

SHARING SCIENCE: AN INTERVIEW OF DANIEL PAULY BY ISTO HUVILA¹

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Abstract

This account on ‘Sharing Science’ is based on a two-part interview conducted as part of one of Isto Huvila’s research projects on July 17, 2020 (Part 1) and July 21, 2020 (Part 2). This contribution presents a transcript of these two parts, slightly edited to increase intelligibility. The topics covered include doing science, publishing ones’ results in peer-reviewed journals and all the supporting data, improving the peer-review system, publishing books and book chapters, maintaining positive interactions with journalists, and avoiding the social media swamp.

PART 1

DP: I agree with being recorded, and I agree with all the stuff you told me.

IH: Ok, thank you very much. All right, could we start with you telling me a bit about your research discipline and your areas of research? I’ve done a little bit of, kind of, background work, but I would like to hear you to tell about it.

DP: I’m a fishery scientist, and I studied in Germany; I was prepared to investigate the fisheries in the North Sea or in the North Atlantic, one species at a time. However, I got my first exposure [to tropical biodiversity] after I got my master’s in working in Indonesia, where there were lots of fish species in the catch, and there was no way that you could study each of them with the same intensity that we focus on cod or other species in the North Atlantic. And I saw the need to develop generalized rules that would apply to the vast number of species - because the fishery would always be multi-specific. And this insight, or epiphany, occurred at the same time as computers - personal computers - became available, for example the Apple II. So, I was able to combine the understanding that we needed rules with the availability of personal computers, and I transposed lots of the software that existed to investigate these multispecies into personal computers and programmable calculators.

And I became specialized in understanding tropical fisheries. Tropical fisheries have few datapoints and the scientists who study them have very little institutional support. They had no access to international journals; it was before the Internet, right? They didn’t travel the way researchers traveled in Europe. So, we had a communication problem in addition to a problem with too many species to study. I tackled each of these issues with my computer-based methods, studying them different ways. And I started very early to do what we now know as “meta-analysis”. That is, putting big data sets together and inferring things. Some of my papers got lots of citations because they were useful meta-analyses. And I also began in the late 1980s to understand the need to have a database on fish that not only gave references to literature -

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like bibliographies - that was relevant to our work, but that it should give the data themselves. What was needed was not a tag indicating where you can get information - because you still couldn't get it - but the information itself. And that became FishBase, a huge database of fish that is extremely successful. It gets about 50 million hits a month from half a million to a million users a month. Unique users. And this was extremely successful, and it's used very widely. This got me a certain degree of notoriety.

I moved to Canada in the mid-1990s, but I continued to have this emphasis on the Tropics - or, rather, my interests in fisheries became global. And the one thing that my style differs from that of my colleagues: I don't do much fieldwork anymore. I did fieldwork in Ghana for my master's, and fieldwork inspired my PhD, but since, I've basically become an analyst of data that exists, of secondary data. I have been able to convince major philanthropic foundations to give me lots of money for a long time, and I have created a project called the "*Sea Around Us*", which celebrated recently 20 years of activities, and we have tackled a number of issues. One of them was creating a worldwide database of fisheries' catches that is more detailed than the official database that the Food and Agriculture Organization of the UN produces. And the *Sea Around Us* and I get lots of credit for that.

I express myself through my writing a lot, through formal papers, and also newsletter articles and lots of informal papers. And in the late 1990s and the early 2000s, I began working closely with journalists and environmental NGOs, because I realized that government scientists are hampered in their ability to communicate and even to pick up issues that are relevant to the sustainability of fisheries. These colleagues are not supposed to work on that because government agencies really are captured by the fishing industry. And so, I realized when I was working in the developing world that the ministers of fisheries and the fisheries decision-makers didn't care about the science. And when I moved to Canada and became more involved with what happens in North America, and Europe as well, I discovered that essentially, the decision-makers choose to allow fishing whatever the state of the stocks is. And the only social force that can be marshaled against that is really the environmental community, the NGO community. And so, I allied myself to the NGO community and am on the board of a big one called Oceana, but I'm explicit about it. I never say I'm not. My sources of funding are mainly philanthropic organizations, foundations that also fund environment NGOs, and this has brought me into conflicts with the representative of fisheries science as it is currently constituted, i.e., as a supporting system for the fishing industry. And so, the arguments go back and forth. But I think we are winning - but for the wrong reason - we are winning because the fish are losing. We are winning because the fishing industry is actually doing a lousy job of maintaining, or sustaining the resources that depends relies on. And so, the argument that you have to be more prudent, you have to conserve more, is becoming more credible.

So, there I am, I'm quite productive. My papers are mainly conceptual and involve lots of work. I don't have the kind of focus that allows me to go into the guts of equations, but I compensate that by working hard, and having a team that assembles data from various sources and puts them together. And I very much believe in making the data behind a paper or claim widely available. And so, in addition to FishBase, we have created SeaLifeBase, as a database for marine animals other than fish. Also, the *Sea Around Us* has a huge database and website that allows you to download all the data that we produce. So that's where I am.

IH: That's very good, thank you. You already told a lot about how you disseminate your research, but, do you, kind of, is there something specific about, kind of, dissemination that you didn't mention already? How you- yeah.

DP: The analyses that I did in the past always included the data they are based on. So, the result can be reproduced. I made data available through FishBase and *Sea Around Us* website. All these data are free, so people can work with these data. And I talk a lot with journalists, and since about 2000, I interact with journalists on a regular basis.

IH: Yeah.

DP: I even employ a journalist who writes our press releases and other outreach materials. So, everything we do is disseminated at the scientific level and at the public level. I even work with teachers on high school lessons. So that people get the stuff at different levels.

IH: Right, that's very good. If we, kind of, think the other way around, how did you get to know about the research others are doing?

DP: I read a lot. I read *Science* and *Nature* every week. Also, I have a service that my wife actually created, which sends me references to all the papers that cite my own work. I don't do that because I'm pleased to see myself cited, but because the people who cite my own work are the people who work on the same problems I do. So, basically by looking at what people who cite me write, I can keep track of the literature. Also, I'm an avid reader of science books, so I can contextualize my field in the general field of natural sciences. So, at the big picture level, I can situate fisheries in the context of marine biology, which is a part oceanography, which is one of the Earth sciences, which can be seen in the context of Exobiology and Cosmology. I can see this very straightforwardly and I can move between these levels. I also read science fiction, so [laughs] the things that I don't know, I can make them up.

IH: [laughs]

DP: I recently read about, a book about "Alien Ocean", about a possible ocean on "Europa", a moon of Jupiter and other moons of the solar system. Anyway, so there are 4 or 5 moons in our solar system that likely have huge ocean, and they had these oceans for hundreds of millions of years. Thus, it is possible that they contain life, and then you can imagine all kind of scenarios for that, right? All under water.

IH: OK.

DP: And, so, I get my information by reading, reading regularly these two weekly journals and reading the literature that connects to my work via citations. I also read *Scientific American* and its French version.

IH: That sounds very good. Now I would like to ask you about, about a few specific genres of scholarly communication or, kind of, types of media. And for each of those I would, kind of, like you to, kind of, think aloud a little bit, how you, kind of, think about those as means for you of disseminating your own research, and then, on the other hand, about, kind of, getting to know about others' research? And why these different genres or formats could be good or, kind of, positive or negative size they have. The first one is about videos, and then video presentations. That could be anything from, kind of, from TED Talks to visualizations to reconstructions...

DP: I was very much into TED Talks for a while, and I have done one. But I gradually realized that TED Talks have a bias toward individualized solutions. TED Talks always have one hero that finds something. They never emphasize public or collective solutions. And so, I don't look at TED Talks much anymore. And neither do I look at videos much because they have to make concession to the public; they have to be jazzy, and they are all jazzy the same way. There is always a dashing hero sailing into the sunset, or diving into reefs, but after a while, this is boring. Also, in books, it always starts with someone waking up, it's a beautiful morning, and they go diving, or they go jumping, or they do something, and then gradually, they introduce the field that they are interested in, and basically, I'm not interested anymore. It's like lettuce. Not nourishing. So, videos, they don't tell you much, at the end of the day. Though, yesterday I saw a video that was really emotional about fisheries observers. This was a story about onboard observers of fishing vessels that were being killed. And one of them was being thrown overboard, and that will hit you in the gut and makes you want to cry. If you want your emotions stirred up, obviously that's videos. But if you want to explain something, it usually doesn't work. OK. Next?

IH: Mmhmm. Yeah. About audio, kind of, either podcasts, or radio documentaries, or....

DP: I have no patience whatsoever for social media.

IH: Yeah, precisely. How about social media? Do you follow it, or...?

DP: I avoid them like the pest that they are. And the more I read about it, the more I find out about it, the more disgusted I am. I have tried a few times to read the threads under papers, and you can almost mathematically predict that on the fourth exchange, people will accuse each other of being idiots. And on the next one, they will trade obscenities. I don't believe in non-curated exchanges. I really don't. Because people cannot resist "letting the pig out". This is a German expression. To let your inner pig out. And if there is a place where the pigs run freely, that's social media. It's like people running in pajamas on the street. There is absolutely no restraint, and I think it's absolutely disgusting. We should have another internet where people have to identify themselves. If people have to identify themselves, they could not hide behind anonymity, and this problem would not occur. I think it's completely disgusting that people can pretend to be whatever, and spew poison or venom or stupidity at the world, [scoffs]. Social media, I think, it is a pit.

IH: Mmhmm. Good. And then you already told quite a lot about research data and, kind of, the importance of sharing not only, kind of, the results but also, also the data to, kind of, be able to redo the studies that you've been doing.

DP: Yeah.

IH: Can you elaborate a little bit more on your views about that kind of research data dissemination?

DP: Actually, I thought, I invented a concept in the 1980s, where the place where I worked produced good books, and I included huge data tables into the book which allowed the reader to reproduce everything. I called this "data rich books". Now, many journals require you to make the data available as supplementary material or put them in a database, and it's excellent. Because data are expensive to get, you can get cost-effective research by analyzing the data that others have produced. And I think we should do more of this because if you want to construct a pyramid that reaches high, you to have a broad base. If you try to reach

high on a narrow base, the thing will fall down. So, we need lots of data to infer new things. For example, genomic databases now allow a huge number of inquiries about the ancestry of people, about migration and stuff. But if somebody was to only work with the data that he or she can collect, they would never get anywhere. So, data sharing is a very important thing. Yeah.

IH: Mmhmm. Good. Thank you. What about illustrations? Kind of, infographics, visualizations? Maybe even interactive ones?

DP: I believe in very good graphs. And I'm a pain in the neck as a co-author because I always think about the graphs, what they have to say. Basically, you have lots of scientific papers that include graphs that must be explained. Which is actually the contrary to what they are supposed to do. Graphs are supposed to explain things, they're not supposed to require explanation. And, in fact, I have a booklet halfway done about how to make graphs. I'm a fan of [Edward] Tufte, who wrote a lot of books about how to present data through graphs. And in the papers that I am the first author, I give lots of emphasis to the graphs. Again: graphs must be explaining things and not require explanation. And that is very difficult for some people. On the other hand, I don't really like cartoons and animated graphs; that is for kids. It's not for grown-ups. So, here I am.

IH: Good. Is there, kind of, when it comes to the visual forms, is there something specific about that, kind of, good at conveying something, or...?

DP: Yeah! The eye can absorb a lot of information, and if a graph is well-constructed, it can tell you a lot. That's the saying that a graph is worth a thousand words. If it's conceived well, it can actually convey lots of information. But most graphs, in most papers, are stupid.

IH: [laughs]

DP: They are not necessary, or they don't convey any information, or they use only one of the axes, and the other, they don't. And this is also a waste of color, colors are used all over the place. You can tell that people don't think about graphs, and I give a lecture once a year to my students here about "bad graphs". I say that bad graphs really are necessary if you want to contribute bad papers. I turn it around. And I show examples of bad graphs and explain why they are bad.

IH: That's very good. Do you, kind of, yourself, read or watch or look at graphs or is that, kind of, that you look at them, if there would be a process, at what stage do they come? Kind of, do you go first for the diagram, or...?

DP: I kind of look at the graph and ask myself, "How can I best present the data?" And I play with the data, and when I have a design that seems to be OK, I have a person who draws for me, and we go back and forth until it is perfect.

IH: That's very good.

DP: Yeah.

IH: Mmhmm. Yeah. OK, well, now I guess we have, at about half an hour, so if you would like to ask...

DP: You can ask one more question, and then I go.

IH: All right, OK. What about, kind of, research posters? It's, as a genre, do you...?

DP: Well, posters...

IH: What do you like about them?

DP: Well, posters can be very nice. But lots of people misunderstand, totally, what posters are. And they try to keep the form of a paper in a poster, which is completely ridiculous.

IH: [laughs] Yes.

DP: I've seen posters with abstracts - as if the poster itself was not an abstract! You can look at guidelines "How to Make Posters" that are completely wrong. Posters are shown at conferences and people walk along the posters at about one-meter distance. One-meter distance. So, the poster must be attracting people that are one meter away. And, so it cannot include little things. But the authors of posters don't know that. They think they are doing a paper on a poster. Posters can be very good, can be very useful, can be very powerful when they are conceived as posters. And what you can do is in the corner of your poster is a bag with real papers that can be distributed once you have attracted people. But the guidelines for posters that most research agencies provide are completely stupid, because they conceive the posters as mini-papers, which they are not.

IH: Precisely. OK, good. Excellent. Thank you very much.

PART 2

IH: Last time, we closed with discussing about different genres of scholarly communication and, kind of, we talked about videos, and social media, and illustrations, and the final one we talked about was posters as a, kind of, way of disseminating research and getting informed of others' research. And, there's, kind of, one more thing on my list, on the different genres. And it's about books of different kinds.

DP: So, books-

IH: Do you write or read books?

DP: [laughs] My house is bursting with books. And I pay nearly \$400 a month for storage of my other books and my reprint collections. I have a big problem, a book problem. I have books all over the place. But I have written about, edited, and written about 30 books. And all of them are fairly technical and had minuscule sales. A few, 2 or 3 of them, had a little bit more; especially the last one, called 'Vanishing Fish'. I have written a book, titled 'Darwin's Fishes' that was translated in Japanese, it's very successful. So, I do books. I like doing books, and I like expressing myself that way. But I don't like the fact that the many book chapters I wrote hardly get cited. I don't know why I continue to do that. I must have done a hundred or two hundred book chapters over the years; I don't know why I do that because they get cited - and thus used - much less than papers. And books don't get cited much except, obviously, the textbook that documents FishBase, and which is cited enormously. But that is in connection with the database. So, books... I use books for self-expression, really. Because they are not reviewed the same way as journal

articles, and you can write personal opinions. So, I have done lots of books, both edited and authored. There was a time I went every year to an event that UBC organizes, called, “UBC Authors and Their Books.” And I was happy that for several years, I was having a new book to contribute. And then I met a gentleman from the English Department who was publishing a book every year, books about some US army guy, like Clancy, you know, who writes books that read like weapon catalogues?

IH: Oh, yeah.

DP: And he was selling every year a hundred thousand or more of this trash, every year. So, I decided not to go anymore to this event, because I was conceited enough to believe that by publishing a book every year, which I did for a time, I would be doing something. But then “Darwin’s Fishes” was quite successful; it’s been translated in Japanese, as is my latest book “Vanishing Fish”. So, self-expression is working.

IH: Do you, yourself, read books? To get informed of research? Obviously, if you have a lot of books, you do... but professionally?

DP: I read about 50% fiction and 50% nonfiction. When I go on a trip, which I don’t do now because of COVID, I get two airport books: one fiction, one non-fiction. It’s always the same. And I alternate between genres in fiction; I read lots of science fiction, actually. But also, all kind of intermediate genres. For example, I just read a book called, “Fish Don’t Exist”, a very personal account of the life of David Starr Jordan, a fish taxonomist and politician and first president of Stanford University. And he is a very shady character because he’s the founder of the eugenics movement in the States. Yeah, I read lots of books about science in general and philosophy of science, and I teach it. I have a course every winter about philosophy of science. So, books are very much my thing. But those I write are not written - and this is true - with a reader in mind. I write to express myself.

IH: That’s good. All right, that’s great. Then, last time you mentioned that you work a lot with science journalists, and NGOs, and so on. Then, you probably have noticed that at least during the last few years there has been a certain kind of an upsurge of different kinds of science communication consultants offering their services. Have you, kind of, experienced that? And how have you reacted?

DP: Well, at the beginning of my involvement with science communication, I became a friend of a person who became a teacher, a mentor to many scientists. She is a former journalist called Nancy Baron. She is Canadian, but lives in the US, and she has taught science communication to many, many scientists. In fact, she was running the Leopold Leadership Program – named after the conservationist Arnold Leopold, in which people are taught how to speak to the press. I didn’t do this program, but Nancy used interviews that I gave as teaching material because I tend to use metaphors and simple imagery in what I say, and give take-home message. And so, she used me for a while for her teaching. Now I’m used to that, and I know lots of journalists. I have even hired one, from the School of Journalism here at UBC, who does our press work. And I respect journalists. Because contrary to what many scientists believe, journalists don’t want to sell newspapers - that’s the editor’s job. What journalists want is to see their articles in the first page, above the fold. And journalists also care about what is under their byline. And, contrary to many scientists’ belief, journalists do mind being wrong. I know many journalists and, for example, in Canada, I’m probably the only Francophone fisheries scientist on the west coast and so I get called a lot by Quebec-based journalists at Radio Canada, and asked to comment on things. And, so, I’m aware of the danger of speaking about things that I don’t know. When people ask me about salmon, for example, I don’t tell them

I have no expertise about those. There is some temptation to talk about everything, right? But I don't talk about things that I don't know anything about. Still, because we employ a journalist who does press releases, I got lots of callbacks. "What is it that you have done?" I talk about what we have done; and I do podcasts.

IH: That sounds great, thank you. Then, we have to talk about, kind of, communication and dissemination of science using different kinds of media, if you like. But if we, kind of, think about a research project or research endeavor, so, I'm, kind of, thinking about how important you think that it's... share? And to get information about different aspects of research that, kind of, sharing now that you're doing, but then also knowing about the research others are doing.

DP: Sure, because if you want to collaborate with someone and you want to get them on board with what you're doing, you have to offer them something in return that will interest them. And, therefore, you have to know what they're doing. Thus, our 'catch reconstruction' project was done in collaboration with about 300 people in different countries. And they had to be motivated to work with us for free because we didn't have money pay anybody. So, what I offered to each of them is to write about the fisheries in their country, in a certain format. If they wrote in this format, then they could compare what they documented for their country with what was happening in other countries as well. If they wrote in another form, they could not. And so, they all participated for free - this is a project that the World Bank could not have done because it would have had to pay lots of people, lots of money. And they all did the work over more than 10 years, and each of them produced a chapter, which we then put online. Now, half of these papers are published in the primary literature. So, for many colleagues in developing countries, we provided an opportunity to publish. And mentorship. And structure. Most of them I knew from previous interactions because I've been teaching courses in different countries in the world. And people write me, and so, I have these contacts in almost all countries of the world, I have somebody I either know or somebody who knows somebody. So, yeah, you have to know what happens in your field if you want to collaborate, especially if you cannot offer financial support.

IH: Of course, yeah. When you're reading a journal article, so, is it important to know who wrote it and from what kind of a...?

DP: No; well-known authors and little-known authors are equally capable of writing stupid stuff. And so, it is not important who wrote an article. For new ideas, I read *Nature* and *Science*. For additional papers, that fill holes in what I do, I look mainly at papers that cite my own work, because they will generally be about stuff that interest me. Also, for FishBase, we need growth parameters and certain parameters for certain fish. When I read papers and I find growth parameters, I send them to the Philippines, where they'll be encoded. This is the more routine thing. The other thing, I mentioned before, is reading about original ideas, well-known authors are not likely to be coming up with a new thing; it is new people who have new ideas, usually.

IH: Precisely, yeah.

DP: And then I read the papers of my close friends, obviously. But I often comment on my friends' papers before they get published, so they are not surprising.

IH: Precisely, yeah. How is it - when there is a, let's say, a paper published, or whatever kind of result is coming out, how important is it to know about - for you - to know about, let's say, a little bit bigger context of all the study - the design of the research study as a whole, within which this research has been conducted?

DP: I don't understand the question - you're asking whether I look at the design of how the study was done?

IH: Yeah, precisely.

DP: OK, I have to confess something, I'm not very good at math. And so, I will not look at the power of the test, for example. Or things like that. Or whether a Bayesian analysis would have been more appropriate than a frequentist analysis, or whether the criteria for using an Anova were all met. In fact, I'm likely not to detect if an error was made. But what I'm looking at whether the results are interesting. Do, they connect with something else I know? Do they connect with previously unconnected things? Because I'm interested in what E.O. Wilson called "Consilience," things have to fit. And if they don't fit, something, perhaps they are broken and need to be rebuilt. Things have to fit. And, so, if somebody proposes something completely, shatteringly new, it is either wrong or all the other stuff around it is wrong. And that is what makes it interesting.

I must say that I'm not interested so much in precision, I'm interested in accuracy. Lots of colleagues spend a huge amount of time on defining their uncertainty of what they say, its precision. But what is interesting is "Can it be an accurate representation of reality?" What are the implications? And they are things that are done with high precision, with sophisticated software, that are bullshit. For example, my work on growth of fish and oxygen suggests very strongly - no, actually, shows - that when the water temperature is elevated, fish get smaller. And there are good reasons for that, which you can verify completely, and the physiological mechanisms for this are well established. And recently there was a paper published in Australia, based on underwater visual census of fish, that suggested that with temperature increasing, the fish either get smaller or get bigger. How can they get bigger? This paper has measures of uncertainty all over the place, but it is fundamentally rotten. And, with a few friends, I looked at this paper, it is so badly documented that it is not reproducible - we cannot trace back what they have done. I have asked some Australian friends if they can help me find out where the tumor is. The point is - and that's something, I'm trying to find a philosopher who confirms this - that some things cannot be the cause of a certain thing and of its very opposite. In other words, if a temperature increase is the cause of fish getting smaller, it cannot be, at the same time, the cause for them getting bigger. But the paper was published with all kind of precision metrics, right? But at the level of accuracy, is it even reasonable? It's not. So, I find that there is a huge drift toward crap that has confidence intervals. You know, crap with confidence intervals remains crap. And that is distressing, especially as statistics get more and more complex, but at the core of it is crap. In this case, you have to know some fisheries biology. For example, many of the fish that got bigger are fish that have been managed well, and so the fishery on it has declined. And that, I guess, is the reason why they got bigger - fishing made the fish smaller, and when fishing was reduced, the fish got bigger, and overcompensated the warming of the water. And I think that's the explanation, because they don't deal with the effect of fishing at all. However, demonstrating this is going to be lots of work, and life is short. Especially for a 74-year-old. That's me. Anyway, so that is my relationship to this... to the literature.

IH: When you said, kind of, in the study that you mentioned, the data wasn't documented-

DP: Very badly.

IH: It was documented very badly, what is good documentation of data?

DP: A good documentation should allow you to redo the analysis. And lots of people are reluctant to do that because they feel that their word - their analysis that they present - should be enough. So, the documentation they present is not sufficient to redo the analysis. And we talked about, the first time we met, about making data available to people in journals, but specifically, people should be able to redo the analysis. I know that the replication problem is more complicated than that; journal articles can be replicated only when you master the method that people have used. Because there are lots of those things that cannot be stated that must be known. But the data that, the key data must be available. Clear.

IH: How much do you have to know about how the data was collected or compiled? And, kind of...?

DP: As much as possible.

IH: Yeah.

DP: As much as possible because if you don't know crucial things, the results are going to be nonsense.

IH: Precisely, yeah. What would be crucial? [laughs] That's an impossible question, sorry.

DP: No- do you remember the kerfuffle with the Hite Report?

IH: Yeah...?

DP: It was a researcher who was investigating the sexual behavior of women, supposedly. And she - Shere Hite was her name - she sent to women, probably ten thousand or so, a questionnaire, and she had a very low response rate - about 10 or 15%. And these responses were saying, "I don't like sex with men, I prefer to satisfy myself because men are horrible persons." So, this became the main finding of the Hite Report. And she was heavily criticized because, [laughs] because she had no way of dealing with responder bias. But she said that she knew how to - there was a "woman's way of knowing" so that was how she could deal with it. She was hounded out of research. She left the U.S. and went to Germany.

I had a Brazilian PhD student who was working on sport fishing in Brazil. She did a questionnaire and she also had a very low response rate, and she was afraid of this problem, of this responder bias. And so, my advice to her was - because I view myself as a feminist - to write to Shere Hite and ask her how she dealt with it. [laughs] Because I believed at the time that she had found how to deal with responder bias. And, so, this student of mine wrote a very friendly, respectful letter to Shere Hite asking "How did you deal with responder bias? I have a big problem with responder bias, and could you tell me how you dealt with it?" And she got a hateful, hateful response. It was like the computer jumping at you. My student was part of a conspiracy to get her down - it was horrible. The student still, 20 years later, she's now a professor in Brazil, she still is under shock from the response from Shere Hite. [laughs] So, there we are. That's the story with Shere Hite. Incidentally, I have another student now who is doing a questionnaire, and I am

still so shocked by Hite's response that I pushed her to send a questionnaire that would consist of one question, and the questionnaire is sent as a private email, separately, so it is not a bulk thing. And she has a response rate of 70% because it's personalized and asks only one question. The 70% response rate is because I became aware that there is a problem that Shere Hite didn't know how to deal with. So, in general, I'm not interested in the power of tests. I would not be a very trusted medical researcher. Because I'm interested in the accuracy of the result, not their precision. And I have authored a textbook of fish population dynamics where I showed how to obtain various parameter estimates, but for most of the things that I proposed solutions for, I don't even show how to compute the confidence intervals.

IH: Yeah, [laughs].

DP: Yeah, but this is a long time ago now, I wouldn't be able to write a textbook like this anymore.

IH: Precisely, yeah, then, I guess I just have one more question to go, and it would be, kind of, an imagination exercise. Let your fantasy guide you. And, kind of, if you could describe an ideal scientific communication system, kind of, how you would be able to disseminate and inform about your research, and how would you get to know about what others are doing, if there weren't going to be any kind of restrictions or problems with the resources or any problems with reality? How would it look like?

DP: I think what we need is to get rid of for-profit science publishing. What we would need is to get back, if it's possible, to publishing by scientific societies that are not out for profit. I think that the profit motive, when injected into science, is as bad as when it is injected into education or health care. These are three sectors where the profit motive must be absent. Health care, we can see in the U.S., cannot be run with the profit motive. We can also see what it does with education. I think if we could get rid of the profit motive in science publishing, we would all benefit. We have solved many problems that affected science before, the fact that it was only a selected group of people who could participate. Now, women can participate, people of color can participate, everybody can participate. It's the publication cost that is the remaining problem. The peer-review system, I think, should be maintained, but it should be connected with some sort of rewards. Not monetary, but, for example, a free subscription to the journal in question if you do a certain number of reviews, or accelerated review of your own papers. An idea I have is that if you submit a paper to a journal, you must promise, within a year, to review 2 or 3 articles by others. This would guarantee that the journal that published your work, gets reviews done by people who are competent in this area because that's your area of specialization. A scheme like that would work because my motivation for reviewing is largely guilt. I cannot justify to myself turning down a request to review by a journal that has accepted my papers. So why not turn guilt into a contract? We would publish your stuff, but you agree to review 2-3 papers. Incidentally, I have become, the first of July, a member of the Advisory Committee of *Science* and I have reviewed the first 3 papers - not really reviews, only pre-reviews, assessments of whether they should be reviewed or not.

So that's my only good idea. That's my only idea about this reform. That the journals should require of all authors that they have published papers, that 2 or 3 are reviewed. And that would, I think, resolve the big problem of reviewing that we have, that reviewers are so hard to get. I'm an editor of a special research topic in one of the *Frontier of Science* journals, and finding reviewers is very difficult; you might have to ask 20 people before you get somebody, who then doesn't deliver. It's awful. People expect their papers to be published in peer-reviewed journals but do not want to review. That is out of whack. But I think that the science journalists do a good job, and that scientists are now increasingly aware that they have to

communicate with science journalists. When, when I was a young scientist in the 1980s, there still were colleagues who thought that, “oh, we are too good to be interacting with science, this will pollute the science.” Nowadays, science denialism is so strong that scientists must intervene. They must participate in societal debates. And the best way to do it is to work with a science journalist because the scientists themselves mostly don’t know how to present the science they do.

IH: That’s a good point. All right, then, I don’t have any more questions, but I’m wondering if you have anything you would like to ask me, or if you would like to comment or say something more...?

DP: I don’t know what you do. So, tell me what you do, just for information. What will do you with this?

IH: What will I do with this? Yeah, we’re doing a bunch of interviews, about 20, at least to start with, and what we’re trying to figure out is how scientists and scholars - in the sciences and social sciences - how people are disseminating their research to others, mainly for research, but also to other stakeholders. And then to see what kind of preferences scientists and scholars have about getting informed about others’ research. And to try to figure out how the, how people are knowing, are getting informed about things nowadays because it’s very much not what it was before, that people are reading a bunch of journals and reading, new books. So, it’s more like people are using many diverse strategies nowadays, but there is this kind of a hunch that these things might not really match at the present.

DP: Are you finding any well-established scientists who spend any time on social media? Or social...?

IH: Well, so far, we haven’t, extremely a lot of interviews yet, but yeah, we do. But it’s really, kind of... not everyone. I would- I can’t really quantify, it’s impossible on the basis of this. But there are, kind of, there are those who think that social media is very useful, and then there are those who use social media only in their free time to communicate with their friends and family and so on and absolutely don’t do anything professional on social media. So, it’s- it’s really an interesting question that, kind of, why, and if there is something that explains why certain people find it useful and others don’t.

DP: It’s not that I find it useless, it is that I hate it.

IH: [laughs]

DP: OK, what I’m left is for having to apologize again...

IH: No worries...

DP: OK, so, in 2 years, when your study is finished, send me a PDF of it.

IH: I will, absolutely. After this interview- so thank you once more for your time and for your great insights into this whole thing. We’ll be sending you a transcription of the interview, you can comment, edit, add whatever you’d like to it if you’d like. You don’t have to do that. And then you will also get a gift card to the UBC bookstore. And that will be happening kind of...

DP: I’ll be waiting for that!

IH: So, you can get more books.

DP: OK, thank you very much.

IH: Thank you, thank you yourself.