

Episode 3: Peter Doherty

Peter Doherty Visual is extremely important and a lot of us work through a visual world — increasingly so, I think, with modern communication and modern entertainment. So the more we can make things visual, I think the better we do with getting the message across to the general community.

Bob Milstein Hello and welcome to Top of Their Game, the show where we speak with the people making communications clearer, fairer, and just plain better. I'm your host, Bob Milstein, a lawyer and plain language trainer, practitioner, and advocate. And I'm very excited that our guest today is one of the world's great communicators: Laureate Professor Peter Doherty. Trained initially as a veterinarian, Peter is an Australian immunologist and pathologist who, with Rolf Zinkernagel of Switzerland, received the Nobel Prize for Physiology or Medicine in 1996 for their discovery of how the body's immune system distinguishes virus-infected cells from normal cells. That discovery changed the science world's understanding of the immune system and continues to be used by medical researchers and doctors around the world in designing vaccines, understanding the auto immune and other viral diseases, and even cancer. The Nobel award also led to an increasing involvement in public science communications, both in his own area of viral pathogenesis and immunity and in topics related to environmental sustainability and climate change. After working on infection and immunity at one level or other for 60 years, he moved to Emeritus status at the University of Melbourne in July 2023, though he continues to be the patron of the Peter Doherty Institute for Infection and Immunity that is based in Melbourne, Australia. Peter is the author of many books, including *The Beginner's Guide to Winning the Nobel Prize: A Life in Science*, *Sentinel Chickens: What Birds Tell Us About our Health and the World*, *Pandemics: What Everyone Needs to Know*, *The Knowledge Wars*, and *An Insider's Plague Year*. In today's interview, we pick Peter's very big brain on a wide range of communications-related issues, both in science and more broadly. And now, Professor Peter Doherty.

Peter, thank you so much for joining us today.

Peter Pleasure. Bob.

Bob I wanted to start with some heavy-hitting questions about the Nobel Prize that you won in 1996. When you got the phone call, did you think someone was pulling your leg?

Peter I had always thought that someone in the lab, for instance, could pull my leg on this one and I had a particular candidate who I thought would be likely. But it quickly became apparent that it wasn't a hoax because, firstly, I mean, the guy said with a very clear Swedish accent, "This is Nils Ringertz from the Nobel Foundation." And then he also said, "You have ten minutes to tell your family that this has happened" — and this is at 4 o'clock in the morning because we're in the United States — "and that after that you will start to get calls from all over the world." And that's what reinforces the fact that it's not a hoax, because when you're being called by Reuters, talkback radio, and Bogota, Colombia, the Sydney Morning Herald, and you're living in Memphis, Tennessee, you know that something has happened.

Bob Absolutely. And you were then invited to the ceremony to receive your award. I have to say that you don't strike me as a regular wearer of the tuxedo, particularly the white bow tie variety of the tuxedo. Was that a purchase or a rental?

Peter Well, like most scientists, I'd never worn a white tie and tails. Being Australian, I had worn black tie quite a bit in my younger years particularly, but, living in the US, that was almost something you didn't do. We rented the tux and I went back on 3 separate other occasions — their invitation, because I was doing some pre-Nobel public communication events — and on every occasion I rented the tux. It was just much more convenient.

Bob And has that experience exposed you to a network of Nobel Prize winners with whom you interact over the journey?

Peter To a very limited extent. There is no formal network of Nobel Prize winners. We don't have airport lounges dedicated to us or anything of that sort, but we do get to know each other a bit. And particularly people in your own field, the people who are part of your class of whatever year it was. And also I got to know some more broadly because I was doing the public communication thing — Joe Stiglitz, for instance. Other than that, there is an annual event in Lindau in Germany where they bring a lot of Nobel Prize winners together to talk to — initially, it used to be more high school students; latterly, it's more university students and graduate students. And that Lindau event brings a lot of people together and you get to know a range of people through that. I've stopped going to it though. I'm now 85 and I'm not travelling very much.

Bob Last Nobel question, Peter. The medal. Do you keep it in a special place and, if so, do you ever bring it up for show-and-tell?

Peter The medal itself is in a bank in a secure deposit. It's worth in excess of 250,000 US dollars. They've sold for more than a million. We do have several replicas of the medal that the Nobel Foundation sold to us and I sometimes show those, but I think the one that I've got left — or the two that I've got left — may be in the bank vault too.

Bob Right. You mentioned your interest in your role in communications, public communications, and that's going to be a big focus of our chat today. But I wanted to take you back to the days of the very young Peter Doherty. What first sparked your interest in science? And was there a moment where there was a mentor who set you on your path?

Peter I didn't have a specific mentor. I had the example of an older cousin, a medical graduate — very, very bright man who'd gone into public health. And his name was Ralph Doherty. And his group isolated the Ross River virus and tied it to the disease that it causes. So he's quite well known and he was very prominent in medical circles. So I had that example. He was 13 years older than me. I thought I'd like to do something that had some meaning to it, but I didn't want to be a medical doctor. I was very young: age 16. I was a year younger than most of my classmates and I didn't have a lot of empathy at that stage and I didn't want to spend my life listening to sick people. I didn't realize ... I decided instead that I'd study veterinary science and that I would work towards improving food production, because there was a great amount of discussion at that time about how we were going to get into trouble with feeding people. I didn't realize, of course, that pets and productive animals also have owners, which can be no less difficult than sick people. So I trained as a veterinarian with the idea of later going into research and doing research on diseases of domestic animals, which I did for 10 years in fact. I'm in fact the only person with a veterinary training to have been awarded a Nobel Prize.

Bob And that prize was awarded jointly to you and Rolf Zinkernagel in 1996.

Peter Correct. We worked together at the Australian National University in Canberra. After 10 years in veterinary research, I decided that I needed to learn some basic immunology. So I was supposed to come back to Melbourne, Australia to join the big government research organization, the CSIRO. But I decided to spend a couple of years at the Australian National University learning about the new immunology of T cells. And while I was there, Rolf Zinkernagel arrived as a recent medical graduate to learn something about the same thing. And we just happened to be put together in the same very small lab and we started to work together and we worked together for about 2 and a half years. And that led to a Nobel Prize more than 20 years later.

Bob And 1 year after receiving the Nobel Prize, you were offered Australian of the Year and you accepted.

Peter Yes. Australian of the Year was awarded on a different basis from that years now, where it's kind of a competition between candidates from various states. The decision was made then by a committee that met in Sydney every year and they would choose some individual to be the Australian of the Year. I got a call in Memphis, Tennessee — just before Christmas — telling me that I've been named as the 1997 Australian of the Year. That was somewhat of a surprise because I didn't know what that was. And secondly, I said, well, "Can I put it off for a year?" because, quite frankly, I've an extraordinarily busy year ahead. That's what happens with the Nobel Prize. You're the flavor of the year for the year following. And they said, "No, not if you ever want to come back to Australia." So I took that on and we came out a number of times and spoken all the capital cities. And I spoke very broadly in town halls and in all sorts of venues and with various types of radio and television and found that I was reasonably good in the public space. And that started me on a second career of public science communication with absolutely no training whatsoever to do that.

Bob So, as you've indicated, you've worked across several worlds: research, public education, and writing, which we will come to. How have those worlds informed one another in your approach to dealing with people and communicating to them?

Peter Well, I've learned something about communication and I learned the importance of clarity. I learned very quickly the absolute importance of never talking down to anybody and never humiliating anybody. If, for instance, you're giving a lecture and they ask a question which may seem quite ridiculous both to you and to the audience, still, if you put someone down in that sort of format, you will immediately lose your audience. I also learned to talk to people, to look at people — If you're giving a big lecture, look at people in the audience. Don't just turn towards a PowerPoint slide on a screen. — and to use plain language wherever possible.

Bob We'll be talking quite a bit about the wonderful world of plain language, but I wanted to ask you a question about the scientist's role as an explainer. Do you think great scientists also need to be great explainers?

Peter Some great scientists are great explainers, some are not. Those that are not should walk away from it. A lot of great explanation in science is done by professional science communicators and we're familiar with them: people like Robin Williams and so forth. They fulfill a very important role, but it is also important, I think, for those professional scientists who are interested in public science communication and do have some flair for it to be involved. You have to realize it will take some of your time and you have to realize you have to think out of the framework that you would think about. Of course, when speaking to a scientific audience, you have to be very careful with language. It's not just the specialized terms, which in my field of immunology are really quite horrific for other people in science, let alone for the public. It's also some ways of speaking and

some assumptions we make in science that are not general in the community. For instance, the idea of probability and relative risk, which is absolutely central to a scientific thinking, is not necessarily a familiar idea in the public space even though people, for instance, will wear a car seat belt because they think they're safer if they do so. And that really is just on that equation.

Bob That issue of probability links back to the broader challenges of community literacy in general and scientific literacy in particular. Do you see that there's a future where the focus won't be so much on getting scientists the skills to communicate, but also helping bridge the gap by getting the community educated in a way that allows them to engage on a more informed basis with these difficult concepts?

Peter Well, we've been hoping that for decades, of course.

Bob Yeah.

Peter We all assumed that a more educated community, that greater general education would lead us there and that would give them understanding and we would be living in a more sophisticated and more aware world. That hasn't necessarily happened. It is not the case that people have become more sophisticated in a general sense, so far as I can see. For instance, I learned no biology at school, though I've spoken over the years mainly about biology. So I don't think we can rely on that. There are great science teachers and many people who enter science speak about the role of a science teacher, a high-school science teacher, even a primary-school science teacher. But we can't rely on that. We've got to find some better mechanism for engaging people. I mean, particularly on the art side, will be automatically turned off whenever the word *science* is mentioned. And publishing science-related books, for instance, I think most bookstores — I haven't checked recently — would have a bigger astrology section than a bigger science section.

Bob As part of my Doherty due diligence for this interview, Peter, I did look at some previous interviews you've given, including one, I think, for the Oxford Vaccines Group earlier this year where you talked about young Peter Doherty — “pale-skinned Peter Doherty in the Northern Australian sun” — having to spend a fair bit of time indoors because of the unhappy collision between that skin color and the sun. But you said that one upside of that was that it did give you an opportunity to be exposed to some fairly heavy-hitting writing early in your youth, which your peers and more junior scientists tend not to be exposed to. Do you want to say a bit about that?

Peter Yes. I'm driven by curiosity and I'm still driven by curiosity. That can be a bit unusual at my age, I think. In fact, one of my senior colleagues made the remark to me early on: “All good scientists remain perpetual adolescents.” And I think to some extent that is true. I did live indoors a bit more than I would have liked to have because I got so sunburned. There were no sunscreens, none of the modern sunblocks. The only thing that you could do to stop yourself being sunburnt was to cover yourself with zinc cream, which made you look like the mime, Marcel Marceau, in an absolutely white. So, yes, I did spend more time inside. I was also very embedded in classical music, because my mother was a classical pianist who loved to play, and I read a lot. I read voraciously. I read crime novels that my dad brought home from his workplace library and I went then and bought paperback books and I read Camus and Sartre and Aldous Huxley. In fact, I was reading Camus, Sartre, Aldous Huxley at the same time I was reading Ernest Hemingway. So, you know, very different types of writing and cultures. So, yes, that was unusual, that I was reading way outside the usual text. Also, I was learning French. The only foreign language I've ever had any real contact with was very important for

interesting me in a different culture and actually getting me to use English grammar better. So I do value greatly that we studied some Shakespeare plays and we studied some great books at school as well.

Bob Do you think that early reading has equipped you with a set of communication skills that others in your field might lack?

Peter That's possible. I think I'm a bit unusual having read so widely, but many, many great scientists read a lot and they read very diversely — at least of our generation and your generation, which is much behind mine. A generation in science is about 10 years, actually. So, yes, many do read widely and appreciate reading and I think that adds a level of sophistication. In fact, one of the predictors for excellence in the biological sciences is more a facility with language than actually just passing science courses.

Bob You mentioned that curiosity has driven you and I'm imagining continues to drive you. How do you keep that spark alive today?

Peter Well, basically, I keep it alive by writing. I'm a writer. I've always been a writer. I did consider briefly, when I was a high school student, of trying to become a journalist. I would have applied for a scholarship in the Brisbane Courier Mail, which became a Murdoch newspaper, of course. And I think by now I would be retired or dead and probably an alcoholic if I'd gone that road. But I decided not to follow my natural instinct, which was to be good in the literature type of area, and I decided to try and do something practical. I think it was a kind of a Hemingway model: I wanted to get out there and actually do something. And that's why I chose the veterinary science career.

Bob I mentioned earlier that Oxford Vaccines Group talk. You gave one other thing you said in that talk and this dovetails neatly into our broader discussion of writing by scientists. It's your recommendation to young scientists that they should write early and write often. What did you have in mind when you said that?

Peter I tell any trainees that I'm involved with or any young scientists who ask me that what is extremely important is as you do experiments — I'm an experimental scientist and I get my inspiration from experiments and the results of experiments. I mean, with an experiment you always go in with a hypothesis. But with biology — because it's so complex and it's so complex because it's evolved, it hasn't been designed — we often get unexpected results. So I tell young scientists you need to engage very much with the data that you're generating. And it's very important to pull that data together as you're doing the work and to start to write about it because the process of writing actually forces you to confront what it is you have in front of you. And I'm not unique in saying this. The other Australian, who won a Nobel Prize for Immunology, Sir Macfarlane Burnet — and that was way back in 1960, I think it was — also said the same thing. He thought things through properly when he started to write. So my advice is to develop a facility with the English language, if you can, and to write early and often — be prepared to discard it, of course. But writing, I think, is very important in the scientific process. Of course, that's more difficult for people who don't have English as a home language, though, quite frankly, some of the best writers of scientific English weren't brought up to speak English. They learned it later and, as a consequence of that, they learned grammar.

Bob Quite apart from the value and the benefit of writing when it comes to the work that the scientist is doing, I imagine you'd agree that writing skills, communication skills for scientists are important for a range of other reasons, including attracting funding, gaining interest from relevant publics — be they agencies, politicians, or the general public.

Peter Yes, the particular scientific institutions I worked in early on were government laboratories and then the Australian National University, which is what's called "hard-money funder": We didn't have to write grants. But then I went to the United States and worked in Philadelphia at the Wistar Institute and the University of Pennsylvania, where I had to write research grants. And very good advice that was given to me early on is, when you're writing a research grant, think that it is being read by someone who may be a scientist but is not in your field and is sitting in a warm bath and sipping a martini. That'd be unlikely now, because they'd be reading on a computer, so you wouldn't sit in a warm bath with a computer. The point is, it needs to be accessible and generally accessible language — not in highly specialized language — and it needs to carry a theme through it. So you need to think systematically about how you write. And it's certainly the case that it's not necessarily the best scientists who are good at getting research funding. It's the people who think things through and write feeling.

Bob There are a lot of very smart people though who are not very clear writers. They subscribe to a writing voice that impedes accessibility. Is that something that scientists are generally tempted to do because they think that's the way they need to sound?

Peter It can be the case. For instance, at institutions that I've worked in, we've had different lecture series. We've had the sort of lecture series where it's specialists talking to specialists, but we've also had a situation where — for instance a weekly prestigious lecture — we will ask the lecturer to be sufficiently general so that people trained in clinical medicine — people trained as psychologists, nurses, for example — can also understand the lecture. And it's actually pretty disappointing that many lecturers will appear and give a lecture which is directed strictly at their peers. It seems that some scientists find it very hard to step into that space of general communication.

Bob A little while ago you touched on the importance of plain language communication, Peter. With that in mind, I wanted to have a bit of a chat about an international initiative that's potentially of immense value. The International Organization for Standardization released, some years ago, what it called part 1 of the International Plain Language Standard. It's a multi-part initiative. Part 2 has been released, which contains a supplement of the topic of legal communications. But part 3 — as we're speaking today hasn't yet been released — but it will deal with the topic of science communication. Do you see potential — indeed actual value — in disseminating that kind of a resource to scientists of today and tomorrow? And, if so, what potential value does it have and indeed what limitations might apply to it?

Peter Of course, it's good to do that and it's good to try and put these general pointers out there. The problem is to get the scientists to actually engage. And unless you're requiring formal coursework in, say, science communication that may be difficult. Though, now, most science training — even in cultures like ours where we don't require coursework with our PhD trainees and, of course, the PhD is the ticket for a scientist — most of them will require that the candidate learns how to write a research grant. So it could be useful for those people and for them to engage with that. But having the guidelines there is good, but it's only when you actually start to write that you learn anything.

Bob Yes.

Peter I think you have to do it. And so it needs to be introduced to them by their supervisors and they need some examples and, of course, not all supervisors are good at it anyway. So, yes, it's useful to do; it's good to have those standards out there. It's good to emphasize the fact that, for instance, when you're trying to

communicate, the first question is “What am I trying to communicate? Why am I trying to communicate and who am I trying to communicate with?” I mean that's absolutely central. I will often be asked to give a lecture and they don't really tell me who they want me to talk to. And I have to get back to them and say, “Am I talking to specialists? Am I talking to the general public? Am I talking to children? What is the audience?” Because the audience really determines how you communicate.

Bob In partial reflection of that audience focus, that science writing standard in fact is split. It deals with what it defines as *science writing* as opposed to what it defines as *scientific writing*. When it comes to the latter, I think they're talking about peer-to-peer communication as opposed to more public-oriented writing.

Peter Yes. A very good example of the difference would be the journal *Nature*, which is one of the most prestigious journals in the world and a very old journal. You will have scientific articles in that journal that are very complex and really can be quite opaque to read, even for other scientists. But then you will also have a set of what are called “News and Views,” where an editorial person or a science communicator has taken the message in that particular piece of science that they think is important and they put it in plain language that any well-educated person can read. So, yes, we very much need that second part.

Bob I got very excited when I saw that *Nature's* guidelines to authors suggested that they should default to writing in the active voice.

Peter Yes. Yes. And that is kind of unusual for scientists. They don't necessarily think in that way, but *Nature* itself, I mean its scientific articles ... This is another issue and it's a problem in science. They tend to be so over-reviewed that what may start out as a nice, clear piece of writing will end up being very garbled by the time it's published. I have a bit of a quarrel with it, but they're partly responsible for the inaccessibility of a lot of science writing as far as I'm concerned.

Bob You mentioned the opacity of some of that writing. Is that sometimes absolutely necessary and unavoidable or are there ways to maintain precision yet make the reading journey a bit more engaging?

Peter Well, when I started in science, you would have often 1, 2, or 3 authors on a scientific paper. Now, because of the complexity of modern science and the capacity of modern science to do extraordinary things, any particular serious bit of scientific work may have 20 or 30 authors on a paper. And the reason for that is different people command different technologies and different approaches that can help solve the problem you're trying to attack. So you have a multi-author paper which can often read as though it's written by a committee. But even if you get that clear and you get a logical thought line running through it, often these things for the so-called prestigious journals are so over-reviewed that they become very garbled. And part of the problem is the unwillingness of editors to actually let the scientists say clearly what it is they want to say. I think editors have to be able to say to themselves “Look, what this reviewer is saying is fine, but we don't need it for this particular publication. We don't have to encompass the whole world in a single scientific paper.” I think there are a lot of problems in the professional scientific writing and publication space. That's one of them. The other one, of course, is that a whole lot of journals — particularly online journals — have come in that are really not respectable in any sense whatsoever.

Bob Are there, in your view, any other significant barriers to clarity in modern scientific writing?

Peter Well, the complexity of it is always a barrier. I mean, you don't write a modern science paper for a general readership, even though that paper may be accessible through open access. And that is a problem

and I actually wrote a book about that called *The Knowledge Wars* to try and tell people how a scientific paper works — that's part of the book — and how you access it as you read it. For instance, it's a very formal structure in our field. There's an abstract and introduction, results, materials and methods, and a discussion. In the discussion, ideally you should be able to speculate quite a bit and you should say, well, "What if?" and this sort of thing. Often an inexperienced reader will take points from the discussion which may be put forward as a bit of a way-out possibility and think that they're gospel. It's difficult and I don't think many people read the book. I don't think many people are all that interested. And, in fact, in the general public, people who try to access science, they can access it in exactly the wrong way. What you're trying to do in science is trying to find out what's right. So what you're trying to do is let the data instruct you — "we're instructed by nature" is a term I often use — and you're trying to understand what it is that's actually happening. People who access science from the broader spectrum may be trying to find the science that supports something they believe and they will go through scientific papers, cherry pick this or that, and use it as an argument to make their case. That is exactly the wrong way to approach science and it's toxic.

Bob During the pandemic, you were, of course, one of the most trusted scientific voices in Australia. Looking back, what, if any, communications lessons did that experience leave you with?

Peter Well, one thing it left me with is the importance of saying that we're scientists. We're not priests or popes or gods. What we're trying to do is tell people our best understanding of what's happening and that understanding — with a different result or a different outcome — can change very quickly. It's sometimes very hard for people to realize that someone like me, who is quite prestigious in a field, is not necessarily an authority figure. I'm not talking down to people to tell them what they have to think. I'm trying to explain or show them what it is we know. That can be a very difficult message. It's very difficult for politicians who want to get absolute answers and act on absolute answers. So that's really important. Other things ... Well, basically it's the usual message. You talk to people with respect, you try to engage at a level you think those people will understand, and you try to engage with the particular community. I had a lot of fun and it was exhausting and I did an enormous amount of Zoom and radio and talkback radio and all sorts of things. I did heavy-metal radio and all sorts of things and I had some pretty good experiences. You don't make any assumptions about any community you talk to, you just listen and you react to what it is they're asking and what they're saying. We have to avoid assumptions: That's really important. Don't assume that because someone's listening to talkback radio, they're totally anti-science or they're not smart or anything. They may be very smart.

Bob I know that you went into your pandemic-related social-media engagements with an enormous amount of good will and good faith and courtesy, but I'm conscious that quite often that was not a 2-way street — that you did get some vigorous opposition, to put it lightly.

Peter I was very active on Twitter, which was actually terrific during the early phases of the pandemic. It was extremely good because scientists were using it to talk to each other and also you got a respectful dialogue with people on the whole. Then I think Elon Musk bought it and damaged it irrevocably and, after that, I started getting an enormous amount of abuse. Now the abuse may come from people or it may come from bots. You don't know who it is. And that's one of the reasons, actually, I've gone off social media. I can no longer spend the time to engage with it. That's bad because people like me should be on social media, but it can drain your whole life away. And I've got limited time left and I've got better things to do with my life — namely writing. So I've gone off all social media and now I'm simply writing long-form books if I'm writing

at all. And that is much more satisfying and I think much more worthwhile. But we need young people particularly active on social media. I think YouTube is a very good way of communicating. And one of the things we need with YouTube is a lot of very good animations because a lot of scientific concepts are very hard to explain in words, but you can explain them very easily with a good animation.

Bob Gets back to the definition of plain language communication: It's not just words—

Peter Yeah.

Bob —it's not just structure, it's design.

Peter Visual is extremely important and a lot of us work through a visual world increasingly so — I think with modern communication and modern entertainment. So the more we can make things visual, I think the better we do with getting the message across to the general community.

Bob I'm not sure if I should mention this, Peter, but I can't let our social-media discussion pass without reminding you about the challenges of distinguishing a Twitter feed from a Google search.

Peter Yes, one of the reasons I ended up with a very large number of followers — I forget how many it was, but it was a hell of a lot — was that I mistakenly tweeted “What are the opening hours for Dan Murphy?”, the local liquor store. I thought I was putting it in Google and I put it in a tweet. That actually was very good because it made people realize my Twitter handle, which had been developed by my publisher, had “Prof” at the beginning of it, which was a mistake, and they realized that this so-called Prof guy is just like everybody else and makes mistakes.

Bob Yeah, if the Australian public wasn't already in love with you, that sealed the deal in my view. That was a, that was just a huge boost for everyone.

Peter Yes.

Bob Okay, let's talk about your career as writer. You've written for both research journals, of course, and general readers. Peter, what changes in your mindset when you switch audiences?

Peter Well, you got to decide who you're writing for, what you want to write about, and how best to put it out there and why you want to do it. And so you try to write in as plain language as you can. Even so, I was still on a learning curve with trying to write this stuff — I was writing books about science — and even my attempts to put science in the most accessible language were still very difficult. So it is extremely hard to do good science writing and good scientist communicators are to be greatly valued. I mean, David Attenborough, for instance, is extraordinary, but he's not a writer. He's working visually with a big production team. I do think these people have to be highly valued.

Bob Do you have a particular writing process?

Peter I just sit down and write. You don't agonize about it. You just start to write. And you don't necessarily have to get it all clear in your mind before you start to write, because it will clarify as you write and then you have to go back and edit. I think the important thing about writing is not put all sorts of hedges around it. Don't say, “I have to have a proper writing room. My office is not set up properly.” You can write in an airport departure lounge, you can write on a plane, you can write just about anywhere. Don't put all hedges around if you want to write. Start to write.

Bob When you've done your own editing, I assume you also hand the manuscript to an external professional editor.

Peter Yes, my wife.

Bob Oh.

Peter Penny. Extremely critical editor. She reads it. And then, of course, once you submit a book, for example, your publisher will either have one of their people look very closely at it or they will maybe send it to someone who's professional in the field to read, to comment on. That happened a bit early on, but latterly I found that people just pretty much accepting of what I've written.

Bob Are there any writers — in particular, science writers — who you admire and maybe you even seek to emulate in your writing?

Peter Not really. I haven't spent a lot of time reading other people because I don't want to write like them. I don't want to be copying someone. Macfarlane Burnet, who comes from a much earlier era when people did read science books more commonly, was a wonderful writer. Sir Peter Medawar, who shared the Nobel Prize with Burnet, was also a wonderful writer — wrote with great clarity. And so, yes, I've read them a bit, but basically I've just done my own thing and I don't want to be emulating someone else.

Bob Well, in your experience, what's the hardest part of translating complex scientific ideas for a non-specialist audiences in your books?

Peter It's not so much in the books that I tackled that. I assume that the person reading the book is probably reasonably well-educated and capable of handling complex ideas, because that is, in fact, the readership. But I did do a weekly blog for our institute's website. It's called *Setting It Straight* and that was through COVID. And I wrote 120 pieces week after week and then actually ran out of steam. And we ran out of information, in fact, because the science wasn't moving fast enough. But there I tried some rather fanciful types of examples and so forth and had a bit of fun with it. And basically wrote some things that were possibly a bit outrageous, but I enjoyed writing outrageous in the sense that normal scientists would not normally write like that at all.

Bob Well, when you mention a bit of fun, I think anyone who's ever seen you present, Peter, will observe that you use humor freely in your talks. Is that deliberate or is it just that the way your brain is wired?

Peter No, that's who I am. And basically I think a lot of good communicators have some humor to them — some don't. I mean, I don't know if David Attenborough's all that humorous, quite frankly, but he's a great communicator. No, I do use humor. It's a bit my background. In fact, I've been thinking about that recently. I'm a quarter Irish by heritage and I think I've got a bit of that Irish blarney, if you like. Also, I was raised as a Protestant in Methodism. Methodism at that stage was an evangelical religion with a lot of lay preachers. So I'm a bit of a lay preacher as well.

Bob I know you mentioned that you'll assume that whoever's going to pick up one of your books is a reasonably intelligent person and motivated to pick the book up. But, when you're writing, do you have in mind a particular reader to whom you write? Maybe a curious teenager or a policy maker or someone who thinks they don't get science but would like to get it?

Peter Not necessarily. I'm trying to write for people who don't necessarily engage with science, but have some clarity in mind. And I don't try and target it specifically. One of my colleagues has suggested that we should

get together and write a book for children. I'm not sure that I would be good at that, but some of the people I know are good at it. And, for instance, an Irish colleague — he's a very good scientist and much younger than me — has written some wonderful books about science and has also written some for children.

Bob I know you've mentioned several times that getting the right person to do science communication often involves going to someone who is substantially younger than you or me.

Peter Absolutely. I think, particularly in visual media, we need to get right away from the aging male figure. We need a much more diverse group of enthusiastic and often young presenters and, of course, you are seeing more of this in visual media. You know, most young people are not now watching television, for instance. What they're communicating through is things like TikTok, YouTube, and so forth. And I think that we need young people doing that. And I think all institutions really should have an office that's set up specially to do social media. I think it's just so important.

Bob One other thing that I'm guessing may be very important is the role of generative AI in communications. Do you have a view as to its desirability — its potential utility — on the topic of scientific communication? Peer-to-peer and lay-facing communication?

Peter Bob, I really haven't thought about this or engaged with it. I'm not using it. You know, that's for a next generation as far as I'm concerned. Now when I do a Google search, the first thing that comes up is an AI summary. That can be very useful, but I've found at times that I know something and I want to find it and the AI summary won't acknowledge it exists. And, in fact, I think it must be in some way controlling the search, because the search seems constrained to support what's in the AI summary. I'm very suspicious of it. I'm afraid AI is going to narrow our thinking very substantially and that would be very bad for science.

Bob Why do you think it would do that?

Peter Because it's taking what's out there and what's out there depends on what's put in. How does it gauge quality, for instance? And, you know, we have a lot of people putting out sheer disinformation in areas like climate science.

Bob What's one thing people often get wrong about scientists?

Peter Well, people tend to think of scientists as cold, hard, intellectual types who are very isolated and have some sort of god complex and godlike superiority. Scientists are just like anybody else, except they obey a certain set of rules that requires them to try and tell the truth. And actually a good laboratory with people who like each other and get on is a very nice social environment. And they party a lot and all sorts of things. Nobel Prize-winner in my sort of area, Jim Allison, for instance, has his own rock band and various people play music in bands and stuff. They climb mountains. They do dangerous things. They go surfing. I mean, scientists are just people like anybody else. They're not different. They're not weird. Some of them are weird, but then some in any profession, they're likely weird. They're just people. And it's not an isolating life. It is intense at times and hard working, but it's a very satisfying life. And I think discovering, as I did, something that nobody has ever known before — ever in human history — is really pretty satisfying. You know, in literature — I've written a lot now and everything I've ever said in a general sense has been said before. Shakespeare said it or Homer said it or Jane Austen said it or something. But, in science, you can be saying things that nobody has ever said before because nobody ever knew. Now that may be that what you're saying

is only accessible or of interest to a few people, but sometimes it's actually quite important. And that's why we get Nobel Prizes.

Bob One other feature of scientists that I think the public has assumed — and it was very prevalent during the pandemic — is that they think that you are the font of truth, and as soon as you change that truth, because the data leads you to a new insight, they lose faith in science when, in fact, that's what science does. That's what science is.

Peter That's what science does. We're constantly reinventing. We're constantly probing. The way you make a reputation in science — or one way you can make a reputation — is to disprove something that everyone's always believed is so. And so I always try to present things in the sense that our best understanding is that. But people don't like that, they want certainty. They want certainty from experts. I never used the term *expert*. I never used the term *truth*. We're not presenting absolute truth. If you want absolute truth, go to religion.

Bob So how do you describe yourself? You're not a hobbyist.

Peter I'm an investigator. I'm an experimentalist.

Bob When you read for pleasure, does that influence how you then write or how you think about science, or are they mutually exclusive zones of interest?

Peter No, they're not mutually exclusive. For instance, some of the best crime fiction writers, to my mind, are writing some of the clearest and most readable stuff that you can get out there.

Bob Anyone in mind?

Peter The dry, the Rebus character, Scottish fiction writer? There's a whole lot. I read a lot of crime fiction actually for relaxation. I think they're investigators. They pick up great plots and often very well-written. Literary writing at times can be rather inaccessible. I'm at the moment struggling a little with the most inaccessible writer in human history, which is James Joyce.

Bob James Joyce.

Peter *Ulysses*. I mean, you need a companion to even get into it. And people love his writing — particularly people who are graduates of American EngLit programs — I think because it is revolutionary writing and nobody's ever tried to write like it since he did it. It's basically — as far as I can see — it's a kind of poetry. It's stream of thought that hasn't been edited to translate into either language or communication.

Bob How are you finding it?

Peter It's kind of intriguing. I'm writing it because I'm writing a book that's basically about being on the Celtic fringe as a result of my name particularly, which is very, very Irish and very old Irish name. And the fact that I've had a lot of interaction with Ireland since the Nobel Prize — simply because of my name — and the fact that if I walk into a pub in Dublin, I look Irish. But as long as I don't open my mouth, I can pass for Irish. I've got that washed out, pink-and-grey look that's very classic. And there's a certain unreliability of character as well.

Bob Putting aside any Joycean linguistic idiosyncrasies, do you have any language pet hates? Or, on the flip side, words you just love?

Peter One word I absolutely loathe in science — and scientists use it all the time — is *revealed*. We're not about revealed truth. Revealed truth is for priests. Don't *reveal*. We find, we discover maybe — we're not into revealed truth, I loathe it. I've got irrational loathings in English.

Bob Don't we all?

Peter I think we probably do.

Bob Peter, if you had to write a 1-sentence manifesto for science comms, what would it be?

Peter Know who you're talking to. Be clear and be concise.

Bob Audience and purpose. It always comes back to that. Across your global career — and I know you've spent large chunks of it in Memphis and also in Australia — have you noticed differences in how scientists from different countries communicate or how their audiences respond to those communications?

Peter Not really. I think science is a universal culture and a universal language. If you look at the recommendations of scientists, you look, for instance, at the people who set off the nuclear bomb — afterwards, many of them were horrified by this. Some of them went into biology. But basically they say this: We must work together across the planet. And that's science. We work together across the planet. So isolationism is not for us. We're dealing with global realities, we're dealing with universal realities, and we have to work together. So, no, you can get a bit of a different flavor, but basically we are all playing by the same rules no matter what culture we work in or what language we work in.

Bob What do you think are the biggest challenges for science communicators in the next decade or so? Is it misinformation? Is it reader attention span?

Peter Yes, we're living in a world where there is active and virulent and evil disinformation. This has been put out for years, for instance, by the fossil fuel companies who, at their basis, are doing enormous damage. It's when science and money go to cross-purposes. You think of climate science, for instance. Science has always, pretty much, made things generally better for people, healthier. Australians live longer on average by 14 years from lifespan in 1939. That's pretty impressive. And that's due to modern medical science. So science has generally improved our lives. But now, with climate change, what people are being told is we have to change the way to do things. Some of our toys may have to be taken away. We don't like our toys being taken away.

Bob What toys did you have in mind?

Peter Well, gas-guzzling, 4-wheel drives taking kids to preschool for instance. Why do we need these things? Because we have the right to have them. But we're doing a lot of damage. I mean, you know, there are some things in Australia where particularly you need a big diesel 4-wheel-drive truck, but you don't need it around city of Melbourne.

Bob Peter, scientists want to engage with the public often do it through journalists. How can scientists and journalists work together more effectively in your view?

Peter I don't normally work with journalists. I think I've found that we have very few professional science journalists in Australia and now increasingly fewer and fewer across the planet. *The New York Times* still has a good panel of science journalists. I was actually part of an initiative to get another form of communication

going, which was called *The Conversation*. This started in Melbourne, it started at the University of Melbourne, and it's now gone global. Basically the model is that people write about their own field of science. They write 800 to 1,000 words for general readership, but then it goes through an editorial process with professional journalists who look at the content, put it in plain language if it needs to be, add some good illustrations, and so forth. And this has actually gone global. There are branches of *The Conversation* now across the planet. And the content is made available to any newspaper or publication that wants it as long as they don't change it and it's made available free of charge. I think it's a great initiative and we need more of it. So working with a science journalist is fine, but there are so few science journalists. And even if you work with a science journalist, the problem is that the subeditor of a newspaper, for example, may cut the content — and may cut it in a way which makes it nonsense — and they may put a title or a header on it which is totally inappropriate. So I'm very wary of any communication with journalists or by conventional media that is other than straight to air.

Bob And I know from your own experience that you've had engagements with journalists who are some distance off being science journalists.

Peter Well, you know, the greatest number of journalists in Australia are footy journalists. Now footy journalists can be fine people, but they want to put everything in terms of competition and winning because that's the way they're constrained to think and that's not particularly useful. Not that all sporting journalists are terrible. I've had a lot of contact, for instance, with Gideon Haigh, who's a wonderful sports writer and—

Bob Great writer.

Peter —about sports and also thinks very broadly. And Gideon's terrific.

Bob Peter, we're almost at the end of our time. But I just wanted to conclude with a couple of quick questions. If you could give one piece of advice to a young researcher about writing and about speaking clearly, what would it be?

Peter Write often and early. And I used to say, "Try to think you're trying to explain it to your grandmother," 'til one young person said, "My grandmother's a nuclear physicist." That's one bit of advice — probably the main piece of advice I'd give.

Bob Could you give me 1 word that describes your writing style?

Peter I don't know, I think I should leave that to someone else.

Bob All right. If you weren't a scientist and if you weren't a vet, what would you be doing?

Peter I have no idea. When I ... On the point of going to university, because my family didn't have any money, I was in for 2 scholarships. One was to become a veterinarian at the state Department of Primary Industries and the other one would have been to be an engineer in the Postmaster-General's Department, which was then handled also sort-of telecom and so forth in Australia. I did a very bad math paper, so I became a vet. If I'd done a good math paper, I probably would have been an engineer.

Bob If you could have dinner with any writer, living or dead, who would it be?

Peter I've just thought about that because something I've been writing. I've thought of 2 authors I'd love to have dinner with and I knew one of them, Seamus Heaney. And the other one is Les Murray. Both poets. I'd love to have dinner with Seamus and Les. You could add Jane Austen and Shakespeare and a few others.

Bob Yes. Coffee? Tea? Or, in light of your Dan Murphy Google search, something stronger when you're writing?

Peter Oh, I gave up drinking pretty much about 2 or 3 years ago because I found that I wasn't sleeping well and I need my sleep at this age. Can have the occasional glass of bubbly and that sort of thing. I have 1 strong coffee a day, couple of cups of tea. I think you need to stay away from the stimulants and so forth as much as you can. But I do need a cup of coffee a day.

Bob Final question. If 1 word could define your legacy as a communicator, Peter, what would that word be?

Peter One word might be difficult. Interesting!

Bob Well, we are living in interesting times, are we not?

Peter Yes, yes, I like that. You know, I like my epitaph to be "buy my books," but every author's like that.

Bob Well, Peter, it's been an absolute pleasure and a privilege to spend this time talking with you about your career, your insights, your experience, your stories. I'm so grateful to you. Thank you very much.

Peter Pleasure, Bob.

Bob For those who've only heard Peter for the first time in this interview, I think you'll understand why he is globally celebrated as a spectacular communicator. It was a little surprising to learn that his first passion was writing — something he's now returned to in earnest over the last few years. And, of course, he reminds us that the process of writing is — for scientists and others — the process through which we start to think and to sort out our ideas. To learn more about Peter's work, be sure to check out our show notes.

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