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[00:00:00] **John Cook:** Misinformation is polarizing. It pulls the public apart. So I wanted to explore, could you depolarize misinformation or neutralize it? The way I did that was I just talked about a specific misleading technique, and then I used tobacco misinformation and used that as an example of here is how the tobacco industry used to use fake experts to mislead us, and then afterwards, then I showed them some climate misinformation that used that same strategy, and I found that it neutralized the misinformation across the political spectrum, and that aversion to being tricked is bipartisan.

[00:00:43] **Nate Hagens:** Today I am joined by physicist and communication scientist, John Cook, to discuss how to recognize and counteract misinformation and how to teach others to do the same for any issue. John Cook is a senior research fellow with the Melbourne Center for Behavior Change at the University of Melbourne in Australia.

[00:01:01] He researches how to use critical thinking to counter misinformation for all types of polarizing issues. In 2007, he founded Skeptical Science, which is one of the most reputable sources for explaining the science behind global heating. Additionally, he created a game called Cranky Uncle, which as we discuss in this episode, combines critical thinking cartoons and gamification to help people recognize and understand misinformation.

[00:01:29] In this conversation, John and I walked through how to debunk some of the most common claims like. Arguing against human caused global heating. more importantly, John breaks down the underlying logic and critical thinking that can be used to correct any misinformation across any subject. My hope is that

after watching, you can apply this approach to any current issue or topic you view to be the most important in your own life at the moment.

[00:01:56] Additionally, if you're enjoying this podcast, I invite you to subscribe to our substack newsletter where you can read more of the system signs underpinning the human predicament, where my team and I share increasingly quite a lot of written and video content related to The Great Simplification. You can find the link to subscribe in the show description.

[00:02:15] With that, please welcome John Cook. John Cook, great to see you. Welcome to The Great Simplification.

[00:02:22] **John Cook:** Thanks, Nate. Great to talk to you.

[00:02:24] **Nate Hagens:** So you have been researching and educating on science communication for almost 20 years, including through the creation of climate education websites, skeptical science, which I know when I was getting my PhD back in the day, I, I used that and recently cranky uncle as such.

[00:02:44] Given we are now in a moment of escalating challenges with. Communication, across many contentious topics in the world. I invited you today to unpack your methods, for becoming aware of and combating miscommunication of all kinds. So, to start, I'm wondering if you can tell us about the moment when you realized that the way that we, in the world who, care about the issues of the world, currently communicate science, especially but not only science, about global heating, it's not working, and, and that we need to rethink our approach to science communication.

[00:03:24] Let, let's start there.

[00:03:25] **John Cook:** I guess the moment for me was when I realized that I wasn't communicating it effectively. or, or potentially it could have been better. so I started skeptical Science 2007, I think. And, And I came from a physics background, so very, very much natural science, you know, really operating under the assumption that you just get the facts to people job done right?

[00:03:50] And, and that should be enough. And so skeptical science was really just about making the facts about climate science available to people. and debunking climate myths. After several years of doing this, a cognitive scientist, a a psychology researcher, sent me some research that found that if you debunked in the wrong way, you could make things worse.

[00:04:15] You, you cause a backfire effect where people read your debunking and end up believing the myth more than before they read your debunking. And the thing that really horrified me, and I still vividly remember the kind of. Blood draining from my face as I was reading this research paper was that the bad way of debunking was the way that I was doing it on skeptical science,

[00:04:39] **Nate Hagens:** fully well intentioned as a scientist and as a science communicator, you were, you recognized at that moment that all of your work might have actually been having a counterproductive, impact

[00:04:51] **John Cook:** Yeah.

[00:04:51] Might have. yeah, and, and more broadly, I realized that there was a science to science communication, which I wasn't even aware of up till that point. but I will say that that early research into this backfire effect of debunkings making things worse, it hasn't really replicated like scientists have tried to.

[00:05:16] run experiments where they try to, find that same backfire effect and it's really elusive. It's really hard to achieve. So, so I probably wasn't making things worse.

[00:05:28] **Nate Hagens:** So, wait a minute. The, the backfire effect, is that also called motivated reasoning?

[00:05:32] **John Cook:** no. So motivated reasoning is when people resist facts that they're motivated to reject because it goes against their beliefs or threatens their identity or, or whatever reason, gives them the motivation with the backfire effect.

[00:05:49] There are, there are a number of different reasons why a debunking might potentially backfire. One of them might be because it threatens people's ideology. So there is a bit of motivated reasoning in that sense, but the more basic reason why. Debunkings might backfire or at least be ineffective, is because they put too much emphasis on the myth and not enough on the facts.

[00:06:15] So that afterwards, all people remember is the myth, not the, not the factual. Oh, debunkings. So that's not really motivated reasoning, that's just basic bad communication.

[00:06:26] **Nate Hagens:** Yeah. So, I think there's many people, especially in environmental circles that still have this belief that. The problems of the world are because of lack of enough accurate information and facts.

[00:06:45] And so you, you no longer believe that's the case. can you unpack that a little bit?

[00:06:50] **John Cook:** A simple way of of looking at science communication is, is what we call the information deficit model. So it's the idea that the reason why

there's controversy about climate change is because people just don't have all the information.

[00:07:03] So let's just pour that information into them, and hopefully that will solve the problem. Now it turns out that that's a gross oversimplification. and just pouring or, you know, throwing a lot of information at people isn't, isn't the be all and end all. It's not going to solve the problem. But I will, also say that you don't wanna throw the baby out with the bath water and go in the complete opposite direction and say that facts don't matter.

[00:07:35] Facts do matter. Education matters. Like we still wanna communicate the facts. We just have to recognize that they're necessary but insufficient. we also need to recognize that people are motivated, reasoners, that we do look at facts or interpret them through our cultural lenses, our, our backgrounds, our biases.

[00:07:55] So we just have to recognize those other complexities as well.

[00:07:59] **Nate Hagens:** So does that mean that. If we were totally rational robots, you could communicate science and facts in one way. This is the science, these are the facts, here they are. But with the complexities and the nuance and the context that you just said, does that suggest that there cannot be on an issue?

[00:08:21] Let's just take climate change. for now, there cannot be just one message. There has to be 10 or 20 messages depending on the demographic, the context, the identity and all that. There, there, you can't have just one thing because there's lots of different audiences. Is that right?

[00:08:42] **John Cook:** Oh, definitely. The, the message depends on the audience.

[00:08:45] It depends on the messenger. It depends on what particular aspect of climate change you want to talk about. and. How you wanna frame it and what you wanna put the emphasis on. So, and I'll, I'll give an example of a, a scientific study that kind of exemplifies this. So there was a study that, communicated the same climate facts to people, but in two different ways.

[00:09:13] So they basically took their research participants and split them into two groups. One group got a climate message and then the climate solution was. Regulating the fossil fuel industry. The other group got the exactly same climate facts, but the solution was reinvigorating the nuclear industry. And what they found were was Democrats responded to both messages exactly the same, but Republicans responded to the two different messages in completely different ways.

[00:09:46] If the solution was regulating the fossil fuel industry, they were like, I don't like that science.

[00:09:51] **Nate Hagens:** That makes total sense. And this is one of my pet peeves, is I think we need to distinguish and separate out the science of a world affecting issue. And the prescriptions. And what do we do? Because they're separate conversations and so many people lump them together.

[00:10:12] And because of what you just said, it's almost impossible. So I wish there was a way that just, we could just talk about the science, nothing else. And then in another conversation then we talk about solutions and what to do. is there any hope of something like that working?

[00:10:28] **John Cook:** Well, that's funny you've mentioned that.

[00:10:30] 'cause that's also problematic.

[00:10:33] **Nate Hagens:** Oh, okay. Why?

[00:10:34] **John Cook:** Because when you communicate a pro problem without a solution that can be paralyzing. So you, you communicate the doom and gloom of climate change and people are like, Ugh.

[00:10:49] **Nate Hagens:** So you have to follow it with some solution.

[00:10:52] **John Cook:** yeah, because a message about a problem needs to also come with a sense of efficacy that we can do something about it.

[00:11:02] **Nate Hagens:** Now you're. Casting a, a umbrella on, on my entire podcast platform because I don't offer a lot of solutions here. And the stuff that we discuss are hella scary and, and, worrisome about the future. But I don't know the solutions, so I don't talk about 'em. We're probably gonna have to use less on average.

[00:11:23] We're probably gonna have to have a different sort of economic system. I don't know. But I think you're absolutely right. There's a lot of people that are like, whoa, what do we, what do we do? I want answers.

[00:11:32] **John Cook:** Yeah. And, and the answers are not easy. like, like this is just a, such a, not only a complicated problem, but so interconnected and ubiquitous and, and big.

[00:11:47] yeah, it's certainly a difficult topic.

[00:11:50] **Nate Hagens:** We're gonna dive into a lot of this. John, so you started, skeptical Science in 2007. That's 18 years ago. What have been your aha moments about science, science, communication, some of the things you just shared, and where are you now, like in maturing as a human alive at this time, trying to convey these things, but also all of us are susceptible to biases and, you

know, when I'm super confident about something, I have to self handicap my own view by 10 or 15% because I'm human and humans can be delusional.

[00:12:33] So I've gotten used to doing that. I wish more people would do that, but what, what have you really learned? Like how have you matured on your journey of, of all this?

[00:12:43] **John Cook:** Over the course of my PhD, I think the thing that I learned was probably my PhD was really trying to answer the question. What are some ways that we can count on misinformation effectively?

[00:12:56] Like given, like I had already worked out, okay, don't do it this way, how should I do it? And so I was experimenting. I was just, you know, really it was exploratory and I was just throwing out different approaches and I just kind of stumbled into the technical term. The jargon I would use is logic-based inoculation, which is basically just explain the techniques of misinformation to people.

[00:13:22] Expose the magician trick. What's the slight of hand used to mislead people? That is actually, it's almost like a universal vaccine against misinformation because once people can spot. Misleading techniques, they can spot them across topics.

[00:13:38] **Nate Hagens:** But is there a motivated reasoning or backfire effect bias there, depending on the issue and the demographic that you apply it to?

[00:13:47] Like, because if you tell me to inoculate myself against misinformation on an issue that I deeply believe in and care about, I may not wanna know about that. Yeah. And so is that a real thing too?

[00:14:01] **John Cook:** so you put your finger on the, the real issue there, a, a, a subject that you deeply care about the power of this approach of, it's really a critical thinking approach is you, you can sidestep those, those triggers the, the, that issue that you deeply care about.

[00:14:20] so let me, Explain that by giving you or explaining the experiment I did during my PhD, so I wanted to inoculate people against climate misinformation because I had, I had found that climate misinformation is polarizing. People, when you expose people to misinformation, not everyone responds to it the same.

[00:14:42] I found that people who were on the politically conservative end of the spectrum were much more persuaded by climate misinformation than people who were on the politically liberal end of the spectrum. And so that means that misinformation is polarizing. It pulls the public apart so that you see this different response.

[00:15:01] So I wanted to explore could you depolarize misinformation or neutralize it. the way I did that was I showed people an inoculating message, which didn't talk about climate change at all. Instead, I just talked about a specific misleading technique that in this experiment, it was the technique of fake experts using people who convey the impression of expertise, but they don't have the relevant expertise.

[00:15:31] And then I used tobacco misinformation as an example. So I took one of those newspaper ads from the, the mid 20th century, you know, that kind of madman sort of, style with the, the dude in a white coat and he is smoking a, a, like a camels or something. And, and use that as an example of here is how the tobacco industry used to use fake experts to mislead us about.

[00:15:56] The health impacts of smoking. And so I was not, I was sidestepping the, the trigger of talking about climate change. And then afterwards, after

inoculating them and building their awareness of the fake expert strategy, then I showed them some climate misinformation using that, used that same strategy, fake experts.

[00:16:17] And I found that it neutralized the misinformation across the political spectrum, whether people were liberal or conservative. And what this told me is that yes, we are motivated reasoners and climate misinformation. people respond to it in a motivated way, but we also don't like being misled. And that aversion to being tricked is bipartisan.

[00:16:41] It's, it's the same across the political spectrum,

[00:16:44] **Nate Hagens:** the human aversion to being tricked. Is as or more powerful than the existing identity or ideology on some issue In, in some cases,

[00:16:57] **John Cook:** yeah. Well, at least in this case, I found that it, it completely neutralized it.

[00:17:01] **Nate Hagens:** Yeah, that's encouraging.

[00:17:03] **John Cook:** It's, and, and it also offers a, an approach because if you can, you can explain misinformation techniques using examples that aren't loaded, culturally loaded, then you can potentially build up their resilience against misinformation even on other topics where they are motivated.

[00:17:23] Reasoners,

[00:17:24] **Nate Hagens:** I think you, correct me if I'm explaining this wrong. You've developed a framework to help people think more critically, which you call the five techniques of denial, to look out for one, talking about misinformation, in the news. And I think, fake experts is one of these five, techniques.

[00:17:42] What, what are some of the other ones?

[00:17:44] **John Cook:** Yeah, so, to be fair, I didn't come up with it. it was actually Mark Hoof Nagel who first proposed the Five Techniques of Science nar, but I was giving a talk to, A youth, like a climate youth organization. So it was all young people and I was like, okay, I need to come up with a catchy way to remember these five techniques.

[00:18:05] So I need an acronym. So I was like, okay, fake experts, F unrealistic expectations, U cherry picking C. this is going in a bad direction. I need to, so, so I ended up coming up with FLICK as the acronym, so it's Fake Experts, logical fallacies, impossible Expectations, cherry picking and Conspiracy theories.

[00:18:29] and, and I found that that acronym is a really. hooky way of helping people remember the techniques of denial. And it's actually out of all the d things I've worked on, it's one of the things that has really stuck because I think it just helps people remember it.

[00:18:46] **Nate Hagens:** So you, you spoke briefly about fake experts.

[00:18:49] Can you give an example of the, the others, briefly?

[00:18:52] **John Cook:** Yeah. So I'll, impossible expectations is demanding impossible standards of proof from the science. Mm-hmm. so that's something like climate models or, or, you know, weather models can't predict the weather next week, so therefore climate models, how are they gonna predict the weather in a hundred years?

[00:19:14] Right. So, so cherry picking is looking at just, only a limited part of the data and ignoring the full body of evidence. So it would be something like, Hey, Global warming hasn't, hap happened over the last three years, therefore, it must

have stopped ignoring the long term trend and conspiracy theories is, Just assuming that there's a shadowy secret group of people who are, conspiring to deceive the public. and then the, the last one is logical fallacies. Now I left that to last because it's actually a whole umbrella. There's a whole range of different logical fallacies.

[00:19:58] **Nate Hagens:** And what, what does that mean,

[00:20:00] **John Cook:** A logical fallacies when the conclusion doesn't follow from the premises of an argument or the starting assumptions.

[00:20:08] but I'll just give some concrete examples. So probably the most common logical fallacy in climate misinformation is single cause, which is assuming that there's just one cause of something and ignoring all the other possible causes. It's a type of oversimplification, and we hear this all the time when somebody says.

[00:20:29] I believe in climate change. Climate has always changed. They're basically saying, well, climate has changed naturally in the past, so what's happening now must be natural as well.

[00:20:38] **Nate Hagens:** Whatever the issue, whether it's climate or something else. Certainly there are moneyed, interests involved in wanting a certain narrative to expand, but also in an era of social media and clicks and likes and status.

[00:21:02] and were a social, primate, seeking status. It seems like a playground for people that just want dopamine and attention to just wreak havoc with the science. And you could cherry pick till the cows come home and find little nuances and things that neglect the wide boundary aircraft carrier view of the situation.

[00:21:26] But just look at one little thing and you are technically right on that one little thing, and it's just legion on the internet. so some, some part of the science communication problem that you're describing is. Everyone has their own AM radio station because of YouTube and, and the internet. And we are incredibly, geared to being right and getting acknowledged for being right.

[00:21:57] what are your thoughts on that?

[00:21:58] **John Cook:** So, one of my science heroes is Naomi Que. she wrote The Merchants of Doubt book, and she also published the first study finding there was an overwhelming scientific consensus on climate change. So once I, I was, hanging out with her trying not to look like a bam boy.

[00:22:19] So just trying to be cool. And we were just talking about the, the, the climate denier influences and speculating on what drove them. And I, so I asked her, what do you think drives them? And she was just quiet for a moment thinking, and then she said, malignant narcissism. So, so I think that y yeah, you're right.

[00:22:43] There's, people are complicated. There can be lots of motives. Money is a motive for some, ideology is a motive for others. But yeah, I think that's, some people just get fame from being a contrarian.

[00:22:57] **Nate Hagens:** Yeah. I, I think that's, that's a real, that's a real thing. so something I talk about frequently on this channel, is our innate cognitive biases like ingroup, outgroup or authority bias.

[00:23:14] So on top of what you just shared, how do cognitive biases play into the way people interpret information, and how does that relate to the logical fallacies, you just mentioned?

[00:23:24] **John Cook:** Yeah, I, I think that question really follows on well from what drives these deni influences, because ultimately we don't know what's going on in a person's head.

[00:23:37] but also. We dunno whether they genuinely believe the misinformation or, or whether it's disinformation where they're deliberately trying to deceive us. And the real challenge in that, that issue is if someone has cognitive biases, if they're motivated reasoners,

[00:23:56] **Nate Hagens:** I mean, that means all of us, we all have

[00:23:58] **John Cook:** cognitive

[00:23:59] **Nate Hagens:** Yes,

[00:23:59] **John Cook:** yes.

[00:23:59] Yeah. To degrees like every, like yeah. If you have a spectrum of motivated reasoning, like you

[00:24:05] **Nate Hagens:** Right. Some people have 10% and some are at 90%.

[00:24:08] **John Cook:** Yeah. Some are off the scales. Yeah. And

[00:24:09] **Nate Hagens:** yeah.

[00:24:11] **John Cook:** well, it also, it depends on the, the context, right? Because you might belong to a group where the social identity motivates you to reject a certain.

[00:24:22] About, you know, certain science or you might have a, belief system that motivates you to reject science. So yeah, when it, it's apples and oranges,

everyone's different and, and there's lots of different reasons why people might reject the science, but the thing is, from the outside, it looks exactly the same.

[00:24:43] If you are intentionally deceiving people or if you deceiving reasoning. What it looks like from the outside is the same. You use the same flick techniques. You rely on fake experts, whether you are using a fake expert knowingly to deceive people or whether you are biased towards this person because hey, they're saying things that I agree with.

[00:25:10] So I think that they're a, they have greater expertise. Like from my point of view, it's like you look through a person's music collection and think, Hey, you have great taste in music. You're actually saying you have my taste in music. So that, that's an example of fake expertise from a bias point of view.

[00:25:27] **Nate Hagens:** So how does money, apply to this? Because if, if it were an equal playing field, I would think that over time the science would win out. But if it's not an equal playing field and some people have megaphones and those people have the tricks, the other side. Doesn't really stand much of a chance. I'm not talking about climate per se, but anything in our world.

[00:25:54] **John Cook:** Yeah. And, and firstly, science is winning out. like when we look at like public opinion, like when we look at surveys and the, the, the most authoritative surveys are the ones done by Yale and George Mason University, who, who every year they survey the public, they do these big national surveys. and they've shown that over, over the last few decades, the public, attitudes, opinions about climate change have slowly been getting better.

[00:26:25] Problem is. And so science is gradually progressing and, and, and people are becoming more and more supportive of the science and supportive of climate action, but it's happening slower than we would. And really it's happening slower than we need to in order to get climate action. the, the science is telling us

we need, so to come back to your question, one of the reasons why it's moving slower is because of misinformation.

[00:26:53] And the reason why misinformation is, has been so powerful and effective is because of funding. Bob Brule has, has documented the amount of funding that has gone from like industry, from the fossil fuel industry to the organizations that produce climate misinformation. And it's in of the order of billions of dollars.

[00:27:17] Arguably, climate misinformation has been the most well-funded misinformation campaign in human history.

[00:27:23] **Nate Hagens:** So I, I don't expect you to know the answer to this, but maybe you could speculate. Do you think the people that are funding that, what you just said. Do you think they know that it's misinformation and they just wanna do it because it's good for business and their, their own families and futures?

[00:27:40] Or do you think they truly believe, in what they're saying? And I want to amplify this because the climate science is not true. Like they might think the same in their bodies and mind, they might think the same as you. I don't know. I'm I'm asking you.

[00:27:57] **John Cook:** I'd say it's, it would be both. It would be ca both cases.

[00:28:01] Some people would knowingly be doing it. others would be self deceiving themselves and never underestimate the human capacity to deceive themselves.

[00:28:10] **Nate Hagens:** Oh, I do not, I do not underestimate it.

[00:28:13] **John Cook:** I, I, I forget that quote. You know, if a person's paycheck. Depends on them believing something. I, I forget the exact words.

[00:28:20] **Nate Hagens:** Yeah, yeah.

[00:28:21] **John Cook:** so yeah, we can, we can, again, motivated reasoning can help us believe these things. So, so again, it comes back to the point we don't know what's going on inside a person's head, but we can, we can see the actions that they take. And so that's why my work is focused on the techniques of misinformation rather than the motives, because you can see those techniques spot them and, and be, resilient against being misled.

[00:28:47] **Nate Hagens:** Just outta curiosity, science is a new thing for our species. I mean, the enlightenment was not that long ago, so knowing what, you know, doing your PhD and spending almost two decades. Trying to understand this question. If we put you back 500 years into Europe, you would've been like a wizard, to, to know these things.

[00:29:13] But we are such an advanced species with the power of gods, and now AI is here, and yet we have these self-deception, delusional cognitive bias list as long as my arm aspects of the, the human social primate brain that were really immature in, in that sense. And it, it just seems like this bizarro combination,

[00:29:38] **John Cook:** our brains are struggling to keep up.

[00:29:41] and then. You have a problem on climate change and our brains are really ill-equipped to just like, even if misinformation didn't exist, even if there wasn't, billions of dollars going to misinformation and it was everyone was good faith trying to deal with this problem, it would still be really challenging because our brains are hardwired to deal with a predator jumping out of the bushes at us.

[00:30:06] It's not, not hardwired to deal with a global problem occurring over decades, caused by all of us.

[00:30:14] **Nate Hagens:** Yeah, you're exactly right. our. Human predicament, human and more than human predicament is complex. It's abstract, it's in the future. There are no easy answers. The famous people aren't talking about it.

[00:30:30] and it's not immediate in the sense that it's happening at this moment. so it's almost the perfect storm for us to ignore or deny. And you can't fault people for working hard and then coming home and looking at some videos and being misinformed when they didn't have the chance to have hundreds and hundreds or a thousand hours of education on this like you and I did.

[00:30:58] you know, it's a, it's a pickle. So. I have a list, given that I've hosted this podcast for over four years now of some of the most common arguments made by people who are skeptical of the reality and the critical relevance of our current trajectory of global heating. So if you would be willing, can you kind of walk us through how to deconstruct each of these one by one?

[00:31:25] A couple minutes each? So something you mentioned earlier, we hear a lot in the past there were natural changes in earth's climate. So current changes are natural, not human cause what's everyone upset about?

[00:31:39] **John Cook:** And the challenge too, like you mentioned, deconstructing them is these arguments are often you articulated that argument then in a fairly logical way.

[00:31:51] Often it's a lot more, concise and shorter. It's just, oh, climate has always changed. You know, it's just this, Very short, snappy talking point, but really what that argument is, is trying to say, if you deconstruct it and break it up into pieces is climate has changed naturally in the past throughout Earth's history.

[00:32:15] Therefore, what's happening now must be natural as well. And the fallacy there is that it assumes that whatever is causing. Climate change now

must be the same cause as what is causing climate change in the past. The, you know, it's assuming that there's only one possible cause of climate change natural drivers.

[00:32:36] **Nate Hagens:** So that's a logical fallacy.

[00:32:38] **John Cook:** That's the fallacy of single cause.

[00:32:40] **Nate Hagens:** Fallacy of single cause. Okay, so, so here's another one. And I, I've actually asked a few people on this podcast and I didn't get a great answer. So not to put you on the spot,

[00:32:50] **John Cook:** no pressure,

[00:32:50] **Nate Hagens:** John. But rising temperature leads rising CO2, not the other way around.

[00:32:55] **John Cook:** Yeah, this is a, I like this one actually. This is one of my favorites, because it's, it's such a clear, logical fallacy. Now the background of this is when we look at ice core records in Antarctica, we find we can build a history of the changes in CO2 in the air and also the hist like temperature. And what we find is temperature goes up first and then around 800 years later, CO2 goes up later.

[00:33:24] And so that's, that implies that temperature is driving CO2, not CO2, driving temperature. And that's the argument. The that argument commits the fallacy of false cause or false dichotomy. It's a false dichotomy is when you say it's either A or B, but those are your only two options. Maybe A and B are both true, or maybe it's C, maybe there's a third option.

[00:33:53] In this case, they're saying either temperature causes CO2 or CO2 causes temperature, but it has to be one or the other. And you, you have to make a choice. In reality, it's both. What happens, is the earth. changes its orbit that

causes warming, and the warming. Then when you have warmer water, it causes CO2 to come out of the ocean.

[00:34:20] And then the CO2, causes extra warming and you have a reinforcing feedback loop. and it's actually that reinforcing feedback, which pulls the earth out of ice.

[00:34:32] **Nate Hagens:** How does. Earth's orbital change cause warming.

[00:34:37] **John Cook:** Okay, that's a very complicated, question. So the way that the Earth's orbit changes, it happens in three different ways.

[00:34:46] You have the tilt of the earth, that's what causes the seasons, and that tilt varies over like tens of thousands of years. You also have the shape of the orbit. So it's, it's not perfect circle. It's actually more oval shaped, but that oval shape gets more circular and then it gets more oval over again over tens of thousands of years.

[00:35:10] and then there's a third, way that. Again, with the access that changes in, in different ways. now when you add all these things together, you combine the, the tilt changing and the, the oval shape changing. These combine in ways that change. 'cause the tilt causes seasons, it changes how much sunlight hits.

[00:35:34] The, the poles, each year basically you get more or less sunlight hitting, hitting the poles, which causes more or less ice melt. and then as the ice melts, ice is white and reflective, which reflects the sun's heat off. Once you lose that ice, you expose the darker water and that absorbs heat. And that's another reinforcing feedback.

[00:36:00] **Nate Hagens:** So there are people, now this wasn't on my list, but, talking about orbital changes happening now, also impacting things, is that a big part of what's happening now, or a small part?

[00:36:13] **John Cook:** It's a small part. So yeah, orbital changes is constantly happening, but this is happening over 100,000 year cycles.

[00:36:19] **Nate Hagens:** Okay.

[00:36:20] **John Cook:** Climate change, the global warming we're experiencing now, this has been, happened over a few decades and it's happening at a rate, way faster than what you see with, With orbital changes.

[00:36:34] **Nate Hagens:** I'll ask you this one, although I did a recent frankly on it, so I think I know, the answer. But, you're a better science communicator than I, so give it a shot more.

[00:36:44] CO2 is good for plants. So warming is actually a good thing.

[00:36:48] **John Cook:** Yeah. So, it's true that CO2 is part of photosynthesis. Like plants do need CO2, but they also need other things in order to flourish. They need a regular water supply, they need a comfortable temperature range, and adding more CO2 disrupts those other things.

[00:37:09] and so, so this the argument that plants just need CO2, it's an oversimplification. It's ignoring all the other things that plants need in order to flourish. It's the same argument as saying humans need calcium, calcium's, good ice cream has calcium, therefore all you need to eat is ice cream.

[00:37:31] **Nate Hagens:** Okay.

[00:37:31] That's an iation that landed, that landed, especially personally that landed.

[00:37:36] **John Cook:** Yeah.

[00:37:37] **Nate Hagens:** okay. So, we are having an abnormally cold winter, and by the way, three days ago, John, where I live, and you're gonna find this unbelievable 'cause where you are, it's probably 37 C, it was minus 27 degrees Celsius here three days ago.

[00:37:53] So, you know, we're having an abnormally cold winter. So the climate must not be warming, is something that is commonly said,

[00:38:01] **John Cook:** arguing that it's cold where I am, right now at this moment in time. Therefore global warming isn't happening. That's anecdote. Fallacy. Yeah. You are just looking at your own specific circumstances and ignoring the bigger picture because globally, you know, we're experiencing the hottest temperatures on record right now.

[00:38:23] even if you might be feeling cold. Right now in, in one particular place. It's the same argument as saying, I just had a big meal and I feel full. Therefore, global hunger doesn't exist.

[00:38:35] **Nate Hagens:** Yeah. It's, it's directionally similar to that. And it is quite hot where you are today, right?

[00:38:41] **John Cook:** Yeah, it's well, right. I'm in a very cold house, but my, my wife just texted me, she's on a trip at the moment.

[00:38:47] She said it's gonna be 32 CI think today for Melbourne. That's pretty warm.

[00:38:52] **Nate Hagens:** Yeah. Yeah. Alright, how about this one? CO2 is too small of a fraction in the atmosphere to make a big difference in the climate. It's four parts per 10,000. Who cares if it's five or six or 10?

[00:39:04] **John Cook:** Yeah. So CO2 is about 0.04%. funnily enough, that's almost the same well in Australia, at least 0.05.

[00:39:16] Is the legal limit for blood alcohol level. Right. Okay. I think it's like 0.08 in the us right?

[00:39:24] **Nate Hagens:** I, I don't know, but that would stand to reason.

[00:39:26] **John Cook:** So we know from things like blood alcohol level or putting a drop of arsenic into a cup of water, we know that tiny fractions can have a big impact. and, and so we know that CO2 causes warming because we directly measure it.

[00:39:45] We measure the heat being trapped by CO2.

[00:39:48] **Nate Hagens:** Is there. A phenomenon whereby people don't understand some of the things that you just described, but then they have education or conversations or media or, oh, okay. Now I understand. Is there a, a backsliding when they're in groups that don't agree with them or once they understand something it sticks or, or do you not have enough evidence to, to weigh in on that?

[00:40:15] **John Cook:** Certainly factual communication that can fade over time. and I, I'll give you example from, from my field, misinformation research. So, so. Like we design, messages that try to inoculate people against misinformation, and we measure the impact it has. So we measure just before we've inoculated them and just after, and we find, oh, that's had a really positive effect.

[00:40:42] Then if we measure them two or four weeks later, we find that they've, they have backslid, like not because of necessarily people or whatever. It's just our memories fade over time.

[00:40:52] **Nate Hagens:** Like, I know you started out as a, as a climate educator, but, but. You know, the, the stuff you've been sharing so, so far, do you ever just take a step back, John and Marvel at the human animal that you're trying to understand and influence?

[00:41:08] I mean, it's really quite, we are just bizarre, as a species wonderful and amazing and creative and delusional and all the things. I mean, and do you, 'cause yeah, you said you haven't studied the evolution and, and all the anthropological evidence, but you do know how our brains work with respect to science and it's, it's really a, an amazing observation, don't you think?

[00:41:32] **John Cook:** Yeah. I mean, humans, incredibly complicated. And the work I'm doing, like trying to undo misinformation in people's brain is, it just seems to be getting more, the more I dig into it, the more complicated I get. it's, it gets, and the closer I get to the finish line, the more the finish line gets moved further away from me.

[00:41:56] **Nate Hagens:** And, and yet we have to try my friend.

[00:41:58] **John Cook:** Well, the, yeah, we have no alternative but to try. but, but just to finish my answer to your question. So the effect of facts does fade, which requires booster shuts. We need to, you know, it's pushing the inoculation analogy. We find that, you inoculate people, it's fading.

[00:42:19] You inoculate again, it fades. You inoculate again, it fades. But there was a really interesting study by some researchers at Cambridge. They found that after the fourth inoculation, it stuck. It stopped fading. In other words, the

inoculation, the facts that they were communicating to people entered long-term memory.

[00:42:40] And so the, and so I, I had a conversation with the researcher who was doing this. So like, okay, well how do we get people to, you know, repeatedly, like, do these interventions, like our misinformation games? And he was like, that's, that's the big challenge for us. We can design our interventions in the lab and they work and we've got the answer.

[00:43:05] But then like, even if you do crack that psychological problem, then there's the social problem. Like how do you actually implement that at scale?

[00:43:14] **Nate Hagens:** Have you found any, let's stay on the topic of climate change. Any misinformation the other way around? like. There's some information that is overly exaggerating the risk or from the more liberal progressive side.

[00:43:30] Have you applied these methods in that direction?

[00:43:34] **John Cook:** Yeah, there, there have been. But it's, it's unequal. Like the, the two aren't equivalent. It's a bit apples and oranges. So, so there are cases of exaggeration or, or distortions or oversimplifications of the science. Like a really fundamental one would be, and we use this in our misinformation game, like you brought up cold weather, disproves, global warming, which is an example of anecdote fallacy.

[00:43:58] And we use that example in our misinformation game, but we also use the example hot weather proves global warming, which is also anecdote, Alison, it's the same thing. It's exactly the same anecdote.

[00:44:11] **Nate Hagens:** Yeah.

[00:44:11] **John Cook:** Yeah. So, so you do get oversimplifications of that sort. I'll tell you an example. I watched the documentary cow.

[00:44:21] **Nate Hagens:** I've heard of it. I haven't seen it.

[00:44:23] **John Cook:** Yeah. It's a documentary about the animal agriculture industry and you know, there is a lot of problematic stuff about that industry and it is a very carbon intensive industry. But the documentary just was, had just really misleading, like misinformation in it used to justify their arguments.

[00:44:47] So I agree with their final argument that we need to reduce eating meat, but I just was really had a big problem with them using misinformation to justify that final conclusion.

[00:44:59] **Nate Hagens:** So you, in your work, you're able to spot that maybe easier than the average person?

[00:45:04] **John Cook:** No. See that's the thing, like you can spot.

[00:45:07] You can generally spot some fallacies. They have red flags, they have telltale patterns, you know, ad ho attacks like attacking people or false dichotomies. These either or arguments, they're easy to spot. But some arguments, you need to know the basic, like all the, the facts and the data that. That undergird that argument.

[00:45:31] and in this case it was, it, yeah, it was quite a complicated thing. You needed to really delve into the original study and, and the methodological flaws in that study. So it required expertise in order content expertise in order to sput it.

[00:45:46] **Nate Hagens:** So my understanding is that you currently train educators how to teach critical thinking skills to high school and college students.

[00:45:56] so what have you found to be the main challenges for educators when trying to get young people to understand and use logical thinking?

[00:46:04] **John Cook:** How I, I got into that was we, we developed a misinformation game called Cranky Uncle. And initially we just released it to the public and I just posted it on social media and, and I found that the people who were using the game were the kind of people who followed me on social media and, and therefore already knew all that stuff.

[00:46:22] They knew flick, they knew all the techniques. It, this was not the right audience for this intervention. It was kind of preaching to the choir. and so then we reached out to educators and we said, here is a tool, an interactive game. It's fun, it's got cartoons, but it also teaches critical thinking.

[00:46:42] And here are some different ways that you can use this game to teach critical thinking in your classrooms. And, and so that's where we saw that the game was then reaching the people who needed it. So, and, and not just that, it also solved the, one of those problems I mentioned before. How do you scale up and reach.

[00:47:00] The audiences that, that need these kind of interventions through, through educators, you can just reach the general public, not, not just self-selected.

[00:47:09] **Nate Hagens:** So can you tell us a little bit about how that game Cranky Uncle works and, and how it actually helps people to overcome the, the psychological structure and social barriers that you, that you outlined?

[00:47:20] **John Cook:** Yeah. So the, the game is basically about inoculating people against the flick techniques. So it basically just goes through all the different flick. Flick techniques here is what fake experts look like. Here is what

cherry picking looks like. But the way we do it is we try to make it funny by having a cranky uncle cartoon character.

[00:47:40] So he is, he's your science denying cranky uncle. And I've never met a person who doesn't have somebody like that in their life. Yeah. Usually in their family. I said, I have several. Me too. Most people too. Yeah. This ubiquitous concept that everyone resonated with and it was using humor to explain flick, but then the real power of games is we also added an interactive element where we would show people examples of misinformation and they had to spot the flick technique in it, through like a quiz.

[00:48:15] And if they got it right, then they earn points. we call it cranky points. And as they earn cranky points once they level up. Cranky uncle also leveled up and his mood got a little bit crankier. So he starts off agreeable, then he becomes peevish, then he becomes huffy. And we, so we just go through this range of emotions and his face gets angrier and angrier.

[00:48:38] So by the end, steam's coming outta his ears. His face is red, his got bloodshot eyes. He's, so it's using, again, all those elements of gameplay and humor to motivate people to get further into the game. But really what we're trying to do is get them practicing critical thinking.

[00:48:53] **Nate Hagens:** And is that app or website used all around the world or just in Australia or

[00:49:00] **John Cook:** used a lot more in the US than Australia?

[00:49:02] I was based in Virginia when the game came out. Okay. and so, it's a, and amongst educators, it's mostly US classes where it's being used in high schools and colleges.

[00:49:16] **Nate Hagens:** I think I know the answer to this on climate change, but my question is broader. have you noticed any cultural, or geographical cognitive biases relative to science, whether it's climate or, or anything else?

[00:49:32] Like do people in the United States and Australia behave a certain way towards science and people in Nigeria or China or France, are different or have you noticed anything like that? Or are humans human, the world over?

[00:49:48] **John Cook:** Yeah, I think I noticed it when I moved to the us. This was in 2017 and I lived there for four years in Virginia at, based at George Mason University now, and you, you're asking what are the insights I've had?

[00:50:01] This was the next big insight I had after my PhD because over the five years when I was living in Australia during my PhD, I would've said that political beliefs. I'm the biggest driver of climate denial. But once I moved to the us, I realized that even bigger than political beliefs was, political.

[00:50:27] I social identity was an even bigger driver. Now, the difference between the two is your political social identity is what social group do you identify with? I'm democrat, Republican, independent, as opposed to what are your beliefs? I believe in small government, or I believe in, deregulation. You know, that, that kind of thing.

[00:50:53] Now there's a big overlap. If there's a Venn diagram, those two circles are overlapping a lot.

[00:50:57] **Nate Hagens:** But which one was stronger?

[00:50:59] **John Cook:** Social identity is the, the much stronger one. and I reali, I was actually, I think, I. Seeing the change in public opinion in the US towards

Russia, which you thought, especially amongst Republicans, you would've thought that would be a unfixable belief.

[00:51:19] But it changed so quickly. once the tribal leader said, Hey, we like Russia now, it, it, it surprised me. And around that same time, like, because that's a, that's an anecdote really, but at the same time, scientific research came out finding that political affiliation or that social identity was a much stronger driver of climate attitudes than political belief.

[00:51:43] And so what I take from that is that at the most fundamental level, humans are social animals. So we do have our beliefs and our beliefs can be quite strong and hard to change. But even more fundamental than that is what is the tribe that we identify with? And when our tribe leader says X, the tribe tends to go with that.

[00:52:05] **Nate Hagens:** Here, here. Yeah, that's it. So I understand you've also applied, those same anti misinformation methods to other contentious topics, including, I believe, vaccine education in in Northern Africa. Can you tell us a bit how your team and you went about adapting your cranky uncle app for issues outside of climate change?

[00:52:30] **John Cook:** Yeah, so Cranky uncle had just come out focused on climate misinformation, and then UNICEF approached me and said, Hey, can we have that for vaccines? they, and it was really convenient. Like there was, there was this. Existing game, you know, off the shelf, like it was, it was not a big deal to adjust it.

[00:52:49] And because the game is really based around critical thinking and fallacies, it is very transferable to other topics. and so the first thing I did was I did a survey of vaccine misinformation and what were the most common fallacies in vaccine myths, and we just picked the top 10. Now, eight of the top 10 were

already in the game and were, you know, the top climate fallacies, we only added two new fallacies, which were somewhat unique to vaccine misinformation.

[00:53:22] One was. Appeal to nature saying that natural remedies are better than something that scientists have developed like a vaccine. And the other one was, we call it false cause the technical or Latin term is post hoc ergo prota ho. Mm-hmm. Which is basically saying this happened and then that happened.

[00:53:44] So this must have caused that. someone got a vaccine and then they got autism, or showed autism symptoms, therefore the vaccine must have caused autism. Or more broadly, you know, a teenager got the HPV vaccine and then showed some kind of, you know, adverse, you know, some kind of injury afterwards.

[00:54:04] They use the term injury, and therefore the, the vaccine must have caused the injury. Now, And so the example we use of that fallacy is arguing that the rooster crowed and then the sun rose, therefore the rooster must have caused the sunrise. it's exactly the same logic. Just 'cause two things happen at similar, at close to each other, doesn't mean that one necessarily causes the other.

[00:54:34] **Nate Hagens:** Have you noticed yourself or your wife, or your close friends and family over time becoming less susceptible to these things because you understand them? Or do you still just fall right into the pitfalls?

[00:54:49] **John Cook:** Oh, that's a good question. yeah, because as you say, we're all motivated reasoners, right? like my wife would say that I.

[00:54:59] And way too casual eating food in the fridge that has been there for too long. Where I would tell, I would say that she's an alarmist. So, so yeah,

[00:55:12] **Nate Hagens:** I'm laughing because it rhymes with, with my own situation, but yeah. Yeah. I mean, it's just, it's metacognition, right? Metacognition is, is hard for us to think about how we think.

[00:55:24] **John Cook:** Yeah.

[00:55:25] **Nate Hagens:** Especially if we have some biases that we discovered about ourselves, that usually doesn't feel good.

[00:55:32] **John Cook:** And that can almost be a two-edged sword, right? Because like, my familiarity with fleck makes me very wary of conspiracy theories. So, and we all see something dodgy and think, oh, you know, is there a conspiracy behind that?

[00:55:49] So once our website, like we have a private, with skeptical science, we have a private forum for the authors to collaborate. And, and, and to, to write the rebuttals. And we kind of peer review each other's work to try to make our rebuttals as strong as possible. But we, we do it privately so that there's the climate deniers.

[00:56:11] can't come in and disrupt the discussion. Now, at some point, the forum started acting weird. And somebody said, oh, I think someone might be trying to hack into the forum. And I was like, you're just being conspiratorial and paranoid that that's not happening. It turns out it was, we were hacked. Someone took the entire forum, posted it on some Russian server to the public, and then Climatized just started pouring through all our private discussions and cherry picking, you know, the bits where we were venting probably, you know, saying swear words or something and, and just trying to make us look bad.

[00:56:49] **Nate Hagens:** That's a interesting story, but it, it raises my blood pressure. 'cause I can only imagine the comment section on this YouTube,

conversation when it, when it comes out. It's, it's hard. and I'll just share this with you openly, on camera because this, this platform, The Great Simplification, I care about climate change and the environment and global heating.

[00:57:14] I understand it. I've spent time on it. I don't think we're gonna be able to do anything just specifically about it because we have 10 other crises that are happening simultaneously. And invariably, every topic will have its own cranky uncles. And therefore, if you deal with 10 or 12 interrelated topics, there will always be a cranky uncle or aunt.

[00:57:42] and it's, it's very difficult to. Hmm. Consistently say, stay tethered to the science or the best science that we know on a systems ecology, complex, nuanced story of humanity in the biosphere. And yet we, we must try, but it, it's, I I think you can probably empathize with, with the, the level of difficulty.

[00:58:12] **John Cook:** Yeah. But, and we'll always have those cranky uncles, like I mentioned, the Yale surveys where they find that the public opinion is improving, but there's, there's always been this stubborn, 10% of cranky uncles really, who have just are dismissive of climate science and that that just hasn't shifted over, over a decade.

[00:58:33] **Nate Hagens:** Yeah.

[00:58:33] **John Cook:** Yeah. You know, I recognize that they will always have that, that stubborn. Minority, but do we need to change them in order to get progress? We don't. I think that, it's, it's. Getting 100%,

[00:58:49] **Nate Hagens:** no

[00:58:49] **John Cook:** agreement on climate action. It's about activating the people who care.

[00:58:52] **Nate Hagens:** But what you said earlier rings true that it's the ingroup outgroup and that we value our social identities more than, our political beliefs per se.

[00:59:04] So if all of a sudden the world is in a depression and times are really tough, the tribe or the ingroup that's going to talk about ways forward is probably not gonna be the climate group, because that's gonna add even more economic constraints on our choices. So I, I don't know what the answer is there, but I could argue that the 10% cranky uncles on that topic will actually increase in an economically constrained future if that.

[00:59:37] Made sense.

[00:59:38] **John Cook:** Well, hopefully, I think the answer is that those who do want climate progress, they just have to step up. Like, we, we need to activate the people who care about climate change. Like this is my great Simplification, right? even though the public are very complicated, complicated, I kind of simplify it into three main groups.

[01:00:00] There's the, the, the convinced, there's the undecided, and then there's the dismissive. the 10% dismissive. Now the convinced, more than half, there's something like 58, 60% of the public talking about us public. and then you have like about 30% undecided. So, it's not a, and I think we do need to try to.

[01:00:27] And we do need to move the unconvinced into the convinced, but to get climate action, we need to activate that 60% who are convinced, most of whom are inactive. So it's not about convincing the whole public, it's about, getting people talking about climate change and, and doing something about it. Like we have enough people care about climate change to get enough social momentum, to get political momentum, but, we need to be working on, on activating them.

[01:01:01] **Nate Hagens:** So I, I asked you this before, let me ask you in a slightly different way, given that the original cranky uncle was made for US and Australia audiences, what was it like implementing those techniques in other countries and cultures? Did you learn anything that, that surprised you?

[01:01:15] **John Cook:** Yeah, so what we did was that once we developed the vaccine version, we co-designed it through a range of workshops in East Africa.

[01:01:22] So we ran, we, we drew sketches like I. Before my PhD, I was a cartoonist, so I, I drew all the cartoons in cranky. Okay,

[01:01:31] **Nate Hagens:** that makes sense.

[01:01:32] **John Cook:** So I drew all these sketches and they would stick them up on walls and, and these, participants would go to these workshops in Uganda, Kenya, Rwanda, and then later Ghana and Pakistan.

[01:01:45] And they would just put all these little sticky notes saying, you know, this is how you make these characters look like us. and also they would play the game. They would read the content and they would say, this is how you make the content, me more meaningful to us. And so we, we worked iterated the game, the content, the, the characters.

[01:02:07] created versions for East Africa, another version for West Africa. Then we went to Pakistan, which was even more challenging and, and created a Pakistan version. And then we ran these pilot studies where we tested the game's effectiveness and. The thing that jumped out at me most, like the most important result I think from all these different pilot studies.

[01:02:27] 'cause whether it was East Africa, English, or whether it was Rwanda and we did French and Kenya Rwanda as the languages, or whether it was Urdu in

Pakistan, we always found that the people who started playing the game vaccine hesitant. So they said that they were either unlikely or very unlikely to get vaccinated.

[01:02:49] More than half of those people switched to being likely or very likely to get vaccinated. So they switched from vaccine hesitant to accepting vaccines, by the end of playing the game. So that mix of communicating the facts, but also explaining how misinformation tries to distort those facts. All the flick techniques, that combination of facts and logic, helped inoculate people and switch their attitudes towards vaccines.

[01:03:21] **Nate Hagens:** Well, isn't that a, that inoculation and versions of that game be applied to all different kinds of, scientific, contentious issues in the world today?

[01:03:32] **John Cook:** Yeah, potentially like. Because those same fallacies are seen in every topic. So in theory, you could just create a cranky uncle, for, for any other topic.

[01:03:43] **Nate Hagens:** So in your opinion, at what age, should we be starting to teach people these sort of critical thinking and logic-based skill sets? Is there a too young or too old?

[01:03:53] **John Cook:** There probably is, but I don't know the answer to that yet. And I'd, I'd like to know, we found that this is, and this is a really weird.

[01:04:02] Counterintuitive surprising statistic. We found that the game was more effective the older people got. Yeah. We thought it would be the opposite. we thought it would be young people play smartphone games and old people are like, what's this newfangled technology? But we found it was like the boomers, were, were showing the greatest, effect, like improvement.

[01:04:27] **Nate Hagens:** Is that maybe a product that they had a, a, a longer attention span?

[01:04:32] **John Cook:** You jumped right onto it. So that's my hypothesis. We haven't confirmed that, but I think it's because, yeah, young people. Breeze through, and I don't, I'm just speculating here, but probably young people breeze through the game, whereas older people just gave it more of their attention.

[01:04:47] **Nate Hagens:** Well, I think you saw the recent study, Jonathan Het was on the show, and he posted something that the, the attention span and the, the test scores and high school and college are just going down, down, down, correlated with how much time you spend on social media apps. And so I think that itself is a barrier to understanding science.

[01:05:09] **John Cook:** Mm-hmm.

[01:05:09] **Nate Hagens:** Because if you wanna read a paper about ocean acidification, the prerequisite of that is some degree of education in the natural science and some attention span to spend an hour reading something. And there is a little bit of this Idiocracy, game piece that's been added to our, our human predicament board.

[01:05:31] **John Cook:** Yeah. I, I better, go back and listen to the Jonathan. Oh yeah, because, because I wanna, I, I like to track down that paper.

[01:05:40] **Nate Hagens:** Yeah. Yeah. I'll, I'll find it. It Jonathan's episode here was two years ago, but this is a recent thing that he's posted. It's, I'll, I'll find it and send it to you and I'll put it in the show notes for others to see

[01:05:51] **John Cook:** Even better.

[01:05:52] **Nate Hagens:** So how have recent increase in political attacks on, on climate science and the climate consensus affected your outlook, on your current and future work, on these issues?

[01:06:04] **John Cook:** Are you talking about recent as in just this last year or the trend? Yeah. So, we published, research a couple of years ago, just we used, we trained a machine learning model to detect all the different misinformation claims and then we could build a 20 year history of climate misinformation.

[01:06:24] so we're basically using AI to better understand what climate misinformation looks like. Two things really surprised us. firstly like. Notice that all the myths that you brought up to me were all around science type topics. You know, the, the CO2 lag in the ice cores, or cold weather or, or, climates change.

[01:06:46] In the past, we found that those arguments were actually the least common form of climate misinformation. The two most common forms of climate misinformation were either attacking climate solutions or attacking the scientists themselves. And there was an increasing trend from the science denial to solutions.

[01:07:09] So climate misinformation is transitioning towards attacking renewables and climate policy. and less and less about science denial, which was quite chastening for me. 'cause I've Skeptical science is all about debunking science myths.

[01:07:23] **Nate Hagens:** Well, my, my take is on that and it's just my initial reaction is attacking the scientists or the solutions is a lower bar.

[01:07:33] It's easier to attack than the actual science.

[01:07:36] **John Cook:** Yes. In terms of attacking scientists, like at homan attacks are the easiest type of misinformation. and you will find even the science myths, it's the simple ones that are the most common. The cold weather dispr is global warming or climate has always changed.

[01:07:50] They're just easy arguments to make. And so they're the most. Common solutions, though they can be quite nuanced because, you get your stupid ones, windmills kill birds and the sun doesn't shine at night. So solar panels can't, can't solve our energy problems, that kind of thing. But, but often climate policies quite intricate.

[01:08:12] And so, it's, it's a, it's a more difficult terrain for a fact checker like myself, to. To deal with mis misinformation around solutions. So

[01:08:28] **Nate Hagens:** you have to have, you personally, John, have to have somewhat of a thick skin or just an un airing, north star moral compass to continue to fight this Sisyphean battle for almost two decades.

[01:08:43] Because this is hard stuff. You're not like making widgets or just testing, drinking water, sort of science.

[01:08:49] **John Cook:** For me, it peaked around 2013. So at that time, this was in the middle of my PhD, we published a paper finding 97% scientific consensus on climate change.

[01:09:00] **Nate Hagens:** Oh, that was you that published that paper?

[01:09:02] **John Cook:** Yeah. Yeah, I

[01:09:03] **Nate Hagens:** remember that paper.

[01:09:04] **John Cook:** Yeah. So it came out like on May the 16th and on May the 17th, president Obama tweeted about it, and I came into work that day and someone's looking at the Obama tweet said. You realize your career has just peaked, don't you? Shit. Australians can be quite blunt, you know? but, and that was, that was the most gentlest because the Obama Tweet led to this wave of positive attention and very closely followed behind it.

[01:09:34] Very, very negative attention.

[01:09:36] **Nate Hagens:** How does that 12 years later stand, that 97% figure, and maybe just gimme a little context of that.

[01:09:44] **John Cook:** Well, firstly, we were not the first. Study to find 97% consensus. There were two previous studies that had also found 97% consensus. Since then, as a couple of studies have found that actually it's, it's getting closer to 98, 99.

[01:09:59] That's just, it's getting stronger, as you would expect. And in fact, even our own study, it was 97% averaged over 20 years. By the end of that 20 year period, it was actually closer to 98%. So, and the consensus is just getting stronger and stronger and it's being replicated in multiple studies. So it's.

[01:10:19] It's such a non-controversial figure that, or, or conclusion that there's overwhelming consensus.

[01:10:26] **Nate Hagens:** So does it bother you when a very persuasive, website or article or famous person or congressman or senator or president critiques your work or work linked to it? Or do you have a thick skin and you know, you're with the other 98%?

[01:10:47] So it's just part of our distribution of humans on the planet and it doesn't bother you?

[01:10:55] **John Cook:** I wouldn't say it doesn't bother me. particularly back then in 2013 when it was at its most virulent. The, the lowest period though was not when they were attacking me, like publicly. They actually then started coming at me through my university strategically, like attacking, like, or trying to influence.

[01:11:17] The university leadership to try to either get me fired or or censored or something. And like Michael Mann talks about this in, he's a climate scientist in, in one of his books, he calls it the Serengeti strategy, which is when, like lions will try to separate one member of the herd away from the rest of the herd.

[01:11:37] When the herd's together, they protect each other. But if you can just separate one wildebeest, then the lions. Can take it down. And really, that's what they were trying to do, trying to isolate me from my own community.

[01:11:49] **Nate Hagens:** That resonates. so, in respect to your Jack Russell, who I know is on the ground next to you, wanting to go for a hike,

[01:12:00] **John Cook:** he's, he's, eyes are shut right down.

[01:12:02] Oh,

[01:12:02] **Nate Hagens:** his

[01:12:02] **John Cook:** eyes are shut. Is, this is the most docile He's been like, usually I, as soon as I start a meeting, he'll just start yapping at whatever's happened at the front window. You are like, I don't know, maybe it's you and your Jack Russell energy or something, but he's being very well behaved.

[01:12:18] **Nate Hagens:** well, I have a Jack Russell Dotson mix and the mix is, is important.

[01:12:23] and, boy, if I could find another one of those. He's a special dog. Frank. let me ask you some, some closing questions. I ask all my guests. Do you have advice, personal advice, John to listeners, viewers of this program at a time of global upheaval and anxiety, people worried about the economy and the environment and climate, what some would call the, the poly crisis.

[01:12:45] what personal advice do you have?

[01:12:47] **John Cook:** I do have some hopeful, positive advice, which I hope does mediate some of all the depressing stuff we've talked about. My advice to people is pretty simple. if you wanna do something about climate change, if you wanna contribute to this problem, just. Start by opening your mouth and talking about it to people.

[01:13:06] You don't have to be an expert in climate change. You don't have to know all the flick fallacies. You just have to send that social signal that you care about the issue because we're social animals and that that signal matters. And bring what you have to the table. We are all unique. We all have different interests, skills, passions, and backgrounds that combine in a way that is unique to you.

[01:13:30] Bring that u uniqueness to the table and that can make an impactful contribution. Like I'm, I'm a bit of a odd duck in the academic community. I had a cartooning background, then I did psychology, PhD and now I work with a whole range of people, game developers, philosophers, critical thinkers and so on.

[01:13:50] And it's that weird combination of different things that led to Cranky Uncle, which, which couldn't have existed without all that weird, unique stuff.

We're all unique. We all have these different things we can bring. and that can all contribute.

[01:14:07] **Nate Hagens:** Do you teach or, or just do research and, and this sort of work, or do you also have classes?

[01:14:12] **John Cook:** I mostly do research. I have done, I do some teaching like. In fact, just this last semester I taught a class where it was like teaching psychology students how to go from, come up with an idea, design an experiment, collect the data, analyze it right from, you know, beginning to end. And that was really exciting and rewarding.

[01:14:33] **Nate Hagens:** And what sort of advice do you have to people in their teens and twenties who become aware of, of all these things?

[01:14:39] **John Cook:** Well, I, I, I mean, a similar thing I think, like do get yourself informed. do inoculate yourself against the misinformation, but mostly just get out there and, and. Start talking about it to people, even fam, start with family, friends, and, and,

[01:15:01] and

[01:15:02] **Nate Hagens:** your cranky uncle.

[01:15:03] **John Cook:** Yeah. Well, and yeah. And when you talk to your cranky uncle, recognize that you're probably not going to change his mind. But the conversation matters because other people, might be listening to it too. And like, when I like, so my version of that is I will give public talks and there will inevitably be a cranky uncle in the audience who will then stand up at q and a and say, what about the cold weather?

[01:15:30] What about the ice core record, et cetera. And I will answer him. And I recognize that I'm probably not gonna change his mind, but everyone else is listening to that conversation. And, and it's an opportunity for me to inoculate everyone else who's listening. And that actually gives me kind of a, a, I get less frustrated because I'm not banging my head against a brick wall.

[01:15:51] Why won't you change your mind? I, I recognize I probably won't, but I, I have a different goal to that.

[01:15:56] **Nate Hagens:** That's, that's actually interesting. What do you care most about in the world, John?

[01:16:01] **John Cook:** My family, I guess, like, it's, yeah, I, I, I know that the world is heading in dangerous directions, so I wanna, I do wanna create a, a safer world for them.

[01:16:14] And unfortunately, I think it's going in the other direction. It's becoming less safe. So it's about also about looking after my family.

[01:16:21] **Nate Hagens:** And in the world that you just mentioned, what are you most concerned about and most hopeful about kind of in the next decade in our world,

[01:16:30] **John Cook:** I'm really concerned about the backslide of democracy.

[01:16:35] Like I took democracy for granted until really about just the last, decade, and realized that it was a much more fragile thing. I'm worried that with the backside democracy also comes attacks on science. So it's not, it's not just the kind of attacks, the misinformation that I study, it's actual overt taking down of scientific institutions, you know, taking away measurements of, you know, like stopping measurement of what's happening to our climate, that kind of thing.

[01:17:09] Like actually deleting the data and, and defunding science. So that concerns me. I guess the thing that gives me hope, is that, Because it's such a big issue, like it, it seems hopeless, right? but there is an analog for this situation, and that's the abolition of slavery, an institution which at the time seemed like it was impossible to shift.

[01:17:39] The economies were based on it. The people who were fighting against it, felt like they were screaming into a void and, and making no progress. But they persisted and they eventually prevailed. and so, and the way that they did it was through building social momentum. So I think that again, by opening our mouths and talking about it, we build social momentum.

[01:18:03] That's the only way that you can really tackle these big societal level problems.

[01:18:10] **Nate Hagens:** And that's why I'm continuing this podcast after four years. So if you were to come back, a year from now back on this show, what is one. Piece of research or some topic, that you are personally really curious about or passionate about that's relevant to human futures that you would be willing to take a deep dive on?

[01:18:34] **John Cook:** Yeah. The, the thing that I'm, we haven't even talked about yet, but I'm intensely interested in at the moment is the potential of fiction. So like, 'cause I'm about nonfiction, science, communication. Mm-hmm. You also. Surprisingly little research into the impact of fiction, but the research that there is, when they compare fictional narratives about climate change to nonfiction science communication, they actually find that the fiction is more effective in

[01:19:08] **Nate Hagens:** Yeah.

[01:19:08] **John Cook:** In engaging people. And, and even shifting their s

[01:19:11] **Nate Hagens:** the Kim Stanley Robinson book about the wet bulb, story in India, that was hella impactful

[01:19:18] **John Cook:** reading

[01:19:18] **Nate Hagens:** that.

[01:19:19] **John Cook:** Yeah. And so I'm surprised that there's, there's like, I've been doing a literature review on climate fiction actually empirically measuring it, but like there's a lot of, I've, and also reading a lot of humanities papers about it.

[01:19:32] The humanities talk have a lot of opinions, but not many people are measuring the impact. But the, the little there is, is some really teasing, like. Tantalizingly, interesting results. So we're actually designing an experiment now where we're testing several genres of fiction, against nonfiction, to see the impact.

[01:19:53] And the, and the thing that isn't studied at all is, is testing, not just climate fiction, but different genres. Because I, I think that if you want to really impact the public at a societal level, like literary fiction is, is important. It's great, but it doesn't really go mainstream. I think genre fiction or popular fiction is, is the way to actually go, go viral, basically.

[01:20:21] Go mainstream. and so we're testing different genres,

[01:20:24] **Nate Hagens:** said differently. We do need the scientists like yourself and the architects and the engineers, but I think we need the storytellers and the artist, almost first. And then we get the, you know, the hard science people involved.

[01:20:37] **John Cook:** I happen to connect with a few, climate fiction writers who, who are also academics, but they publish novels and short stories. So we're working on an experiment now where we're developing different narratives.

[01:20:53] **Nate Hagens:** Awesome. Well, let's, let's follow up on that. this has been great. Thank you for your time. do you have any closing comments for people watching who understand and agree with what you've laid out here today?

[01:21:07] **John Cook:** At the risk of being repetitive, I will just say that, Yeah, don't, don't be too discouraged. Like I, I'm a pessimistic personality by nature, but I do, I, I guess I have a steely hope. and it's, it's, it's a hope that, I don't know whether acting will get the job done, but you, we just have to do it.

[01:21:30] Otherwise it becomes a self-fulfilling prophecy. And also, I guess my last finished thought is climate change is not a binary thing. Again, that's a false dichotomy. It's a matter of degrees, like literally degrees. So how much we do now affects how much climate damage will experience in the future. So every little bit counts now.

[01:21:52] **Nate Hagens:** To be continued. John, thank you so much.

[01:21:55] **John Cook:** Thanks, Nate.

[01:21:56] **Nate Hagens:** If you'd like to learn more about this episode, please visit The Great Simplification dot com for references and show notes. From there, you can also join our Hilo community and subscribe to our Substack newsletter. This show is hosted by me, Nate Hagens, edited by No Troublemakers Media, and produced by Misty Stinnett and Lizzie Siri.

[01:22:18] Our production team also includes Leslie Balut, Brady Hyen, Julia Maxwell, Gabriela Slayman, and Grace Brumfield. Thank you for listening, and we'll see you on the next episode.