



**I'M CALLING BS!**

**PART 1**

(The Science Police)



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## I'm Calling BS! – Part 1 (The Science Police) Transcript

Dr. James Heathers:

The problem is, of course, in the immediate sense what slips through the cracks, not in terms of how much stuff is wrong. But we do not have any good estimate how much of what is published in the entirety of the global scientific enterprise, we have no idea how much is inaccurate, how much is just wrong, how much is plagiarized, how much is literally fabricated from cloth, how much is, like the data is real but the analysis is fake.

Dr. James Heathers:

We don't have estimates for any of these things. There are some estimates offered that in general they rely on things like surveys that ask you to report whether or not you're doing fraud, which is spectacularly naïve.

Dr. John Berardi:

This is the Dr. John Berardi Show, a podcast that seeks important lessons in a seemingly unlikely place amid competing points of view. In each episode, I look at fascinating, sometimes even controversial, topics through the minds of divergent thinkers, and together we tease out unifying threads from ideas that may feel irreconcilable.

Dr. John Berardi:

Today's topic I'm calling "BS." For the last few years, I've become fascinated with the rise of the BS detector, the appearance of self-styled protectors of scientific truth and consumer justice. I think you know who I mean: aggressive and antagonistic public figures out to myth-bust, debunk and expose everything, from ideas they deem untruths to people they consider grifters and snake oil salesmen or saleswomen.

Dr. John Berardi:

I'll be honest here. Probably because of my own constitution, I'd rather mediate a fight than pick one. These folks have often rubbed me the wrong way, and I've thought a lot about why. On the one hand, calling out BS feels useful and necessary; if information is bad, someone ought to be out there counteracting it, putting it to an end.

Dr. John Berardi:

On the other hand, aggressive and antagonistic methods feel counterproductive. Beyond my felt sense of decorum as a coach of 30 years and a student of change psychology, I've learned that people don't often change by being mocked or derided, bullied or coerced. Usually the opposite happens.

Dr. John Berardi:

About a year ago, all this came to a head when I read a very comprehensive critique of Dr. Matthew Walker's New York Times bestselling book, *Why We Sleep*. The critique, written by Alexey Guzey entitled straightforwardly, *Matthew Walker's Why We Sleep is Riddled with Scientific and Factual Errors*, was picked up by major media outlets and even prompted Dr. Walker to rush out a second edition of the book.

Dr. John Berardi:

For me, this interaction raised all sorts of questions like: What are the pros and cons of public criticism, especially a criticism of published and popular science like Dr. Walker's book? How does good, ethical, useful criticism differ from bad, unethical, derisive criticism? How should we, as observers of this criticism, react both to the criticism of works that we agree with and to the criticism of works that we disagree with?

Dr. John Berardi:

Even more, because I'm not inclined to do criticism, I wondered about the critics themselves. Who are they? What makes them tick? What are their motivations?

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Dr. John Berardi:

So in this three-part series, we'll explore these questions and more. We'll begin here in Part One by learning about a fringe area of science that you probably haven't heard of, one in which the goal is to call BS on poorly done published research in the interest of having it corrected or removed.

Dr. John Berardi:

Along the way, we'll talk to a colorful researcher and BS detector who's been at the heart of nearly 100 retracted papers, half of which came from a nutrition lab and scientist you probably have heard of, one you've likely even quoted without knowing it.

Dr. James Heathers:

No one wants to interfere with your right to say vegetables are important for children. Here's the thing: Don't do science. Do something else. Go and work for the marketing department in Nabisco. Become a vegetable ambassador.

Dr. John Berardi:

Then in Part Two, we'll move from published science to popular science, talking about Dr. Matthew Walker's sleep book, Alexey Guzey's criticism of it, and how a leading sleep researcher, Dr. Jennifer Martin, thinks both about the book and its critics.

Dr. Jennifer Martin:

When I think about debates like this in general, I think, "What is each person trying to accomplish?" I think that Matt Walker is passionate about sleep. I don't know what Dr. Guzey's criticism was trying to accomplish. I think that there are some things in Matt's book that are debatable and some things that are not debatable. Sometimes scientists get stuck in needing to find the perfect answer when the good answer would have a big public health impact.

Dr. John Berardi:

Finally, in Part Three, we'll meet another BS detector who targets not scientific source material and not popular science books, but the dissemination of popular science on places like Joe Rogan's podcast. We'll hear about his criticism of two prominent appearances on that show, and we'll even hear back from someone he criticized.

Speaker 4:

Yeah, so the podcast itself was three hours, but it probably took me about 15 to listen to it. So to watch it was 15 hours. To write the whole thing up, cite it, edit the article, get it posted, all that, it probably ended up being somewhere on the metric of 40 hours, something like that.

Speaker 5:

I think it's one thing to take a book that someone's written and make a criticism, and it's another thing to criticize a podcast. They're not quite the same product. I think that ultimately we have to ask of any of these things: Is the intention on both sides to create productive discourse that benefits people and provides a product that will allow humans to live better lives?

Dr. John Berardi:

So yeah. We're going to cover a lot a ground. For now though, we have to start at the beginning, and in this case, it all begins with a baby carrot.

Dr. John Berardi:



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The year was 2012, and Cornell University professor, Dr. Brian Wansink and his coauthors published a paper called *Attractive Names Sustain Increased Vegetable Intake in Schools*. Their thesis was that if you changed the name of things like carrots and green beans and broccoli to something exciting, children will eat more of it.

Dr. John Berardi:

So in this particular study, they reported offering three different groups of grade-school children ages eight to 11, so that's grades three, four and five, baby carrots. In the first group the carrots were called a fancy name, X-Ray Vision Carrots. In the second group, the carrots were simply called Food of the Day. And in the third group, the control group, the carrots were unnamed as they usually would be.

Dr. John Berardi:

Lo and behold, the children in the fancy-named carrots group seemed to eat more carrots than the children in the other two groups by a lot. The X-Ray Vision group was reported to have eaten 11 baby carrots versus only five or six for the other two groups. Big win for this seemingly simply and intuitive idea; big win for Dr. Wansink.

Dr. John Berardi:

You see, this paper and a few others of his, one notable one looking at how putting Elmo stickers on apples led children to eat more apples over cookies at snack time, were used to get funding for the Smarter Lunchrooms movement. Now, Smarter Lunchrooms was a program run by Wansink that received over \$20 million in federal money to give science-based recommendations to elementary, middle and high schools that wanted to encourage healthy eating, a noble pursuit for sure.

Dr. John Berardi:

The program leveraged Wansink's X-Ray Vision Carrots and Power Punch Broccoli and Silly-Dilly Green Beans to drive vegetable presentation in elementary schools. By 2017, the group had over 30,000 schools participating, but this is where things get weird.

Dr. John Berardi:

In that 2012 paper, the authors shared a data table with three numbers for each group. The first was the average number of carrots added to a child's plate, the second was the average number of carrots eaten from that plate, and the third was the average number of carrots left behind on that plate.

Dr. John Berardi:

Now, how math works, of course, eating too, is that the number of carrots you've eaten plus the number of carrots you left behind should equal the number of carrots that you added to your plate in the first place. Yes? But in this data table, the carrots didn't add up. For example, in the X-Ray Vision group, the children seemed to take about 17.1 carrots on average, yet the number of carrots eaten, 11.3, and the number of carrots left behind, 6.7, adds up to 18 carrots.

Dr. John Berardi:

So if the children took only 17.1 carrots but ended up eating or leaving behind 18 carrots, where did that extra nine-tenths of a carrot come from? This is the question that puzzled error detection specialists Tim van der Zee, Jordan Anaya, Nicholas Brown and James Heathers.

Dr. John Berardi:

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You see, these four scientists with normal science day jobs were spending evenings and weekends doing something that the scientific process doesn't actually do nor do paid scientists: screening published papers for errors and making sure they're corrected. Here's Dr. Heathers.

Dr. James Heathers:

I have a sideline area of research in what we generally call "error detection" but has sometimes been called "forensic statistics," sometimes "academic integrity." Depends on what hat it's wearing, but basically it goes like this: You go out into the scientific research. You find things you don't like or someone shows them to you because they know you'll do something about it. You figure out what's wrong with it, which is usually mathematical but sometimes is processual, social-driven, and then you punch the snot out of it.

Dr. James Heathers:

It's not really a common approach to scientific discourse, and it's occasionally been poorly regarded by people who I, myself, would poorly regard. So basically, I'm professionally difficult.

Dr. John Berardi:

More on this in a minute. For now, though, back to the carrots. Dr. Heathers and his colleagues noticed other inconsistencies in Dr. Wansink's paper. Take, for example, the control group. The average number of carrots taken was reported as 19.4 with a standard deviation of 19.9 carrots, which is weird on its face because it implies that one or more than one of the children took negative carrots.

Dr. John Berardi:

When reviewing a research paper and oddities like this start to pile up, Dr. Heathers gets this predictable feeling. Here's how he describes it:

Dr. James Heathers:

It's an itch. It's an itch, I mean, and it's a long, long, long way down under a trouser leg, and you can't scratch it through the knee. You've really got to get your hand out from the cuff right at the bottom and pull it all the way up. And then you can't quite reach it, so you go and you rub your knee on a tree, and that doesn't work. You try and find your mom's old ivory backscratcher, and that doesn't work. It gets under your skin.

Dr. John Berardi:

So upon seeing these errors and feeling the itch, he ran a statistical technique he created called, brace yourself, "simple parameter reconstruction via iterative techniques." Thankfully, he calls it SPRITE, for short. This technique and another he created, called GRIM, for short, allow scientists to reconstruct accurate data sets without actually having the original data.

Dr. John Berardi:

For example, in published papers, you typically can only see the mean or the average data for groups and their standard deviation, their variability. You don't get to see the actual data for each subject. So in this carrot study, you don't get to see how old each child was or how many carrots they ate. You see their average age and the average number of carrots eaten for each group.

Dr. John Berardi:

But what Dr. Heathers' techniques can do is to reconstruct individual subject data probabilistically from the averages reported. When running the 19.4 plus or minus 19.9 data, he discovered that for such a data set to be true, at least one

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child in the control group had to eat around 60 baby carrots. That's over a pound. You know those bags of baby carrots at the grocery store? One of those, the whole thing. So the plot thickened.

Dr. John Berardi:

You may be familiar with Dr. Wansink's bestselling book, *Mindless Eating*. In the early 2010s, Wansink was a media darling. His simple, intuitive solutions for eating better were sticky, so even those with a passing interest in food and nutrition had heard of him or seen one of his TED talks. Simply put, in certain spheres, he was a big deal.

Dr. John Berardi:

But among Dr. Heathers' circle of science nerds and error detection specialists, he was just another scientist with questionable data.

Dr. James Heathers:

I was the only one of this little coterie of people who were looking at it who'd heard of his work. I didn't have the imagination at the time to figure that it could be done badly. Because a lot of the time, it was basically if you've got a short, fat glass and a tall, skinny glass and you ask people to estimate how much they pour into it, there's a disparity.

Dr. James Heathers:

This holds true for regular people in the world, but it also holds true for bartenders who free pour things all day long because it's their job. This effects the estimation that you use in this context, effects the environment that you eat and drink in, and hence effects what you put into your body.

Dr. James Heathers:

So maybe this is a useful piece of information for how we eat and drink, and we can turn this into a practical insight. Now, I didn't have the imagination to figure out how you could get something like that wrong. Someone brought us this.

Dr. John Berardi:

Here he means that someone brought Dr. Wansink's work to them. This is a pretty common thing. Having developed a reputation as the guys who do something about bad research, they were always brought questionable papers.

Dr. James Heathers:

The first thing that I said was not, "We should definitely take a closer look at this guy because this could be really problematic." It was, "I don't think there's a problem there. I mean, this is trivial stuff. Computationally, this is trivial stuff. This is not quantum physics. This is counting plates. This is like weighing things. No one's going to get this wrong. This is a bad place to work." I turned out to be very, very, very wrong in that initial estimation.

Dr. John Berardi:

Now, if you're thinking, "A couple carrots here and there, what's the big deal?" you'd be in the majority. Most people wondered why Dr. Heathers and his collaborators even cared.

Dr. John Berardi:

Now, when he was presented with these disparities, Dr. Wansink just explained them away. Missing carrots probably dropped on the floor. Children eating a lot of carrots, yeah, but they were really small carrots. Yet, as they say, where there's smoke, there's fire, and there already was a lot of smoke around Dr. Wansink's research.

Dr. John Berardi:

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Around the same time, van der Zee, Anaya and Brown were already knee deep in investigating some of Dr. Wansink's other work. After finding over 150 errors and inconsistencies in his four papers looking at eating behaviors at an all-you-can-eat buffet, like bloodhounds on a trail, they were also puzzled by yet another Wansink study, which we'll call "the Elmo study."

Dr. John Berardi:

In this one, his lab reported that eight- to 11-year-olds were more likely to choose apples over cookies when the apples had a sticker of Elmo on them. Now, I have a nine-year-old and an 11-year-old, and Elmo isn't the sort of character either would be into. I also have a four- and a six-year-old. It's probably them that'd be influenced by squishy, happy cartoon characters.

Dr. John Berardi:

This triggered more itchiness. Jordan Anaya, who was, again, part of the group analyzing this work, was able to track down an original spreadsheet from Dr. Wansink's lab, which is often difficult to do. In that spreadsheet, there were notes like, "No snack. Didn't wake up," and "Picked neither apples or cookies. Was feeling sick after nap." Which sounds more like children in a daycare or preschool than children in grades three to five. But again, no proof; just an inkling that something wasn't right.

Dr. James Heathers:

Have you ever been in a Wikipedia rabbit hole? Yeah, something comes up out of nowhere and you're like, "I don't know that phrase." You google it, and you see, "Well, that was coined by Lord [Tigrinya 00:17:46], who died in 1789." You're like, "I've never heard of this guy," and you're seeing his best friends were the Earl of Sandwich. "Wasn't that the sandwich guy?" and you click on that. "He was the sandwich guy. Hey, is a hotdog a sandwich?" You click on the definition of sandwich and you're like, "Well, technically not." And you go, "What's this? Hotdog wars?" and you click on that shit. And, "What is actually in a hotdog anyway?"

Dr. James Heathers:

That continual ability to chain things together with the right training and the right context and the right motivation is where this comes from.

Dr. John Berardi:

So, tenaciously, they followed the rabbit hole. They reached out to Dr. Wansink and his collaborators, journal editors, coauthors. Maybe there was a good explanation for the strange numbers and descriptions. Maybe it would all be cleared up without incident. Nevertheless, they wanted to get to the bottom of things because that's what they do.

Dr. James Heathers:

There's an order in which you need to communicate to people. The first thing you need to do, as uncomfortable as it might seem, is write to the people who did it themselves. So Professor Davies has done something that isn't sufficiently rigorous. We write to Professor Davies.

Dr. James Heathers:

Now, a lot of the time that simply means giving them the opportunity to clear something up. I'd say about one in every six, one in every 10 times, someone will write back to you and go, "Oh, you missed something. It's this." And you went, "Ah. Yeah, I guess it is that. Well, thanks for clearing that up. That's interesting. I'll bear that in mind in future."

Dr. James Heathers:

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I would say one in six times Professor Davies will write back to you and go, "Never darken my door again, you filthy young man." And there are four times out of six you get either a completely noncommittal response like, "Thank you for your email. I will look into it," which is immediately followed by nine months of silence, or no response whatsoever, and those are essentially the same things. One is a response to say, "I'm not responding to you," and the other is just not a response.

Dr. James Heathers:

After that you need to talk to the outlet where this is published, depending on the seriousness of it and how you want it resolved. So author, outlet. Then after the outlet, the other coauthors on the paper. They're all collectively responsible to it.

Dr. John Berardi:

Let me jump in and remind you that this isn't their day job. We're talking about a group of guys who already have jobs, guys who are so committed to a particular ideal that they spend most of their free time analyzing other people's work when it seems suspicious, chasing down data sets and writing to anyone who will help them get errors corrected. This process isn't easy.

Dr. James Heathers:

I have been accused of wanting to be the police in the past, which is something that I find very, very funny because the police have statutory authority and I don't. I'm an asshole with a pen. That's pretty much it.

Dr. James Heathers:

If I say something is too inaccurate to exist in the scientific literature or that a book or an article is a poor representation of the underlying information or that something is notoriously inaccurate or that a set of facts are untrustworthy, I have absolutely no obligation to anyone, and I have no obligation for me.

Dr. James Heathers:

It immediately goes into a marketplace of ideas. In general, it means I have to present an argument to an editor or someone in an editorial role somewhere. A lot of the time it's very difficult to convince them even to write back to you.

Dr. James Heathers:

It's really difficult to be the police with no authority. It's like trying to convince people to want to be arrested.

Dr. John Berardi:

Yet in the end by being, quote/unquote, "professionally difficult," they discovered something important about the apples versus cookies study. Turns out it was done in three- to five-year-olds, the kind of children who do nap during the day at school, not the eight- to 11-year-olds described in the original publication.

Dr. John Berardi:

Which made everyone wonder about the carrots study too. Turns out that study was also done in three- to five-year-olds, not the eight- to 11-year-olds written about in the publication. You can probably sense where this is going.

Dr. John Berardi:

Between the years of 2013 and 2018, Dr. Wansink had over 40 published papers retracted, which means removed from the journal they were originally published in, for things like falsification of data, bad methods, statistical errors and



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more. Some of the practices in Dr. Wansink's lab, some of the things he and his collaborators did accidentally or with full intention we'll never know aren't just considered bad. They're considered career ending.

Dr. John Berardi:

In today's parlance, they're cancelable offenses. So Dr. Wansink lost his faculty position at Cornell, was outed in major publications like Time and The New York Times and lost his government funding. What started out as a good run ended with a complete professional collapse.

Dr. John Berardi:

During the difficult years while trying to defend his reputation, Dr. Wansink accused Heathers and his colleagues of cyber-bullying, which is likely a misuse of the word. To be a bully assumes an asymmetrical strength or power or leverage, but he was a world-famous, high-earning tenured faculty member and they were grad students. He also claimed that they wanted to tear him down so they could ruin his Smarter Lunchroom program and hurt children.

Dr. James Heathers:

No one wants to interfere with your right to say vegetables are important for children. He was like, "James, you criticize this research. It's just trying to improve children's diets. Do you have some kind of trenchant child/vegetable antipathy?"

Dr. James Heathers:

No. And obviously the message was "Anything like this is perfectly capable of supporting itself." If it's that important, it doesn't have to wear the big mantle of "This is drawn from the scientific literature" especially if it's not.

Dr. John Berardi:

Yet being in the line of fire is par for the course with Dr. Heathers and his colleagues.

Dr. James Heathers:

There was a spate of very negative comments a couple of years ago where I was accused at least once of being vindictive, as in it was personal. And I couldn't remember the names of the people I was supposed to be vindictive towards.

Dr. John Berardi:

As one of Dr. Wansink's colleagues commented, "I think the field needs some shelter from this kind of criticism. Instead of using their skills for good to help people do better work, rather many of them use their skills to tear people down, and that is senseless to me."

Dr. John Berardi:

While the field he was talking about was the field of food and consumer behavior, I should probably make it clear that Dr. Heathers and his collaborators have worked on many different papers in many different fields, not just Wansink's.

Dr. John Berardi:

For example, a series of Twitter posts drew their attention to a French psychologist, Dr. Nicholas Guéguen, whose work has been at the center of tantalizing headlines about what men supposedly find attractive in women. Findings like, men are more likely to help women whose hair is down versus tied up, or men approach women twice as quickly when they are in high heels versus flats, and men ask women with larger breasts to dance more often than women with smaller breasts.

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Dr. John Berardi:

In his work, they found a lot of methodological and statistical inconsistencies. Some questions came up about whether data even existed in the first place. Several of these papers have now been retracted.

Dr. John Berardi:

Another example: After being tipped off by an anonymous source, Dr. Heathers and Brown scrutinized the work of Dr. Eric Stewart, a criminology researcher who published a series of eye-opening papers on how race is related to criminal sentencing. Again, methodological and statistical inconsistencies, missing data, suspicious claims. Again, five papers retracted.

Dr. John Berardi:

Didn't matter in what field the work was in. If studies were brought to their attention and errors were made, whether due to honest mistakes, sloppy work or intentional fraud, they try to get to the bottom of it. They weren't out to hurt people or ruin careers. According to Dr. Heathers, it was always about figuring out the data.

Dr. James Heathers:

I wrote a whole thing about this a while ago. It was just a silly little blog post, but I think a few people were quite surprised. It's called Forget about Fraud. I was like, "I can't know your intentions. If you had a huge rash of terribly inaccurate papers that wasted millions of dollars and killed people, I couldn't know your intentions."

Dr. James Heathers:

"The important part is what's actually in the project. That's what other people have to use for their ideas. That's what the government has to use to set policies. That's what companies have to read and trust and then spend money developing some version of that because it's part of the broader commercial life. The paper is the important thing."

Dr. John Berardi:

By the mid- and late 2010s, they were on a bit of a tear. And this curious work, this data scientist meets error detection specialist meets scientific purity vigilante all started with an email.

Dr. James Heathers:

I was talking to this guy ...

Dr. John Berardi:

This is the aforementioned Dr. Brown.

Dr. James Heathers:

... and he said, "Do you know anything about heart rate variability?" Now, my entire thesis was called Methodological and Practical Considerations for the Improvement of Heart Rate Variability, so the answer is "Yes." And he said, "Well, I've got this heart rate variability paper. Do you think there's something wrong with it?"

Dr. James Heathers:

He sent it me, and my normal inside voice that you suppress when you're an academic when you don't want to annoy people too much because it's allegedly bad for your career immediately just lashed out horribly. I wrote down everything I thought was wrong with this paper.

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Dr. James Heathers:

He said, "Well, I've got the data," and he sent the data back, and I wrote down everything that was wrong with the data. I said, "Well, that'll be the end of it. This is a fun interaction." But it wasn't.

Dr. James Heathers:

It metastasized into maybe four statistical tests that we have written together, a whole bunch of ancillary work, maybe 20 individual investigations, the largest of which had 51 papers in it, and a whole bunch of work I've done by myself and with other collaborators as a sideline. I've helped work on plagiarism detection software. I've helped work on data duplication investigations. I've had work on some historical stuff, like reconstructing what happened to something over time.

Dr. James Heathers:

It just sort of happened. Someone randomly offered me the opportunity to be difficult about something, and it all just clicked.

Dr. John Berardi:

And while he often jokes about, quote/unquote, "being difficult," that's exactly how he and his error detection colleagues are often perceived because their work doesn't operate the way science typically does things.

Dr. James Heathers:

It's not a function that is presupposed by how we understand the normal functions of science to work, the paradigm of, "Well, if it's wrong, you have to go out and generate your own information and that you have to produce a positive object to be able to counteract some kind of existing negative object. You need to go out and do that work yourself."

Dr. John Berardi:

What he's referring to here is the idea that science can catch errors through replication. Let's say a paper is published suggesting that, I don't know, eating Kentucky bluegrass from your neighbor's front lawn helps control blood sugar and reverses Type II diabetes. Well, that paper alone is interesting. Potentially disturbing, yes, but not really proven until it's replicated. In other words, until another research group repeats the experiment and gets similar results.

Dr. John Berardi:

If another group repeats the experiment and finds that eating Kentucky bluegrass from your neighbor's front lawn doesn't offer a health benefit, the research has to keep going until scientists get to the bottom of this discrepancy. And if multiple groups replicate the study and still can't find a benefit, we keep people off their neighbors' lawns. The point is that science as an enterprise is designed to find mistakes in this one particular way, and over time it does a decent job of it.

Dr. John Berardi:

However, Dr. Heathers makes the argument that it can't be the only way, with replication as the only error detection mechanism.

Dr. James Heathers:

Well, not only does it exclude you from making really simple arguments about how something that really should be right isn't, but it's also monstrously inefficient.

Dr. James Heathers:



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If you say, "I have this paper, and it proposes that all children should eat this say," and the government says, "That's a great idea. We'll put it in 40,000 schools," and I write to the editor and say, "Hang on. The paper that you've written does not bely your ability to do primary school addition. This is a terrible paper, and it shouldn't be used as the basis for public policy," that to me seems a better option than me going out and finding 40,000 of my own primary schools to see if I can counteract this with some kind of positive information.

Dr. John Berardi:

Dr. Heathers continues.

Dr. James Heathers:

When you absorb an empirical ethos, it needs to have an empirical basis. You shouldn't get upset or annoyed or doubt the intentions of people who turn up with a big empirical stick. They're just going to. That's how we work. That's what the job's supposed to be. The whole idea of positively and blindly making more information, we have plenty of information right now. What we really need to do is stress test the stuff we have.

Dr. John Berardi:

Yet this work is still often seen as, quote/unquote, "off brand for scientists."

Dr. James Heathers:

The whole idea if someone produces scientific information ...

Dr. John Berardi:

Bad scientific information.

Dr. James Heathers:

... and I come out with a big stick and I beat it round the head and neck until it goes away forever, that isn't generally how it's done. That isn't how it start off. And in many respects, criticism is very poorly received, to the extent where a lot of the time there's no one to even hear it. There's no arbiter for it.

Dr. John Berardi:

So that's the first problem. As much as it feels necessary, it feels negative and impolite and personal, especially when reputations and careers are on the line. In science, there's an old cliché: publish or perish. Scientists have to get published so they can win grants, jobs, tenure and respect. If someone comes around messing with your publications and they're right, it can feel like a death knell.

Dr. John Berardi:

Yet, again, at the center of the scientific ideal is objectivity, trying to disprove hypotheses. In a word, criticism. Not personal attack but the ruthless scrutiny of your ideas.

Dr. James Heathers:

Open and honest, frank and fearless, all these good-sounding terms. Now, I've had an incredibly negative interaction in my life with someone who literally wrote an editorial about we should welcome frank and fearless criticism. And when frank and fearless criticism came to her, she folded like a cheap chair and told me where to go. So like I said, it's a good story.

Dr. John Berardi:

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Nevertheless, most scientists shy away from investigating or criticizing already published work, either due to human factors or simply they don't have the time to worry about anything that's not going on their own publication record.

Dr. James Heathers:

I'll tell you something reasonably depressing. The vast majority of the time, if someone is a professional scientist for money and reads a scientific paper where they see something that is difficult to believe or untoward or just plain wrong, the modal response to that is not doing anything at all because they don't think it's their problem. That's generally what happens because there is no easy way to deal with it.

Dr. James Heathers:

It is time consuming; it is abstract. It's often very difficult to know who to write to. It is potentially damaging to your career because people don't like having their work questioned. And people who know that their work is terrible really don't like having their work questioned because you might rattle their scam, basically.

Dr. James Heathers:

They know that they've cut a few corners, and they really don't appreciate you pointing that out. Senior researchers in particular do not like having their shortcomings pointed out by people who are 30 years younger than them. That is occasionally very poorly received.

Dr. John Berardi:

I've heard Dr. Heathers and his colleagues called "ruiners, bullies and thugs," which made me wonder why they bother continuing this unpaid work which requires long hours, uncooperative collaborators, unpleasant interactions and career risk.

Dr. James Heathers:

Some people are congenitally adjusted to want things to be as correct as possible. Some people don't like other people taking the piss. It's difficult to explain as a kind of an intrinsic motivation, but I promise to you that it is.

Dr. James Heathers:

Look, I've worked on a back and forth interaction with an editor for four years about a bad paper that wasn't in my field, that probably something that wasn't read a lot, that really wasn't going to affect the rest of the world. Now, eventually this paper was retracted. I don't appear in the retraction notice. I don't get a line on my CV. I don't get a job out of it. I don't get a fucking cent or anything like that.

Dr. James Heathers:

Here's the point: We're supposed to be committed to a central idea of making things more accurate so we improve our understanding about the world. And some people who do that actually believe in it and they're maximalists.

Dr. John Berardi:

Yet despite this commitment to the improvement of science, people have accused Dr. Heathers of trying to tear down not just bad work but science itself.

Dr. James Heathers:

I love science. People hear all this stuff and they think, "Well, you mustn't like it very much." No, I like it more than you do.

## I'm Calling BS! – Part 1 (The Science Police) Transcript

Dr. James Heathers:

My job is to kick it up the hole until it's strong. My job is like an Irish dad from the '50s. I'm going to clip it round the ear until it can take a beating. That is not a recommended parenting style, by the way. I do not endorse this behavior. That is a metaphor. But at the same time, I'm also perfectly serious.

Dr. James Heathers:

Everything should be stress tested, and the resources that we need to stress test things ... I'm talking about the ability to see the code that is under an analysis, the ability to see the data that a paper is built out of, the ability to see the reviews that determine whether or not something is accepted for publication in the first place.

Dr. John Berardi:

I wanted to keep digging, though, to find out what other sorts of things beyond lofty ideals about being guardians of the truth could be motivating Dr. Heathers and his colleagues. Again, it just seems like a lot of effort and discomfort in the service of something like accuracy.

Dr. James Heathers:

I've had very few opportunities to commercialize or pursue what I've done now. Since probably 2014, I'd say, it's resulted in a lot of different things. A great deal of press attention, some academic prizes, some academic papers. A whole lot of people have read about it and talked to me about it, and I give a lot of talks about it. As far as academic rewards, there was some funding, but in general there are none.

Dr. John Berardi:

Yet he continues.

Dr. James Heathers:

You don't have the expectation this is going to be in the newspaper. No one's going to be your best friend and send you a brown paper envelope full of money. In general, you're going to be a pain in the ass. You're going to sink a lot of time, potentially some money.

Dr. James Heathers:

I've gone as far as to buy experimental apparatus that other people have used in different studies. Not big things. I've actually bought stuff, like, "I'm going to get that thing off Alibaba and see actually how it works because they did it."

Dr. James Heathers:

When you get into it, no one's getting famous doing this. I mean, that was a very generous introduction; it's like, "Well, you're known to do this." I go, "Yeah, with some kind of zed-grade notoriety within an incredibly small community of highly critical global scientists. Yeah."

Dr. James Heathers:

But there's no pedestal that's there waiting for me. No one's going to want to syndicate a show called The Most Difficult Man in the World. That's not going to happen, and if you get started with that as the ideal outcome in the first place, you're going to be significantly disabused of your preconceptions of just how important your work is.

Dr. James Heathers:

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Especially if you do it more than once, you know that you're bringing facts to people, and in general they are facts that they don't want to know. You know that old thing: "It's hard to get someone to understand something when the salary depends on them not understanding it."

Dr. John Berardi:

To undercut the idea that this work is done for fame and attention ...

Dr. James Heathers:

I do a lot of this stuff as more private, like now. I'm not a good publicity-generating glory-hunting ... Procedure is to do this quietly without telling anyone.

Dr. John Berardi:

Part of this is to protect his professional reputation now that he has a grown-up job. But another part of this is ...

Dr. James Heathers:

If I write an email ... Someone's done a terrible medical study, and I write to them and they google me, they're never writing back. Getting involved with this is ... Look, and we've seen this because we get copies of university investigations and it's recording people's emails. It's like "I looked these guys up and they are trouble. They're bad people, and they're here to cause trouble and wreck everything." Now, that was in a case.

Dr. John Berardi:

Okay. We're going to take a quick break so I can tell you about a fantastic, free, science-based nutrition tool from our sponsor, Precision Nutrition. It's called the PN Nutrition Calculator, and whether you want to improve your health, change your body or just get your eating on track, it can help you get where you want to go.

Dr. John Berardi:

Within just seconds of entering some basic information, it'll give you a nutrition plan that's 100% personalized for your body, your eating preferences and your goals. And like I said, your customized report is completely free. You can access it right now at [www.precisionnutrition.com/calculator](http://www.precisionnutrition.com/calculator).

Dr. John Berardi:

By the way, when I say it's science-based, I'm not kidding. The PN Nutrition Calculator uses a cutting-edge adaptive algorithm validated by Dr. Kevin Hall and his team at the National Institute of Diabetes and Digestive and Kidney Disease. And full disclosure, when PN was developing this calculator, I acted as an advisor, so I know it's a tool you can trust from a company you can trust, and it's totally free.

Dr. John Berardi:

So whether it's for yourself or if you coach clients, it's for them, definitely check it out. Again, you can find it at [www.precisionnutrition.com/calculator](http://www.precisionnutrition.com/calculator). All right. Back to the show.

Dr. John Berardi:

We can all probably agree that if bad science makes it past peer reviewers and into the journals, there should be some sort of error detection happening, especially for work that could have an immediate influence on human behavior or government policy. Here's the thing: Bad science is likely happening all the time, even unintentionally.

Dr. John Berardi:

## I'm Calling BS! – Part 1 (The Science Police) Transcript

In one of the most influential essays in the field of meta-science published in 2005, Dr. John Ioannidis from Stanford argues, using statistical modeling, that even seemingly well-done studies are subject to a host of errors and biases. To get published, scientists often need to come up with exciting, novel and important findings. And because those findings are hard to come by, they nudge their studies to produce them, often in unconscious ways and then exaggerate their significance.

Dr. John Berardi:

So having an unfunded, rag-tag group of truth maximalists, mostly grad students, a few dozen worldwide seizing randomly on problematic papers, it just doesn't feel like a reliable way to clean up the 2.5 million scientific publications each year. I mean, how do they even decide which papers to work on?

Dr. James Heathers:

For a lot of working scientists, it's a competing interest between how much does this annoy me versus how much time do I have right now versus what do I think are the consequences of this existing or how does it fit into a broader pattern of problems.

Dr. James Heathers:

If it's something in isolation, it's very different to a series of a dozen papers. If it's some paper in a minor regional medical journal, it's very different to something in the New England Journal of Medicine.

Dr. John Berardi:

Yet he envisions a future that leverages technology to scale the impact.

Dr. James Heathers:

If you really want to see something interesting happen, especially as things that are within the correcting science milieu turn into more computational tasks that can be done at scale, can you imagine robotic or artificial intelligence error detection that works? Not the kind that just bale people up for no reason, but the kind that actually worked.

Dr. James Heathers:

That's something that was really problematic just because of the messiness of the task involved. You'd have a very low hit rate, but a very low hit rate out of two and a half million yearly academic objects is ...

Dr. James Heathers:

I mean, the Office of Research Integrity in the US deals with ballpark somewhere between six to ten major cases a year. These are things like where there's been a serious misconduct claim. They go through in general, but something that I do and something that's in one of their reports, there's a lot of crossover.

Dr. James Heathers:

Some of their reports are longer than others because some malfeasance is more serious than others, and, of course, I don't necessarily deal with misconduct cases. We're just interested in mistakes. They're interested in sanction, so, I mean, it's a lot more serious. But four to 10 individuals thereabouts, versus 10,000 instantly locatable, definitely incorrect, someone's going to find a way to open this box.

Dr. John Berardi:



## I'm Calling BS! – Part 1 (The Science Police) Transcript

For now, though, it's still a small group of women and men armed with free time, a few robust statistical techniques, dogged determination and a bone with pick with badly done science. To guide their efforts, Dr. Heathers proposes some rules.

Dr. James Heathers:

One, never do it by yourself. What you miss, the kind of tunnel vision that you can get because, as again, the thing that underlies everything here is the outcomes are serious. You are potentially playing with factors that could affect someone's career or livelihood, et cetera, et cetera. Our criticism should not be offered lightly. This is how we structure the seriousness of it.

Dr. James Heathers:

One, don't do it by yourself. Always bring a friend. Yeah? It's like cave diving or something. Always bring a friend.

Dr. John Berardi:

This means someone to question your assumptions, to rerun your analyses, to check your blind spots.

Dr. James Heathers:

Two, standard of certainty. Generally, we're not thinking, not like strict liability, not like probable cause, not better than 50%, not beyond reasonable doubt. Generally, we're thinking 99%, one in a thousand, one in 10,000 is this some kind of demonstration. It's the closest you can get to certainty about some unlikelihood or some impossibility or similar, as close as you can get to that line.

Dr. James Heathers:

That means you let plenty of stuff slide, but what it amounts to is you just going, "I don't believe you. It's nowhere near enough." Or "I could accept the fact that you got 60 people in your study. You say you've got 3,000? I don't believe you. Not enough." Probably the most fanciful thing in the whole world. It's not an empirical argument, and it has to be.

Dr. John Berardi:

In other words, you have to be sure, like really sure something is wrong before calling someone out, and your argument has to use data and evidence.

Dr. James Heathers:

That takes care of the main points of how you approach it. Now, then the next is how you communicate it. In some circumstances, and especially when there's far too much going on, there's a way to just release it into the public domain if you're not accusing anyone of anything and it's not particularly important.

Dr. James Heathers:

You can find something where it is with 100% certainty likely that there is malfeasance of some kind involved. Like someone who publishes the same article twice in two different journals to pump up their citation metrics; yeah, it's the same text. Someone who plagiarizes something; it's the same text. Something that is literally mathematically impossible; it can't be real. You're allowed to take those observations and put those in the public domain without judgment.

Dr. James Heathers:

You don't go, "This is impossible, and you're a phony," like Holden Caulfield. You don't do that. You just say, "This is what it is, and it is literally impossible." But if you try and resolve where it came from, there's an order in which you need to communicate to people.

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Dr. John Berardi:

As mentioned earlier, the protocol is to reach out to the investigator first, then if you can't get anywhere, the journal. Then if you can't get anywhere there, the coauthors.

Dr. James Heathers:

In general the vast majority of the time, the first author is responsible for the main text, argument, body, content of the paper, which means that someone else is responsible for an inaccurate part. They'll talk to them because they're in charge.

Dr. James Heathers:

So first author, I should say, [inaudible 00:49:29] coauthors, and then after that if absolutely no one will talk to you and there's nothing going on, at that point in time you can start either thinking about writing up a manuscript of your own or just putting it in the public domain.

Dr. James Heathers:

There's a great website for this called PubPeer, which allows anonymous comments linked to the PubMed database. People who do a lot of work, who have a real proper professional sideline in academic integrity stuff use it all the time because it's just quicker.

Dr. James Heathers:

There's a point past which all of this just isn't practical to do everything that I just said, especially considering how often people don't write back to you. You very quickly have a databasing problem. I wrote to 400 editors; I got 17 responses. It's totally unworkable. So just stick it in the public domain and get on with your life.

Dr. James Heathers:

Now, that sounds like a procedure rather than an ethical framework. But what it's doing, I mean, it's defending the right to reply. It's protecting you, yourself, because you shouldn't be too exposed in the ability to do this in the first place. And it's giving the people who are responsible for the continuing existence of the document a chance to actually look at it before you have a broader discussion.

Dr. James Heathers:

Now, if you're in this situation and either one of those people says, "I want to take responsibility for this and what's going on. I will actually do something," then your job is done. And that happens quite a lot.

Dr. James Heathers:

In general, I'll tell you what happens. This is like, "Oh, are you doing this for fame and fortune?" You spent ages working on something that's wrong. You write to the authors who wrote this, go, "Shit, that is wrong. I better go back and recheck that." They recheck it. They write a correction.

Dr. James Heathers:

And the thing that you put in the public domain is, "Isn't this author a good scientist? I like them. I want to come around to their house for a cup of coffee and meet their kids." That is good behavior and it makes me feel good about our collective enterprise.

Dr. James Heathers:

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Doesn't sound too negative and like not really glory-hounding at that point, is it? I mean, almost like there's another motivation involved. We put a lot of thought into the language that we use to talk about this. Who we say, what needs to be said to, how much respect is inherent in the communication.

Dr. James Heathers:

I mean, I can be face to face just very casual, colossally disrespectful and generally unpleasant person, but every one of these emails is written like I'm the Queen of England. Because it is inherent in the process that these people should be respected. As much as that's occasionally not what we want to do, it is not about me. It's about the science.

Dr. John Berardi:

Despite the great pains they take to follow a set of best practices, despite their efforts to keep this work impersonal and all about the data, despite doing this, in their view, for the betterment of the scientific enterprise, many people still argue that this kind of data sleuthing isn't positive or productive, that it undercuts the work of good people trying to do good work. After all, Wansink was just trying to feed children more vegetables. Dr. Heathers has a particular stance on that.

Dr. James Heathers:

Here's the thing: Don't do science. Do some else. Go and work for the marketing department in Nabisco. Become a vegetable ambassador. Get yourself a big, fucking eggplant costume and walk around in that through the schoolyard.

Dr. James Heathers:

People want to wear a big, it's, "I'm trying to help people," and then they wear a big empiricist hat and they play by empiricist rules and they publish empirical information. Then they claim access to the fact that they are drawing this from a body of knowledge that we all agree is a good idea.

Dr. James Heathers:

And then you go out and popularize it and you step all over that. You make assertions that you can't support. You say things that might not be true. You do terrible research in the first place.

Dr. James Heathers:

No one wants to interfere with your right to say vegetables are important for children. The problem when it comes to this is not so much of like, "Well, don't listen to anything he says." It's not this; there's no other people saying it. It's the ability to determine false authority on the basis of "I'm drawing this from a place where we're getting the best available information."

Dr. James Heathers:

What if the best available information is deeply annoying, it's unclear, it's self-contradictory, it's gone around in circles for 30 years? There's things that we do and don't know. There's things that we can't know. Sometimes we don't know the unknowability of different subjects.

Dr. John Berardi:

And then there's the idea of consequences.

Dr. James Heathers:

There's also nothing you can do about the predictability of the consequences. I'll give you an example. Say someone comes out and they're deeply interested in human health. They say, "I'm really interested in everyone having as much

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vitamin A as possible," and they publish a whole lot of stuff on vitamin A supplements. They put it in the cereal, like folate.

Dr. James Heathers:

Shit. Put it in the fire-suppressant systems within buildings so every time there's a fire, it's immediately there taking everyone's stress away as they're covered with all the dirty water sitting in the pipes. It gets criticized when people go, "They don't get your desire to get wrangled up with the intentions of this person." The intentions are fine.

Dr. James Heathers:

Now, here's the thing: Every now and again, one of those people picks something like vitamin A, and you eat too much and you go blind. There's another side of this that isn't particularly nice, and it doesn't come up with vegetables and naps.

Dr. James Heathers:

It comes up with people doing cupping and getting infections that end up in necrosis. It comes with people replacing chemotherapy with herbs. It comes up with the complete rejection of the medical paradigm in favor of praying to the sun. And there is the flip side of, "They're just trying to do the right thing," where their best intentions unchecked are going to kill someone.

Dr. John Berardi:

Whenever I start wrapping up my conversations with guests, one of my final questions is this one: Is there anything you wish I'd have asked about this topic but didn't?

Dr. James Heathers:

I wish you'd asked what it cost me.

Dr. John Berardi:

So we talked about that.

Dr. James Heathers:

I quit doing the harder version of this work maybe 18 months back because there was a degree to which it was killing me in a way. I was spending a lot of time up at night doing post-doc work and then research scientist work all day and then working on something into the night. Drinking far too much coffee, not getting anywhere near enough sleep, but not in the way that people are regularly familiar with. But in the way where I was just gray with trying to deal with everything that happened and had to walk away from that model of doing it.

Dr. James Heathers:

Anything, when it takes a sort of primacy in your mind can become unhealthy, and it probably did in a way that's real and medically definable rather than a way where you go, "Well, that's not a good habit." As much as, "If you keep doing this shit, you'll be dead in five years because you're going to have what's just unconstrained hypertension and you're going to have a heart attack."

Dr. James Heathers:

It's a better place now for me, having stepped away from trying to ruin myself doing it. It got a bit serious there for a while.

## I'm Calling BS! – Part 1 (The Science Police) Transcript

Dr. John Berardi:

This is where we're going to end Part One of this three-part series. In Part One, which you just listened to, we learned about a fringe area of science designed to call BS on poorly done research in the interest of having it corrected or removed.

Dr. John Berardi:

Next in Part Two, we'll move from published science to popular science, talking about Dr. Matthew Walker's sleep book, Alexey Guzey's criticism of it and how a leading sleep researcher, Dr. Jennifer Martin, thinks both about the book and its critics.

Dr. John Berardi:

Finally, in Part Three, we'll meet a BS detector who targets not scientific source material and not popular science books, but the dissemination of popular science in places like, for example, Joe Rogan's podcast. We'll hear about his criticism of two prominent appearances on that show and we'll even hear back from one of those guests.

Dr. John Berardi:

Before we end, I need to tell you about a little contest we're running with our two sponsors, Precision Nutrition and Change Maker Academy. There are \$15,000 in prizes up for grabs, and all you have to do to enter, it's really simple, is to subscribe to the show wherever you listen to podcasts and take a screenshot of that subscription.

Dr. John Berardi:

Next, rate and review the show, positive, negative or neutral, on either Apple Podcasts if you use an Apple device or on something like Castbox or Podchaser if you don't. Then take a screenshot of that. Once you have those two screenshots, email them to us at [reviews@drjohnberardishow.com](mailto:reviews@drjohnberardishow.com). Make sure you spell it D-R- johnberardishow rather than D-O-C-T-O-R, and you're done. Like I said, really simple.

Dr. John Berardi:

From there just before the release of our next show, we'll randomly select three winners who get to choose from among \$15,000 in prizes, including a spot in the Precision Nutrition Level One Certification Program or the Precision Nutrition Level Two Certification Program or Precision Nutrition Coaching. Winners get to choose which one they want.

Dr. John Berardi:

Winners also get to choose one of the following: a copy of my book, Change Maker, or up to \$75 in Precision Nutrition apparel. And finally, winners also get a spot in Change Maker Academy's new course, The Career Blueprint.

Dr. John Berardi:

So why a contest? Well, when podcasts get a lot of ratings, reviews and subscribers, they have a chance of living a long, happy, productive life. It's just the way the algorithms work. But without subscribers, ratings and reviews, a podcast toils in obscurity. So again, for a chance to get some really great stuff from our sponsors while doing us a solid, please get to subscribing, rating, reviewing and sending us those screenshots.

Dr. John Berardi:

Oh, and if you previously subscribed, rated and reviewed, you can send us your screenshots too. We'll include you in the contest as well. Can't wait to find out who wins.

Dr. John Berardi:



## I'm Calling BS! – Part 1 (The Science Police) Transcript

Before signing off, I'd like to thank our production team: Marjorie Korn, my research partner and co-writer on the show; Martin DeSouza, our producer; Dylan Groff, who edited and sound designed this episode; and thanks to you for listening.

