Matt Ridley: How Innovation Works, Part 2

31-39 minutes

Naval interviews Matt Ridley, the author of The Red Queen and, recently, How Innovation Works. Also see Part 1.

Innovation Famine

Matt: I have a chapter towards the end of the book where I complain about the fact that we are living through an innovation famine, not an innovation feast—particularly in areas other than digital. One of the reasons for this is the power of the environmental movement to oppose new technologies, which are often good for the environment. I detail the case of genetically modified organisms, where you make a plant insect-resistant and have the capacity to wean agriculture of chemical pesticides. This has been proven to work and is now being used in India, Brazil and North America as well—but not in Europe and Africa where an entire technology has effectively been rejected by the pressure of environmentalists.

My good friend Mark Lynas was one of the most prominent campaigners against this technology in the 1990s and did a lot of the protesting a lot of the writing about it. And then he changed his mind and said, “We were doing the wrong thing, but it’s almost too late.” It’s very hard to see how Europe now changes its minds and adopts this new technology. The best hope is that with the next technology that comes along, which is genome editing through things like CRISPR, a lot of the concerns of environmentalists can be set to one side because this is not a technology that involves bringing foreign genetic material from other creatures, whatever that means, into plants. So it’s possible that we can leapfrog into some cleaner technologies there.

The end point must be that the more we innovate, the fewer resources we need, the less land we need, the more land we can give back to nature, the more we can make people prosperous, and that results in them cutting their birth rate. It also results in them planting more trees. There is a possible soft landing for humanity later in this century, if we do plenty more innovation. We could end up with 8 or 9 billion people living lives that are much more benign towards the natural environment and that enable most of us to have greenery around us.

The COVID pandemic has shown us, quite starkly, that we have not been doing enough innovation. We’ve not been developing enough vaccines; we’ve not been finding ways of developing vaccines faster; we’ve not been developing enough diagnostic devices. When you look at why not, you find that there is 17 to 20 months of delay to get a license to sell a new diagnostic device. This is enough to deter most entrepreneurs from even trying to go into that area. I hope one message people take is that, if we can do more innovation, we will not destroy the planet. It’s quite the reverse. It’s the safest way of saving the planet. The poorest countries are the ones seeing the most damage to the environment at the moment.

Naval: One of the things that David Deutsch does in his works that he often talks about is how anything that is possible or not forbidden by the laws of physics is possible for us to create through technology and science. As universal explainers, humans are capable of understanding anything that any being or any theoretical creatures capable of

understanding. All we have to do is figure out how to reconfigure the existing atoms and particles out there to do what we want within the laws of physics, which are quite generous and quite broad. In that sense, all failures and all sins are just ignorance. It's just the lack of knowledge.

> "We are capable of making objects, even our simplest objects that are beyond the capability of one human mind to comprehend."

If we were to speed up the accumulation and application of knowledge through innovation, we would be able to solve all of humanity's problems. And we're always at the beginning of this infinity, as he says, because there's an infinite amount of progress to be made. There's so far to go that when you look at where we are at any given point on that curve, infinity stretches out in front of you. I find that extremely hopeful. But as you point out, we can be our own worst enemies in these cases.

Matt: It's a very important part of rational optimism that we are not saying the world is perfect. Quite the reverse. That's what the word *optimism* meant when it was coined by Voltaire: You thought the world was perfect and couldn't be improved anymore. That's not what people like me and David Deutsch are saying. We're saying there is an incredible amount of improvement that we haven't even yet begun to imagine. We are at the start of a very long run on Broadway, as a species. We're not towards the end. We are going to see some amazing novelties in the current century. One of my beefs with the environmental movement—as you say, not the conservation movement that deals with local greenery but the planetary one—is that it imagines that we're not going to be able to invent very much and, if we do invent things, they will do harm. That doesn't feel right to me. We've hardly scraped the surface of different ways of combining and recombining the atoms and elements of the world. Paul Romer talked about how many different compounds of the minerals in the periodic table could be made. It's an astronomical number, and we've hardly explored the properties of half of them. Like you, I'm a fan of fusion energy and I think that could make a huge difference within our lifetimes. There's all sorts of things that we're going to be able to do in this century to improve humanity but also to make it a livable place.

Naval: There's this spaceship-earth metaphor that a lot of people latch onto instinctively because it's seductive. People say the earth is this fragile, precious blue marble that gives us everything we want, and that when we destroy our home, there's no place else left. We can't get off Spaceship Earth. This treats earth as a zero-sum game. But upon closer examination, it falls apart. Even earth is hostile to the idea of 7 billion humans living on it. The only way 7 billion humans live on earth is through innovation through technology and through modifying the environment. The challenge is how to do it in a sustainable way—and then figure out how to do it on other planets, and Terraform Mars and the moon to make them livable. It requires a careful reexamination of this spaceship-earth metaphor, which most people instinctively believe, but upon examination turns out to be incorrect.

Matt: You mentioned knowledge as being potentially infinite. It's very important to emphasize that knowledge is a distributed and collective phenomenon. I go back to this wonderful little essay that was written by Leonard Reed in the 1950s called "I Pencil" in which a pencil works out how it came into existence and discovers that millions of people contributed to its manufacturer—from people cutting down trees for the wood to people mining graphite for the lead. The important point is that not one of them knows how to make a pencil.

We are capable of making objects, even our simplest objects that are beyond the capability of one human mind to comprehend. It requires lots of human minds to collaborate, to make them and to accumulate the knowledge of how to invent them as well. At this point I begin to sound a bit like a Marxist because I start talking about collective humanity, but it's a way of rescuing collaboration, cooperation and partnership

from a communist perspective and restoring it to a much more voluntary end of the political spectrum, if you like.

Naval: Cooperation is the basis for the species. For example, ants and bees look like hive creatures, but they don't cooperate across genetic boundaries. We're the only creatures that cooperate across genetic boundaries and do long-range planning with each other. Yuval Noah Harari, he talks about this.

Matt: We know how to cooperate with strangers, and they don't.

Naval: If you and I were to belong to any other species—whether dogs or mice or ants—given how genetically different you and I are and how culturally different you and I are, if we encountered each other in real life we'd probably attack each other or fight over the same habitat. We couldn't cooperate or converse. That is a unique feature that we should be proud of. You need cooperation, and no one person understands any of these complex systems. It's why I laugh when macro economists build their models trying to figure out where the economy is going to go. The economy is far too big for any one individual to understand. It's an emergent, complex system of billions of actors. So these models, by definition, cherry-pick a few shaky assumptions and end up miraculously converging and whatever political bias the macro economists happened to have in the first place.

COVID-19

Matt: That's one of the problems we're seeing at the moment with the modeling of the pandemic. It's an attempt to understand a bottom-up phenomenon with a top-down approach. The other way of putting it is to say roughly 10 million people eat lunch in London on a normal day, but most of them choose what to eat at the last minute. How is it possible that the right amounts of the right kinds of food are available, in the right places, at the right time for that to happen? Who is London's lunch commissioner? He or she must be unbelievably intelligent. And, of course, there is no such person. And if there was, it would be an absolute disaster.

Naval: Then we would all be eating Soviet-style glop rations, and half of us would be starving. There'd be long lines. Unfortunately in 2020, the economists are building epidemic models and the epidemiologists are running the economy, so we've got it backwards. We're trapped in a bad situation in which we are not willing to put a value on a single human life. You've put these health officers in charge who didn't train or sign up to run the entire world—and they're terrified they'll be blamed for excess deaths if they let up too early. It's very hard to calculate the economic consequences, so they're going to keep us locked down for quite a while. I'm intrigued by the Swedish model, not because it's necessarily the best one. (The best one would have been if we had isolated and crushed the curve like Hong Kong and Taiwan did.) But given that most of the Western countries are large democracies and don't have the ability or the willpower to do that, we're all headed towards a Swedish model one way or another, whatever that turns out to be.

Matt: Thank goodness for Sweden not locking down because, otherwise, the Western world would have been able to say, "Well, there is no alternative." We know there is an alternative. Though Sweden had a huge amount of voluntary social distancing, the country didn't have compulsory lockdowns and hasn't damage its economy nearly as badly as countries like Britain and the U.S. Sweden has shown that the most important measures in getting on top of this pandemic are almost certainly the voluntary ones—things like not shaking hands, not having large gatherings, staying a safe distance from each other—not confining everyone to their homes.

Naval: It makes no sense that big box retailers are open, but small businesses are not allowed to open. Obviously, the best response is a bottoms-up distributed response. You can beat the virus when individuals all panic, not when the governments panic. But a

single panicked individual can outsmart the virus. Governments don't know how to control viruses, but they do know how to control individuals; whereas an individual can control their own health, safety and viral spread. So we've taken an education problem and turned it into a government top-down control problem.

Matt: The British government is discovering at the moment that it's quite easy to scare people and not so easy to unscare them. The draconian introduction of the lockdown was very effective. It turned out that people were willing to go along with it and even report on their neighbors. They became surprisingly authoritarian in a surprisingly short time because they were being given a very scary story. People are easily frightened about things. but when you come along and say, "Right, scare over, please come back to work," half the country is saying, "No, I thought you said it was scary. We're not going out yet. And by the way, you're paying us to stay at home, so why should I?"

Naval: That's going to change. The cynical view is that, up to this point, blue collar people are the ones losing their jobs. So far it hasn't been the white collar people who run society and control the media, government, universities, think tanks and modelers. But when the white collar people start losing their jobs, people say, "Wait a minute. We need to take the economy into account."

> "Unfortunately in 2020, the economists are building epidemic models and the epidemiologists are running the economy."

As the Swedish experiment is going to show, there's three different variables you simultaneously track in your head. It's very hard for most people to do that. One is, of course, the infection fatality rate and how many people end up sick or dying. The second is the economic impact—you have to have some standard way of measuring and comparing that. And the third is what percentage of the population has built up a herd immunity, while keeping in mind that herd immunity through a natural spread is very different from herd immunity through a vaccine. A vaccine is indiscriminately applied; whereas when a virus naturally spreads, it' infects the more mobile super-spreaders as well as the most vulnerable first. So the people who get taken out first were either the ones who are most likely to spread it or the most likely to die. So natural herd immunity is the lower threshold than vaccine immediate herd immunity.

Matt: It's become clear in the U.K., and I think this is largely true in the U.S., that a huge proportion of the deaths are attributable to acquired infections at hospitals and care homes. With insufficient early testing, healthcare workers became infected quite early—which means they became carriers quite early—because sick people were visiting healthcare facilities. As a result, a very vulnerable population— which not only had a high death rate but also a high transmission rate because they were carrying a higher loads of the virus—has seen a very high reproductive rate of the virus. That doesn't mean it's high in the rest of the community. The examples of Sweden and others show that, for those who are not in that category, it should be possible to use voluntary measures to suppress this virus and get to herd immunity at quite low levels of infection.

Naval: We're going to end up in that scenario regardless, so the question will be: How much benefit did people get who tried to flatten the curve for longer periods of time? We're seeing this experiment at a state-by-state level in the U.S. right now. Of course, the battle is turning into the narrative and the interpretation of the data that's coming out saying, "Oh, well they're hiding deaths," "They're exaggerating this," or "They're not exaggerating that." When this is all said and done, I don't know if we will have the honesty to look back and say, "Well, this is what happened," because now in an age of social media, everyone's trapped in their filter bubble/silo. Journalists serve all taken sides. Their objective journalism, to the extent that it existed, has gone out the window. So we may end up living in two different narrative worlds even once we know what happened.

Filter Bubbles

Matt: It does alarm me the degree to which we have, fragmented into these filter bubbles and echo chambers. In the book, I speculate that that is a consequence of technological determinism. Whereas I thought the invention of the Internet would lead to social media, would lead to us all seeing each other's points of view, it hasn't turned out that way. Social media has proved to be a very divisive medium,as radio did in the early years of the 20th century when it was a significant tool helping the rise of dictators. But television did not—it was a medium that pulled us all into the mushy middle.

Naval: I absolutely agree. When I read that section of the book, I put it down. By the way, the thing I love about your book is, every third page I had to put it down and think about it, which to me is the mark of a good book. I think the faster you can read a book, the worse the book is. If you can speed-read a book, you shouldn't. Just put that book away, it doesn't deserve to be a book. But when you cover that section, very briefly I realized: There's a big idea in here; there's a book in here. A lesser person would take these two paragraphs and turn it into a book. But you covered it very briefly.

My thinking on it was that the reason is because television had very high production values and very high distribution costs. You could only afford to get the message out once or twice. Especially in the old days of television, you didn't have that many channels. Therefore, people were getting their news sanitized from the same set of sources. The bad part is you could be living in a bubble controlled by the elites, by the government, or by whatever the media wants you to think. But the good news is that at least you were relatively aligned and there wasn't this constant low-level civil war going on inside society. When you get to something like radio or to the extreme social media, anybody can contribute and create content all the time. Because of that, the divisiveness is almost a given.

In fact, with radio there was filtering by tuning the channel. But in social media, you've built your own channel. The level of a filter bubble that you can go into is much deeper and much more tuned to the individual than any previous filter bubble.

Matt: There's an echo here of what happened with the invention of printing. The most entrepreneurial printer of the lot and the best published author in Europe was Martin Luther. And he is using this new technology effectively to cause a social revolution, and eventually it turns into a series of religious wars. We have been here before and it wasn't a pretty sight, if you like.

Naval: It wasn't. And it's amazing how much the distribution of media and information changes the structure of society. You cite Amara's Law, which talks about how the effects of innovation are overestimated in the short term and underestimated the long term. I have absolutely seen that. I've seen that in Silicon Valley over and over, everything from autonomous vehicles to the internet, to mobile phones, to crypto.

More Crypto

Matt: Crypto is a good example, and I don't write enough about crypto. I wish I had done more. But I do think crypto is a good example of a technology that will continue to disappoint us for a number of years yet. Although you made some very interesting remarks about its potential, I suspect that a lot of people will lose their shirt on crypto plans for quite a while before it starts to deliver that promise—if government ever allows it to, of course,

Naval: This is where crypto is going to work a little differently than people might expect. Amara's Law generally tends to be that we overestimate 10 years, we underestimate 20 years. So 15 years is the crossover. But, obviously, as we know, history doesn't quite

repeat. It can rhyme, but you never get the same result twice because, if you did, there'd be no new information. It wouldn't be a complex system if you could easily predict the next step.

So, first of all, crypto has been around since 2009. That was the original creation of Bitcoin, so it's been longer than people think. Also, you mentioned at the end of your last statement: if states allow it. That is the whole point of crypto. Crypto solves the coordination problem that normally you could only have solved with a state, but you solve it without the state. Originally it's a solution to the Byzantine generals problem. It's not clear to me that states can stop it, because if they can, they will. No state wants an extra-judiciary system in existence, because the control of the money printing press is the ultimate power. That said, in the last two years since the hype bubble popped, there have been great entrepreneurs hard at work, and I can now see the first green shoots coming out of crypto.

I would put them into two categories. One is we're building a decentralized finance infrastructure for borrowing, lending, derivatives, trading, custody, all of that stuff. The things that Wall Street does for 20% of the GDP of the United States will be done for 1% of the GDP in cryptoland. It's getting so good that I wouldn't be surprised if, a few years from now, you see more Wall Street traders saying, "I want to make a certain bet." "I have a certain point of view." "I want to hedge in a certain way." Or, "I want to buy a certain asset, but I can't do it with the existing financial infrastructure. I have to convert into Bitcoin or Ethereum and go do that through decentralized finance." It's just technologically far superior, that's one thing I'm seeing.

The other thing I'm seeing is, the first applications of crypto come out in file storage and authentication and identity. These are plumbing infrastructure for Internet companies being built in the crypto domain. And the crypto versions are superior to the non-crypto versions because they're decentralized. They're no longer under the control of Apple, Google or Facebook.

Independent developers do not like to live under the control of Apple, Google, Facebook, Twitter or whoever, because they know they can be de-platformed at any time. They know that platform operator will capture the majority of the value. They know if they strike oil, the platform operator will come in and take it over.

We're going to see crypto-based plumbing laid out, and we're going to see decentralized finance lay that out over the next five years. That is where the green shoots of crypto are coming up. And then, in the following decade, we're going see the results of that and they're gonna be bigger than we can anticipate

Matt: That's very hopeful, as you say, because it is important to be able to retain our individual autonomy in this world. And I do, at the moment, feel as if the government on the one hand and Facebook on the other, is finding ways of constricting my freedom of expression, thought and argument and, indeed, the facts I have access to.

Naval: The government gets to restrict you because it has a monopoly on violence. People try to hijack the government, because if you can get the government to do your bidding, you've got guys with guns to do your bidding and you run everything. What cryptography enables is, it's the first asymmetric advantage for the defender against the attacker, probably since the castle wall or the moat.

In the history of warfare, the attacker has been gaining huge advantages and the defender has been losing them since the canon and the gun were invented. That favors the attacker. Nuclear weapons obviously favor the attacker. Biological weapons favor the attacker. Airstrikes favor the attacker. Tanks favor the attacker.

Matt: The machine gun favored the defender, funny enough. That's what made trench warfare so static.

Naval: That's a good point. Yes, I missed that one. So crypto the attacker can throw unlimited compute power at it, but if you've done your security correctly, they can't break your encryption key, so it favors the defender. And of course, whichever way the power goes, that's the way the control, identity and anonymity goes. We're losing physical anonymity with camera surveillance, the NSA spying on everybody and Internet-connected cameras everywhere. Physical privacy is dead.

The government will always know where you are physically, unless you're going to do a face change all the time. People talk about the comeback of masks covering it. No, that won't cover it—just a slightly better algorithm is required. If another human can recognize you, eventually the computer will recognize you, because that's one of the very easy problems for AI and machine learning.

That said, digital privacy is real. You will be able to create a personal cryptographically protected identity that goes on the Internet, and you can build a reputation against it, you can do business against it, you can make friends against it, and no one will quite know who you are. Sure, the NSA and people sniffing the fiber lines could potentially unmask you, but if you are sophisticated enough, there are even ways to get past that.

Automation

That leads us to how governments approach our freedoms. They have a lot of power over us, and so people like to create narratives to take that power over. One of the narratives that comes up every 20 years is automation and job loss.

This time it's AGI, artificial general intelligence, that we're going to come up with a technology that advances so quickly that it improves itself faster than we can retrain, faster than we can create new jobs, and we all get put out of jobs. There's two pieces to this. There is the pace of innovation of AI and what AI means. The second piece is that, this time, it's different: We're going to lose our jobs. And I thought you had very good viewpoints on that.

Matt: We've been here before. We've expected innovation and automation to destroy jobs. It never does. It always creates new kinds of opportunities for employment. It creates the wealth that enables people to employ other people.

It also does create leisure. It does reduce the amount of time we have to work in our life. We can spend more time in education and retirement. We can have longer weekends than our grandparents did. To some extent, for the first time the upper-middle class bourgeois professions are feeling under threat from automation. While factory workers and farm hands were being automated, they didn't mind. But now doctors and lawyers can be displaced by machines, and suddenly we must all panic. Every time it's been raised as an urgent issue in the past 50 years, it's proved to be wrong. I think it will be this time, too. Of course, there will be local disruptions caused to employment by different forms of automation and innovation. One can't deny that.

Naval: And, in fact, many of these disruptions could not have existed if a previous generation of automation had been allowed to take place. For example, you can't lose your job as a truck driver if trucks didn't exist. If you had stopped trucks in the first place, because you were trying to protect people in the railway industry or people who were carrying things on their backs.

A lot of the economy today is based on luxury goods. As you mentioned in the book, until I can get all the peeled grapes and massages that I want on demand, there's still room for

more employment. And we shift what we consider jobs to be. There are things that we just haven't figured out how to do yet with automation and robotics.

Matt: If you could reach this theoretical end point where a machine does everything you could possibly need, then you don't have a problem.

Naval: Why would you? Work is not good in and of itself. You should just be able to write books, record podcasts and entertain your fellow monkeys all day long. As you point out through innovation, a lot of this automation that happens is highly democratizing. It's democratic consumption. You also make a good point where it is the nature of modern civilization to consolidate production through specialization. So the one person in the world who's best at anything gets to do that for everybody. But on the flip side, you democratize consumption, where not everybody can have access to everything.

Matt: What we tend to do as a species, as we progress, is to become more and more specialized in what we produce but more and more diversified in what we consume. That saying I got from a wonderful book called *Second Nature*, years ago by a man named Haim Ofek. I wrote to him and said, "This is an interesting insight. Have you written anything more about it?" He replied, "Well, I think I got that idea from one of your books."

Naval: It's funny because I have a tweet about that exact topic that goes back a few years, and I have no idea where I got that from. It might've been from one of your books. It might've been from David Deutsch. It might've been some random thing, I don't even know.

Matt: You have said things to me today about things you've got from my books that are fresh to me, as if you've made this point, as it were, we each put ideas into the public realm, we pick them up, we changed them slightly, we give them back to each other—that's the nature of intelligent conversation.

Great Man Theory

Naval: This ties back into the great man or great woman theory of history. After reading your book, I had to think about that a little bit because I had subconsciously subscribed 70-80% to the great man theory of history and 20-30% to the evolutionary theory of history. And in hindsight, that was probably a flawed balance.

One reconciliation that I came up with is that it does take great people to move the world forward, but it doesn't necessarily take that specific great person. Although we needed Edison to create the light bulb, there were 21 other people creating the light bulb at around the same time. We needed one of those 21 people to be the innovator to drive it forward.

So it's not that there's one individual at any given time who can do anything, but there is a set of special individuals and any one of them in the right situation will suffice—or any set of them will suffice. That's the conclusion that I came to.

Matt: Whereas Leonardo DaVinci did not have to worry about somebody else painting the Mona Lisa before he did, there's something particularly challenging, brilliant and clever about being the first person to develop a practical light bulb.

If you're in a race, it's even more impressive that you do it. To some extent, the fact that it's not a unique achievement is even more impressive.

Naval: I had a mild case of Gell-Mann Amnesia within your book, if you remember that framework. Gell-Mann Amnesia says that, you believe everything you read in the newspapers, then when it gets to a topic that you're intimately familiar with, you realize it's nonsense. Or it doesn't quite apply, yet you continue believing everything else that they write about.

I'm not blaming you. You did a great job. But there was a dissonance where you proved your point by showing that we tend to over lionize and remember a few inventors as being the creators when it's much more of a team and distributed process. You were giving examples of inventors and people who get credit throughout history. Then later in the book, you talk about Facebook as an innovator, Airbnb as an innovator, and you mentioned the founders, Brian Chesky and Mark Zuckerberg.

But anyone who's been in Silicon Valley for a while knows that before there was Facebook, there was Myspace and before there was Myspace, there was Friendster. Poor Jonathan Abrams, who created Friendster, is left as the beaver looking at the dam and saying, "Whose dam?" It's the same with Airbnb: There was VRBO, HomeAway and a bunch of vacation rental sites before that, although Airbnb did pioneer the individual room breakup.

But there was Couchsurfing, there was Craigslist and a whole bunch of others. Unfortunately, history is written by the victors. And in this case, the victors don't even have to write history; it's everyone around them who's writing history. There's availability bias: They see the victor, so to the victor go the spoils and the credit.

Matt: That's absolutely right, and I stand corrected on both of those. You couldn't be more right.

The Book

Naval: Matt, you have this new book out, *How Innovation Works*. It's a must-read for entrepreneurs and government officials who want to either be innovative themselves or foster innovation in their geography or society. Frankly, if you were an entrepreneur, self-styled inventor or innovator, this is probably the cheapest, fastest education you can get on the history and future of innovation. I highly recommend it. I'm going to leave with a quote that I like from the book that summarizes what innovation is and where it's fostered. It has a very optimistic and correct view of how it operates. That quote is: "Innovation is the child of freedom because it is a free and creative attempt to satisfy freely expressed human desires." That's a powerful quote for me. It tells me that innovation requires freedom. It's creative, and we're satisfying what people want to do, as opposed to what they're told or forced to do.

So thank you, Matt, for helping me figure out evolution. I highly recommend *Genome* as well, to figure out the rational basis behind ethics and the origin of virtue. You helped make me an optimist in a rational way through your famous *Rational Optimist*, and you drive home the point of the evolution of innovation and how to foster it in *How Innovation Works*. It's been a pleasure.

Matt: Naval, thank you for the incredible insights that you've given me today, for your fantastic, kind remarks and for the fact that you said this book should be read by people who do innovation, because I'm a bit of a fraud. I'm not an innovator; I've not invented anything; I've not built a business; I'm not an entrepreneur. I'm a writer. So I'm greatly honored that you think the book is a practical use to people, as well as being an interesting tour of the ideas behind this mysterious concept of human innovation.