of them. Now, suppose that each step is 99% reliable. Then the probability of the overall mission being successful is 0.99^{13} or 88%. Problem is, practical experience of failures during space missions during the 60s and 70s puts the chance of success at each step at around 60%.

Now, 0.6^{13} gives us the chances of success of any given Apollo mission that lands on the moon at 0.13%. There were purportedly six Apollo missions that landed on the moon.

0.0013^6 gives us a truly astronomically small probability of

success: 5×10^{-18} . That's one chance of success for every 200,000,000,000,000,000 attempts.

Suppose you don't like the 60% reliability number. Maybe those NASA scientists were just extraordinarily good and managed to make each step 90% reliable—a tall order, considering that they had to get it right on first try. Then the chance of all six Apollo missions being successful is one in 3,707. But then the 90% number is itself highly unlikely.

As far “highly unlikely” goes, the Apollo missions pretty much set the gold standard. It leads us to conclude that it is highly unlikely that any Americans ever set foot on the Moon. Now, a lot of people are understandably flabbergasted at the possibility that it has been possible to pull off a hoax of this magnitude for 50 years. Sure, that's highly unlikely too. I'll leave it as an exercise for the readers to calculate the probability of pulling it off, but my hunch is that it is many orders of magnitude higher than one in 200,000,000,000,000,000 because I think it highly unlikely that an overwhelming percentage of highly compensated professionals wouldn't keep their mouths shut in order to save their jobs, protect their reputations and, if the stakes are high enough, stay alive.

So, yeah, sure, Americans landed on the Moon six times. Lucky, lucky Americans! Soooo lucky!

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