

Concept Fetishes and Perils of the Fringe Technical Literature

I have been working as a physicist in the area of advanced propulsion for many years. It basically amounts to searching for a way to mine momentum from empty space. This problem is as technically difficult and problematic as it sounds. Over the years, I have met many different people, at different levels of technical training, who are very interested in this broad area, and actively pursue developments in the fringe technical literature related to space propulsion – space enthusiasts. Others are trained scientists or engineers who have developed their own theories of the world that “explain everything” – concept fetishists. I don’t mean either of those terms in a derogatory manner. Enthusiasm is not bad, and fetish is meant to be something softer than obsession, but without true utility. I have given the following advice so often over the years, that I thought it might be useful to write it down here, so that others can share it.

The best place to start for anyone is motivation: What are you trying to do? What are you trying to understand? What are you trying to learn? What are you searching for?

For a non-scientist, the technical literature is bewildering. The number of apparent technical journals has exploded with the internet. You can find any study proving anything you want. And if you can’t find it, you can fake it.

Neither the science literature, nor the practice of real science by real scientists, is understood by non-scientists. And understandably so. In the rest of the real world, high scores count: biggest, best, fastest, richest, most beautiful, most RBIs, most loved. So it is reasonable to assume science is like that: Aren’t all these science articles like little movies? And everyone is like the Academy? And everyone votes on the science they like the most? And the best scientists make the best theories and win the Oscar? And that becomes “the theory”? And so why can’t I vote too? I can watch movies and tell the good ones. Can’t I surf the technical literature and pick out the good stuff? The next Olivier, the next Kubrick? I mean, everything on the internet must be true, right? Science is just the weight of opinion, right? A beauty contest? I know as much as anyone, right?

You know where this is going :-). No, Virginia, you can’t believe everything you read on the internet. In fact, much of what you read on the internet is pay-for-click. They put something – anything – on a web page to entice you to click. They make a nickel, you get a dopamine hit, and everyone’s happy. Unfortunately, this business model even works when the thing you click on is not true: they still make a nickel, you still get a dopamine hit, everyone’s still happy. So I ask you, Is this where you want to be? Trading clicks for dopamine? Is this what you set out to do? I think not.

Before venturing into the technical literature, know this first: The laws of physics in textbooks are the expression of centuries of experiments, performed by millions of people. They are a set of mathematics used to predict the future. For example, Where do I point my rocket so it hits Mars in 2026? How big a magnet should I put in the turbine? What is the yield of my nuclear warhead? How big is the battery in my iPhone? The technical literature is where the mathematical laws in the textbooks have been developed and matured. One experiment or study does not make a theory any more than one soldier makes an army.

And here is where science is different than the Academy Awards. Every atom of science in each article gets knocked down; it gets attacked, it gets sliced and diced and blown to smithereens by angry hoards of jealous scientists (“peer review”). It is not unheard of to see tears at a PhD defense.

In what other field do the workers endure difficult emotional suffering, by spending years on a project, then watching passively as others tear it down, and knowing it has to be this way? Indeed, every discovery that truly succeeds becomes the birthright of everyone. Any Cal Tech grad student understands general relativity far better than Einstein ever did. The best a successful scientist can hope for is that her little piece of the puzzle finds a place in the greater shared edifice.

To be a scientist is to live in a bloody battlefield of ideas that is invisible to everyone but the combatants. There are no spectators cheering in this arena. There is duty, but no medals are given. No cancer researcher gets to board a plane before a 23-year-old commando, or fly a private jet like a pro ball player. No one thanks scientists for their service, even though they bring more good to the planet than any commando or ball player or movie star.

So you see, very few “theories” survive the process of scientific development. It’s not rewarded so much as punished. Flawed theories die in the cradle, in the crucible. The ones that do survive, make it into the textbooks. So for a non-specialist to learn about new physics or new science through individual articles in the technical literature is impossible by definition. One article is not enough for it to get sliced and diced by angry science hoards (peer review). It’s like predicting which egg in the ovary will become Winston Churchill. If you’re a betting person, you are more likely to be struck by lightning or win the lottery than find the next breakthrough in any one article in the technical literature.

Do not despair, however! Now, you know the truth. Your eyes are open. Now, your time will no longer be wasted trawling in the technical literature for the next breakthrough, or worse yet, trading clicks for dopamine in the fringe technical literature. Now you can work effectively toward your goals.

Again: What do you want to do? What do you want to know? We have a little of the space enthusiast, and a little of the concept fetishist, in us all. So they are not bad in and of themselves, but they can result in a waste of energy if not directed.

Allow me to address first the space enthusiast. Let us say you are curious about many things, and you want to be trawling through *some* literature to find exciting developments. But you are not trained as a scientist, or not doing research in the areas you are reading in. You are likely technical-minded, perhaps an engineer. As of 2018, the Navy is releasing cockpit video of UAP encounters with their pilots, and inquiring minds want to know. You are looking for that big breakthrough. But from our discussion so far, you do understand your time is wasted if the literature is paid for by click traffic. But you just aren’t ready to give it all up and binge watch *The Flintstones* instead. Plus, the dopamine urge needs an outlet!

In that case, start with high quality general literature. A paradigmatic example is the *New York Times*. What distinguishes the Times from other news sources is its basic scientific commitment to objective reality, objective reporting, and fact checking. That is why you, the reader, have to pay to read the *Times*. They provide a service: reliable information. The stuff you trade clicks for is not reliable information. Whatever general source you choose, make sure they have a mission statement like this

<https://www.nytimes.com/editorial-standards/ethical-journalism.html>

If you want to be lied to; and if you don't believe there is a shared, objective, physical reality; if science is what comes out of the mouths of politicians and cable "news" couch potatoes; then pursuit of science is useless to you, because science is based on shared, objective, physical reality.

Now let us say you agree that rigorous standards of objective reporting are necessary for you to use your time effectively in searching through technical literature, but you want to focus more on science than the odd science and technology article appearing in the *Times* or similar general sources.

Then I would recommend *Scientific American*. It has been around 150 years, and reports on the latest developments and discoveries in mainstream science, from anthropology to zoology. The best article on exotic propulsion I have seen appeared in *SciAm*. The articles involve no math, and are perfect for the curious non-specialist. They are effectively review articles written by eminent scientists in their field, and are rigorously peer-reviewed. Here is a way to stay reliably informed on the latest scientific and technical findings of our age that have not yet made it into the textbooks. Time spent is real education.

Perhaps your technical appetites are too large for *SciAm*? Their articles are too high level, and only monthly? You want to get closer to the action, the real technical nitty-gritty, where the sausage is made? Then your choices are *Nature* and *Science*. *Nature* is the pre-eminent science journal in Europe, and *Science* in the USA. The best scientists in the world submit their most important results to *Nature* and *Science*. Perhaps only 10% of articles submitted are accepted. Issues appear weekly, and run the gamut from cosmic ray physics to sociology. Articles are peer-reviewed by other scientists. The results reported are reliable atoms in the mosaic of science. I bet you can't trawl it all!

Yet be advised. Even the articles in *Nature* and *Science* have not been tested and knocked down. You can not make much more inference from a single article in *Nature* than from a single article at *FaceOnMars.biz*. Yet at the end of the day, what makes it into the textbooks will reflect more of what appeared in *Nature*, and nothing from *FaceOnMars.biz*. That is why you have to pay to read *Nature*, and *FaceOnMars.biz* is free. *Nature* trades in reliable science. *FaceOnMars* trades in clicks.

If you want to go deeper into a particular area, such as a particular advanced propulsion topic, you can look for a technical review article in the field. That is the starting place to assess the state of any area of science. It is relatively easy to find legitimate, peer-reviewed articles that review the state of a certain area, written by an authority in the field. This is where any would-be scientist would start in any research. This is where you mount the shoulders of giants. Use the review article, Luke!

What's that, you say? You want to go deeper still? Full contact science? You want to see the whites of their sciencey eyes? You want to strap the laws of physics onto the hood of your Ford Falcon and go plowing like Mad Max through the wastelands of the technical literature, until you scare something up or until you run out of gas?

I say then, Max, my friend, there is no more noble pursuit. That is exactly what needs to be done. Few attempt it because it is so hard, and fewer succeed. I can guide you. But first, take off that ridiculous leather outfit. You will want jeans and flannel for this adventure.

Then, Max, you must read and master the textbooks existing in your field of interest. If you are interested in advanced propulsion, then please read about classical mechanics, electromagnetism, general relativity, cosmology, the composition of the earth, the size of the solar system, the composition of the planets, the age of the universe, the origin of the elements, the recession of the galaxies, the band structure of solids, the line spectra of the elements, the Hertzsprung-Russell diagram, quantum theory, electronics, and a few things I'm forgetting. You will master partial differential equations, and look at the known solutions to all the equations of physics. You must learn to recognize the "paradoxes" of relativity. You must understand the deep symmetry properties that underlie all laws of physics, and that underlie all we will ever discover. You must learn about inertia and the quantum vacuum. You must understand Lagrangians and Hamiltonians. You must understand what mathematical forms are acceptable for any laws of physics.

When you have mastered all that, Max, we need you to go out into the world, and perform experiments. You must find an experiment that demonstrates an effect unknown to the laws of physics. Something entirely new, not predicted by our existing mathematical laws or seen in millions of previous experiments. Then if you find an effect unknown to science – and you know it is, because you did a thorough literature search to make sure no one else already did it – that is just the beginning. Then your experiment must be knocked down and tested 100 times by angry, jealous scientists (peer review). If it survives all that, only then can we write another chapter in the textbooks.

But if you are a lazy Max, and you want to dabble in the technical literature, fringe or mainstream, technical or commercial, maybe find a Kato to fix the Ford, and you want to believe you are learning something or knowing anything, then you want what can never be and has never been: something for nothing. Merit without work. Authority without experience. Worse, you are of no use. Your efforts are wasted. It is all theatre, a Potemkin village of expertise. Meanwhile, those who needed you, and relied on you, were left wanting while you chased wild geese.

You have a role to play, Max, you are needed! But do not pretend you are not wasting your efforts. Science is not sexy. It is not easy. There are no leather outfits, no Academy Awards. It is the work of nameless millions on behalf of all humankind.

But here is the real ass-kicker, Max. If you run across a truly great, revolutionary discovery in the technical literature, you will not see it. If it's truly great, it will be beyond your comprehension. All that dopamine and clicking is based on an *expectation*. The discoveries we haven't made yet are beyond expectation. Only the honest process of science, which controls for human fallibility and human expectation, can find the unseen. We need your help to find it! But there are no shortcuts.

Today is an exciting time for any science enthusiast, because now crowd-sourced science is available. You can join many scientists around the world and actually help with their research. You can make a productive difference with your energies. Check out

<https://www.zooniverse.org/>

That concludes my honest advice to the space enthusiast. But now, on to the concept fetishist – a tougher nut to crack.

The fetishists, unlike the enthusiasts, are often highly technical, creative, independent, usually engineers, but not physicists so much. As mentioned, the fetish is perhaps softer than obsession, but still unforgivingly dogmatic. We are all concept fetishists to some extent, and one could say conservation of energy is a concept fetish, in that it is applied repeatedly and clung to determinedly. But that is like saying a wrench is a fetish to loosen a bolt. This brings to light the distinction: a fetish has no utility. A wrench is not a fetish. Conservation of energy is not a fetish. The Einstein equations are not a fetish. In science, a fetish is that which is unnecessary, yet still satisfying to the proponent.

The great theoretical physicist Feynman would attempt to verify his discoveries through multiple, independent lines of reasoning, different conceptual frameworks. Something tested like that is a lot tougher to knock down, and he saved his colleagues the work. In his obituary in *Physics Today*, it was said he could derive the Maxwell equations from the commutation relations of quantum mechanics. If so, it is lost to history. Yet it demonstrates that in physics, there are many paths to the mountain top, but only one summit.

For the non-Feynmans among us, which is basically all of us, we struggle mightily to just understand nature from *one* line of reasoning, from one conceptual framework. Sometimes we don't even get that. Therefore, when one among us achieves that moment of true epiphany, and grasps a *second* perspective from which to understand the mathematics of the world, they are understandably euphoric. Mistaking the momentary revelation of the smallness of their old concept, as a revelation of the greatness of their new concept, they weep tears of knowing joy, and rush to proselytize it to the world.

But when they eventually float back to earth, they realize they have the same mathematics, the same ability to predict the future, the same utility, and nothing more. And this explains why so many theories "explain everything" and why they are so often ignored. Nature rhymes on many levels, but not all the rhymes have new information. The revolution is in the mathematics, not the English words we put on the math. The laws of quantum mechanics don't care if we call them the "Copenhagen interpretation" or the "many worlds interpretation" or the "Mickey Mouse interpretation". The math is the same.

If we are honest, we see that these "tiny visions" are themselves not revolutionary. They merely rearrange known concepts, spelling new words with the same Scrabble tiles. Such theories seem geared to "explain" parts of physics the would-be visionary does not himself understand so well. So one falls into a trap of simple concepts assembled like Legos, modeling the subtle with the crude, motivated only by discomfort, taken on faith that nature cannot be more complicated than what seems familiar.

For example, there might be a theory where "everything" is composed of counter-rotating blue and green fairies. We could make the theory work! There would be a fairy density, an angular momentum per fairy, maybe a tunable parameter. We all understand fairies, and it makes the math easy. Let's say we did, grant me the premise. It explains everything, all the known experiments, the Maxwell equations, Newton's law of gravity, beautifully reproduced by the theory of counter-rotating blue and green fairies. It even uses an economy of assumptions! If you grant me the premise, is this not a revolution? Is this not a great discovery, portending mastery of the heavens?

Compare that now with the bold revolutions, the *true* revolutions: that nature is mathematical and the motion of the planets can be predicted quantitatively; that force fields permeate all space and exert forces on moving bodies; that time is not absolute and that gravity is curvature of spacetime; that matter exists as probability waves. These are truly great and truly sublime, and could not have been

arrived at with old concepts. Explaining “everything” by rearranging existing concepts explains nothing at all.

Instead, our understanding of the laws of nature is in the mathematics. Is the fairy mathematics the same as the textbook mathematics? If it is, then the difference is irrelevant. If the fairy mathematics has a new prediction not in the textbook mathematics, then perhaps we would move to adopt the fairy picture of reality, assuming it was knocked down 100 times by angry, jealous scientists (peer review), and survived.

Kick the clicks, drop the fetish, join the rest of us, and put your shoulder to the wheel of science. Everyone has a role to play, but only you know what it is.

May you live long and prosper!

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29 April 2020*