

- 00:00      **Because we're getting too many questions, but I've already spoken to you. Do you mind if I move this little closer? I've already spoken to you before, so it'll go a little quicker and then move into questions regarding collaboration, how you collaborate, etc. and then at the end, talk about technology. I'm not going to ask you to show me anything at all. And I believe I told you the goal of this is to have a better understanding of collaboration in science research and how technical technology is or is not supporting this kind of research.**
- 00:36      **So you are currently an assistant professor at <redacted>. I'm and I have from my notes last time that you're looking at effects in small RNA.**  
Yes, yes. And yeah, I'm looking at non coding regulated gene expression.  
**OK, great. And so and then just to kind of appreciate, if you'd like, restate with the overall goal of your research.**
- 01:10      In a sentence or two, I would say the overall goal is to understand how genes get turned on and off during development and in response to stimuli.  
**OK. And I believe we talked about that last time, one of the potential impacts of your insight into things like cancer or heart disease, understanding how misregulation of gene expression can cause defects and development and lead to diseases.**
- 01:41      **OK, great. So it's like that whole section, you know, spin and double check that's recording, OK? And it's been taking like a long time with everybody else, so it's a little quick. So what is the average number of researchers on this is a general in general on projects that you work on.**  
That's a good question, I would say I want to say, but let me just pull up a publication list and see if that is
- 02:17      Close to accurate. The I would say is pretty accurate. OK. And then I think your largess was like 11 co-authors. That sounds about right.
- 02:45      Yeah, and small is like two for one, you and one other researcher.  
**Are there any disadvantages or advantages to working on projects with a smaller number of collaborators, a smaller group?**  
I mean, the disadvantage one obvious disadvantage is the less intellectual input from, you know, the fewer sources.
- 03:13      So one of the advantages to having a big group or kind of project is you get a lot of input from people who might be approaching a problem from a slightly different mindset and might have some novel insight into the project. So definitely a disadvantage. Just having a few authors on the paper is that there's less opportunity for that to happen and then you have less people to just sort of bounce ideas off.

- 03:42 And so that can potentially limit the sort of the innovation and you also have less people that can sort of double check your work and will pick up mistakes that you make. Or pick up on, you know, in a publication or a manuscript.
- 04:10 The text that's not clear to people who are really familiar with the research, so having multiple people read a manuscript before it's published is always a good idea because then if there's sections of the manuscript, then it clarifies that there can be easy to understand by a broad audience. It's really helpful to have.
- 04:38 So that's another advantage or disadvantage instead of having a few others. And then, of course, the biggest disadvantages, with fewer authors, you have fewer people doing the work and so projects take longer. Typically at least doing the experiments takes longer.
- 05:01 The actual data analysis and the manuscript together can actually go a lot faster, though, when you have fewer authors because you're not dependent on multiple people having to get their data together and get their data to somebody to get organized into figures and then having multiple people who have to, you know, help write the manuscript. So the more people you have involved in generating figures and writing text, I would say the longer things take.
- 05:33 But as far as doing the experiments, the more people you have your experiments, the faster things go. And of course, that's not always true. Sometimes if you have a really efficient group of people, then you can have, you know, 10 authors on a paper and everybody's contributing a fair amount, but they're doing so in a really efficient manner. And so it actually makes things go faster. But the key difference is the differences in those groups that manage to be more efficient.
- 06:05 Well, I mean, one of the one of the biggest difficulties is having collaborators who are really busy and they have multiple other projects going on. And your collaborative project may not be their highest priority or even if it is their highest priority, they still have to sort of split their effort amongst multiple projects or what?
- 06:30 So those sorts of people are often, you know, the most difficult to sort of the time and many other factors often in getting your your your. Data assembled in your paper, written and submitted. OK, so.
- 06:57 **And what it in general, again, these are kind of in general s mation of your research projects, what are the roles that you and your collaborator collaborators are playing there? Stop me if I'm getting off track here.**  
It's fine.
- 07:18 In most situations there is a lead author or maybe two or maybe even three lead authors. And those are the people who are largely responsible for directing the project or at least directing the experiments for the project and making sure that things move forward at a reasonable pace. And then you have the corresponding author.

- 07:47 And this is the last person or the last two people listed on a paper typically. And these are the people whose lab typically the research is being done. And when we're talking about molecular biology research, so those people are ultimately directing the project, but really they're doing so through these through by guiding these lead authors.
- 08:13 And then everybody in the middle is sort of playing sort of secondary roles where or sort of auxiliary roles or whatever in the project. But really, in most cases, it's really those lead authors who push a story or push a project forward and ultimately sort of determine how quickly a project can be completed and published with, of course, those corresponding authors providing some motivation, perhaps, and some guidance.
- 08:51 OK, and but I should point out another thing that kind of goes back to your question about the more difficult sorts of people to collaborate with, people who you're reliant on for computational stuff, and this doesn't tend to be a big problem for us because we do most of our computational stuff ourselves.
- 09:14 But for other labs especially and I've been in this situation myself, where you're dependent on somebody, you know, computational biologist to do some sort of data analysis for you, that can often be a huge limiting step. So, yeah, OK. And those people might be buried in the middle of that hot-air list because their contribution is not necessarily hugely intellectual or really necessarily central to the paper.
- 09:45 But nonetheless, you're really they sort of can hold up a paper and hold up a project.  
**OK.**  
And so we have some similar questions, pick any current research project that you're working on when answering these questions.  
**The reason why I asked you like general and current project is because I'm asking you in general gives kind of a like a broader overview.**
- 10:12 **But if I ask you if I ask you about a current project, I get like a slightly different kind of data that helps validate my interpretation. so, I mean, you pick a pick a project and describe it in like, I don't know, a couple of sentences. Don't click.**
- 10:41 OK, so a project that we recently got accepted in the journal. So it's completed now. Our most, I should say, freshly completed project. It involved identifying the role of a particular class of small coding RNA's and in germline development in protecting germ cells from deleterious genes.
- 11:11 **And this regulation of gene expression, how many researchers run that project?**  
Six.  
**OK, and what were the five, five plus one and what was OK and what were the roles of the collaborators in this?**
- 11:40 **You don't need to like name names.**

So me and one other person who was a postdoc colleague of mine before I came to <redacted>, we initiated this project and we were largely responsible for most of the experiments and, you know, everything that goes along with writing a paper. Then my old postdoc advisor was also an author on the paper.

12:12 Him and I shared correspondence all that. And he was largely responsible for, you know, providing guidance for the project. And then two people from my lab helped out with experiments.

**OK, OK, great. So and then this kind of moving away from that whole line of questioning.**

12:41 **Roughly what percentage of your projects have involved at least one collaborator who is at a different institution?**

In just a second. Yeah, absolutely. Have a few enough papers, and that's a pretty easy question to answer pretty accurately. So a completely different institution.

13:47 It's just over a third.

**OK, so. Why did you choose to work with these collaborators who are at different institutions?**

I mean, every situation was sort of unique.

14:11 For the most part, in some cases, the collaborators had expertise saying computational methods that we lacked. In other cases they had data related to our project and just we just decided to pool their data in with ours because their data couldn't really stand alone as a project.

14:35 But if it nicely within our project in these more recent this most recent paper, it was simply because the project was started when we were at the same institution. Then we all moved to different institutions.

**OK. So like in the case where you're working with people in other institutions because they have expertise that you lack, how did you choose those specific collaborators as opposed to maybe other people who have that same expertise?**

15:09 Primarily because they were people that we knew well.

**So friends, right?**

And I would say that's one of the most common. If there's a sort of particular area of expertise you're interested in, you know, there's convenience is a factor. Of course, there's how well you know those people. And then, of course, their expertise specifically as it relates to your project or your questions.

15:35 And so and most of these cases, it was a combination of those three things.

**OK. And so then when you say that the roles that these collaborators are playing were fairly vital.**

In some instances, yes

- 16:06 **What about the instances where they weren't necessarily vital roles, but you're collaborating with them anyway?**
- The other thing I failed to mention in the question about why you collaborate with specific people and in some cases where I've collaborated with other groups and I wasn't really central to their project, in some instances, it was contributing reagents and stuff that hadn't historically been published yet.
- 16:39 **And I think that's a really that's also a common source of collaborations.**
- But then going back to your question, which was if an anon sort of you. I would say it's really just the same sort of three things, like it's a matter of convenience. People we're friends with, you know, maybe we didn't necessarily maybe their contribution wasn't absolutely essential to the paper, but it would improve the paper.
- 17:12 And at the same time you know, it's mutually beneficial for both groups. And because we're friends with the with that group you know. It makes sense to. Work with that specific group, and oftentimes it's also a chance. So in one example that I can think of where it was not a vital collaboration or whatever, I ran into somebody at a meeting and they and I was presenting my data and they were like, well, we have this bit of data that sort of complements your project.
- 17:50 Are you interested in saying, well, yes, sure. And so we ended up folding their data into our paper and making the people who generated that data authors on the paper.
- OK, so are there any advantages or disadvantages to working in distributed research groups or working with people, other institutions?**
- 18:18 So the advantages, of course, are that different institutions, they might have resources that we're lacking at our institution. So that strikes me is the biggest advantage really is just sort of the resources, the intellectual and technological resources that we might be lacking.
- 18:44 And of course, disadvantages are that when you're, you know, separated by great distance, you don't obviously have that sort of level of communication you would have with somebody who's in your own institution that you can that you're going to run into and talk to in person and stuff at least as frequently. So that can be perceived as part of the biggest disadvantage.
- 19:07 And then coordinating things can be difficult, especially if you're working with somebody you know overseas where there's a big time difference, and just coordinate your schedules so that if you do need to talk, that you can do that.
- How do you manage to overcome this disadvantage?**
- It's mostly just a matter of. Being organized, and
- 19:36 coordinating others, I have to admit, I haven't been in a situation where I have to constantly go back and forth with someone who's overseas so frequently that, you know, it becomes a real challenge, but usually it's like, well, we need to talk at some point in the next week. You know, when can I call you? You'll be in the lab or whatever.

- 20:05 **OK, and then what about the flipside when you're working on groups, working with groups that are all in one institution?**  
Well, what's the question of advantages or disadvantages to working?  
**I mean, it's kind of like the opposite of the previous question.**  
So, I mean, obviously the advantages you can talk to that, that those people in person and that's always I fight.
- 20:36 That's always advantageous, especially when you can have a lot of meetings together and you can sit there and present your data in a group that's collaborating on a project. I feel like that's the most effective way of collaborating. But of course, it becomes difficult outside of when you start working with people outside of your institution. So and then as far as disadvantages, I mean, there aren't really any disadvantage that come to mind except for not having the advantage of people from different institutions that are going to have different resources and stuff that they can sort of bring to the table.
- 21:14 **OK, so why is speaking in person so much more effective?**  
So speaking of person, I think it is typically more effective because it tends to be more casual and it's not as it's not as forced or scheduled. And so when you're speaking in person, you know, you might I mean, at least I have a tendency probably to think a little more casually and take my time and start to think I'm more likely to come up with ideas or have insight.
- 21:51 Whereas if you're talking somebody to somebody over the phone or over Skype, just that sort of environment where it's very sort of fixed, like you have a fixed amount of time, you know, you're going to be in this meeting for an hour or whatever, and you have sort of more. Specific role to play in that sort of situation. Usually I just feel like there's less. It's just not as it doesn't give you as much freedom to sort of think and come up with ideas.
- 22:24 I don't think that's necessarily always true. But I mean, you can have I think you can, especially nowadays with, you know, with very nice interactive and sort of chat, Skype chat type situations. You can you can sort of recreate that that, uh, that sort of physical interaction. You can have people at the same institution. OK, so I'm reading some of this, but honestly, if I have to choose between Skype and.
- 22:55 I was like, if I have to talk with someone one on one about a project and I have to choose between Skype and the phone, I feel like I'll often choose the phone or Skype. And also in general, I just prefer to talk to people over the phone. Compared to Skype, just because I feel like you're going to be a little more sort of self conscious and conscious that things are going on while you're talking to somebody and you can see their face on a computer screen.
- 23:26 And, you know, the image quality is never that great. And there tend to be disruptions and stuff related to the technology not being absolutely perfect. Rise over the third. It's like it's just more casual. You can be doing whatever you want. What you can see what you're doing. You're drinking your coffee, spilling your coffee doesn't really matter. So I feel like it makes it a little more casual typically.

- 23:51 **OK, so what would you say to this. I did glance at your image last Glacier Publications, but it's just kind of a tough thing for me to, as an outsider, figure out myself, because I'm not terribly familiar with really skills. But what percentage of your projects do you say involve collaboration with researchers who are in different fields.**
- 24:22 **Are we talking like chemistry versus biology or a closer bit more like that, that kind of a difference?**  
I mean, I again, I am I'm not a biologist, so I don't have a good handle on the differences between the different subfields or how far apart they really are.
- 24:48 So I mean, I just sort of briefly looking through my publications here, I can't really think of any collaborations that involve somebody who's in like a non biology field. So the collaborations are usually so, you know, I would consider what we do molecular biology. And so occasionally we'll have a collaboration with somebody whose focus is more cell biology or computational biology.
- 25:20 And, you know, I've definitely worked with computer scientists who are not biologists that would count. I guess that's probably the closest thing. But even those computer scientists who are not biologists by training, they're still going to have people that I've collaborated with still have a little bit of biological understanding. Not much. Right. But you're typically working with people who are doing bioinformatics research.
- 25:47 And compared to the rest of us in computer science, they have a huge hit, you know, better understanding of what goes on, but we do a lot of computational work. So even though it's not I mean, it's not the same field, but there's quite a bit of overlap between what we do and those computations or the bioremediation type people that we collaborate with. OK, but I'm so looking at this kind of those projects where you are collaborating with someone who's in bioinformatics as opposed to a little more towards bio biological fields.
- 26:24 **Are there any challenges or to working with someone?**  
Yeah, I mean, there's always sort of a language barrier when you're whenever you're talking about biology and something else like being, you know, computer science or physics or whatever else, even though all those disciplines can be interconnected, there's still a bit of a language barrier when you're when you're communicating and in terms of biology or computer science or whatever with people who are trained in different disciplines.
- 27:01 **Can you give an example off the top of your head?**  
I mean, I can give you sort of a generalized example for, like, you know, collaborating with <redacted>, who, you know, they understand basic biology, like people some people that I work with who understand basic biology, but they're not going to understand little nuances and say you're working with nucleic acids or something.
- 27:33 And maybe they don't understand the difference. They don't appreciate the difference between DNA and RNA, whereas where RNA has a Uracil, are you in place of a T relative to DNA? Little nuances like that they might not actually think of. And so they might go to do

your data analysis. And they're not taking sort of these kind of these they're not taking some of the. The sort of finer details into consideration when they're doing that analysis.

28:07      Simply because they don't they don't normally think in terms of biology as much as in terms of writing code or whatever.

**Are there any advantages to working with people who are in different fields?**

Well, yeah. I mean, definitely, like, you know, people who are trained in computer science are almost certainly going to have a much higher level of, uh

28:35      Computational expertise and knowledge on how to write programs to work more efficiently and faster and understanding of what can actually be accomplished as a biologist who knows a little bit of computer science. I shouldn't even say I know your size. I know a little bit of you know, scripting and whatnot. For me, it's going to be a little bit difficult to gauge how feasible, you know, time, time wise and.

29:09      And processor and memory wise, to do some application, as somebody who has trained as a computer scientist, is going to is going to have a much better grasp of.

**OK, and then what about working on projects where all of your collaborators are biologists or closer to your field? Are there any advantages to that?**

29:35      I mean, I guess the advantages there were all speaking the same language, and so it's really typically easy to understand what everybody's doing and for everybody to understand what's going on. When you start bringing in people from different disciplines who don't necessarily understand the projects, how much they're serving, some function, but they might not really understand what that function really is.

30:04      They know what they're doing. They know what their specific task might be, but how it really fits into and sort of drives a project, they are really going to appreciate as much. So if you have a group where everybody is sort of tuned in to the same language and everything, then I think that it can be a little more. Cohesive, perhaps.

**Are there any disadvantages or challenges?**

30:33      I mean, I think it's always nice to have. You know, intellectual input from people who come from a different discipline because they're going to probably be thinking about things a little bit differently. We get so programmed to think one way that we might not think outside the box, even if it's something really obvious that somebody who wasn't really trained in any specific discipline would come up with, it could just be that we're so sort of narrow minded that we're not thinking of some sort of maybe even obvious things that are just slightly outside of the normal realm of the way we think about things.

31:14      **OK. And have you ever had a project fail because of issues of collaboration?**

We've definitely had projects that never took off because the collaborators were sort of spearheading them and they just their priorities changed.

31:42      **OK, so what happened with those projects at all?**



In the examples that I can think of, we had never invested so much into them that we were like. Really got disappointed that they didn't take off. It was usually things that were sort of in early stages or we had anticipated our two projects intersecting at some point and they never intersected.

32:12

So we just continued our own separate paths.

**OK, so kind of moving. So I'm trying to make sure I check on time because I don't want to run over things after so kind of moving into the last section. Can we start off by can you give me like a list of tasks that occur during a research project that involve collaborating with other researchers?**

32:41

**I mean, you mentioned writing papers or reviewing manuscripts and coordinating or other tasks.**

So the major tasks are initially sort of agreeing to what the individual contributions, and that's something that you're kind of constantly revisiting oftentimes throughout the project, because projects will often take one or two years or even longer to complete.

33:19

So that is probably one of the first tasks. And then you know, the task. Writing the manuscript, of course, would have had the task of reading the manuscript and having all of the authors on the paper, or at least really I mean, ideally all the authors on the paper reading that manuscript, checking it for errors, making their contributions to the manuscript.

33:52

And that's usually sort of a back and forth thing because usually manuscripts go through multiple iterations. And then there's the submission of the manuscript and the task of deciding where that manuscript should be submitted. OK, and then, of course, there's the task of addressing reviewers concerns for that manuscript.

34:24

Typically, the person the lead authors on the paper and the correspondent on the paper, author on the paper, will end up doing the vast majority of revisions on the manuscript or whatnot. But nonetheless, there is still need to go back to the authors and everybody needs to review any changes that were made to the manuscript. In some cases, the collaborators might be required to.

34:54

To modify their contribution one way or another, be it the way they analyze the data or in the way they describe the data in the manuscript, or maybe they need to add additional experiments or whatever to support the data.

**OK, and what about do you ever share data between researchers?**

Yeah, sometimes.

35:20

I mean, it's fairly common to have some data that, you know, you're talking unpublished data, presumably. So you have some data that you know. You haven't published some results that would really benefit somebody else. Yeah, it's really common to share that with people. I mean, there needs to be the sort of understanding that you know, they're not

going to take something that you shared with them in confidentiality and then go and, you know, spread it around to people who might be in competition with you.

- 35:58 But, yeah, I think that. You know, I think we should all be encouraging the sharing of unpublished data and so definitely a proponent of that sharing within the group that you're working. You're working with your group. I mean, I think if you're working with in a group, it's pretty rare, you know, occasionally will collaborate with another group that they're not necessarily competitors, but they're working on similar stuff independently from us.
- 36:32 And by giving them some sharing with them, some results that might push their sort of independent project forward and potentially at, uh, at the risk of our project getting scooped by them. You say but nonetheless within a group and every collaborative group I've been in and we share, we don't withhold anything from anybody.
- 37:03 And I think that's sort of how you need to approach the collaboration, is that if there's data being generated related to collaboration, which is what you're saying, then all that data needs to be shared within the entire group. You can't really withhold data from the group because that can. And that could lead to all sorts of problems, right? Right.
- 37:26 **OK, so when you're working in a group and deciding who's contributing what to what kind of organizing that, what tools or technology do you use to accomplish that task?**  
Email is, of course, the biggest things like Dropbox or Google Drive, where you're where you're just storing, sharing, editing files.
- 37:55 Those I would say those two are the biggest because most everything. Is we do electronically now. Sure, we talk on the phone occasionally or Skype or whatever else, but as far as like how the sharing and the coordinate and everything else does, it's mostly via email and Dropbox type sharing and file sharing, and you also meet in person and occasionally we will meet in person.
- 38:28 **OK, so when would you use email versus Skype or phone or in person to communicate?**  
I think when you need to if you if you expect very little back and forth, like, you know, this is you need to you need to
- 39:02 share some information with somebody or just get some questions answered or ask or answer some questions or whatever, and you don't expect a lot of back and forth and it doesn't need to be done or if there is a lot of back and forth that can be spread out over days and days and days. Email is just easier because you'd see your own convenience, whatever you want to send an email you can whenever you want to check that email and read it and think about it, you can buy when you need when you need to sort of brainstorm or think through things, or there's going to be a lot of back and forth you need to come to and you need to come to a conclusion in a short amount of time.
- 39:41 That's when Skype and phone are really useful also when you just want to get or if you just want to get sort of the group together and make sure everybody's on the same page and stuff. Skype can be a lot better for that because with emails, everybody is a little bit

disconnected and, you know, feel like when you have Skype, it's easier to get everybody sort of on the same page.

- 40:09      **When would you use Skype, send over an in-person meeting or a phone over the phone?**  
So Skype is really useful when there's more than two people involved. So if it's you and more than one other person on Skype. I feel like this is easier. It's hard to have it it's much harder to have a three week conversation.
- 40:33      So I think two way conversations are easier over the phone, but a three way conversation, they become much easier over Skype. Just because you can see who's talking, it's easier to sort of go back and forth and. And it is just more a little more engaging. And then say, when would you rather speak in person than, if possible and possible, speak in person over?
- 41:04      Yeah, usually the only reason we do that is if it's really convenient, like we're getting we're going to be at the same meeting or that person is going to be in the area and they might as well stop by the lab and we can chat or we need to go to that person's institution to do some experiment in their life, or they need to come to our lab to do an experiment or whatever. So mostly it's sort of a convenience thing because it's never simple anymore.
- 41:35      **OK, and so when you when you're using these technologies, email, phone or Skype and use the same tools with everyone, all of your collaborators, or is there somebody that you only email or only call?**
- 41:56      Yeah, I would say the people that like people that are really close with like people who were like my postdoc colleagues and stuff or my baby like my PhD advisor or something, I'd be more inclined to just call them up or, you know, send an email saying, give me a call when you get a chance and talk to them over the phone. People that I'm not as well acquainted with, I'm more likely to do email.
- 42:35      Email is a little more formal, in a sense. You know, it's easy to email somebody you don't hardly know at all. It happens all the time, email people we hardly know. We're a lot less likely to call somebody we hardly know. Oh, hey, this is so-and-so from so-and-so. So even if you're collaborating with a group and you know, you might not necessarily know everybody in that group because somebody knows somebody through you know, somebody through somebody else.
- 43:06      And so I feel like in that case, maybe you need to talk to that person you've never met. You know, sometimes it's just easier to just send them an email and you're not placing as much of a burden on them. So it's much more of a burden to have to talk to somebody on the phone. And so if somebody says, you know, this happens routinely, not necessarily related, collaboration's or whatever, but somebody you shoot me an email and say, you know, I need to talk to you. Can I talk to you on the phone or something? That's a little bit more of a burden. For one thing, you're on the spot like we are now.
- 43:37      I don't I can't if you send me all these questions, I can spend a lot of time thinking about and really nice answers and everything. But I said, I want this spot. And so I just have to kind of

come up with whatever, you know, comes to mind. Yeah. And so, you know, I think I'm more inclined to do that with people that I know.

**Well, I hope I don't make you feel like you're on the spot. It's just a lot faster than an email back and forth. It makes it easier for me to ask follow up questions.**

44:09

I've tried doing this via email and it takes like two weeks and. Yeah, I'm sure.

**OK, so you mentioned using Dropbox and Google Drive when you and throughout these projects when you pressed to share your share.**

44:33

Well, so actually since I've started my lab, whenever we start a new project and this is something I sort of initiated back in my postdoc, that but whatever, we start a project, we make a Dropbox folder and figures and manuscripts and some data related to that project just go into that Dropbox folder.

45:00

So then anybody working on that project can go into that folder and, you know, look at the current status of the manuscript or the figures or whatever.

**Are there any challenges to using that method?**

There is the challenge of if you have multiple people going into this folder, you run the risk of people overwriting your files.

45:30

You know, they go into change of figure or something. And then they don't save it as a new copy or whatever. And then you don't like the changes they made, but you can't go back. You can't change it back easily because that version of the file has been deleted. Or you could go. And it's really good because they do have a version control system on Dropbox.

**Oh, they do.**

Yeah. You can go, you can navigate to your file and then click and view the previous versions and actually roll it back just so you know.

46:01

**I know that.**

Yeah. So if you're in like your you go to the, you had to go to the website, you navigate to where it is because it just duplicates the file structure. And I think you right. Click on whatever file you can view the previous versions and you can, you can go back. I mean it's not as perfect as like some you know, some of the systems we use for code. But yeah, you can do that. You can also retrieve deleted files that way.

46:31

So now you know. Yeah. What I had to do when I'm desperate is I use like crash plan to back up my computer. And since Dropbox is actually right, computer does get backed up that way. But yeah, it's still not quite as convenient. And then just knowing whether or not somebody had done something or how they did it. Right. Right. And drop Dropbox only with like your group or with you use it with collaborators rather.

47:03

Yeah. We used to with collaborators before too.

**OK, and you mentioned using Google Drive sometimes when the only time I've ever used Google Drive is when we have a lot of data to share normally or set up in FTP side like you**

**for transferring large amounts of data. But in some instances that's not possible. Why not?**

Just because, like the people you're trying to share with, they just I mean, I guess we can always set up to have somebody.

47:37

Share data with us or share data with them that way, but some people just don't have the capability of setting up the site. They don't have the they don't have the right person around to set it up for them or whatever else. They don't even know how to get into a FTP site in situations like that.

**OK, do you ever share data in email?**

48:05

Yeah. Yeah, all the time. All the time. When would you do that over putting something in Dropbox. We don't necessarily always want everyone to have access to all the data that goes into one of your Dropbox folders. So I would say basically, if you just want to share small amounts of data that don't that can be sent via email in 20 minutes or less or whatever, what do you do if you want to share data, keep it private, but it's over email and Dropbox as long as it's under a few gigs.

48:45

**Yeah, so. And then what about writing papers. Rewriting papers, you know, reading, uh, reading manuscripts, et cetera. What tools do you, what technology to use. How do you do it just for reference.**

So my friends newspapers references. That can be an issue.

49:14

**What do you mean by using papers, references for citations, right?**

The program papers.

**Oh, OK. Sorry.**

Yeah, I was thinking like. So normally for introducing citations into a manuscript we use in our papers and there's another one that's open source that people use that complicates things a little bit help. Because if I start a manuscript using a note and I give it to somebody and they want to add citations, they can't unless I share with them.

49:49

I had no library and they haven't noticed it on their computer, the same as if you have the same problem with somebody starts a manuscript and they use papers and the citations and you know, I don't have their papers. Library, of course.

**So what do you do when that happens?**

We usually just make the one we make one person in charge of citations and say, I'll go through and I'll just write answers to the citation, throw down the paper and be something like comments or track changes.

50:22

Yeah, I would say the biggest problem in writing manuscripts nowadays is they're not being a widely used open source, high quality citation software. And everyone is in.

**Is it difficult? How so?**

Buggy.

- 50:51 For one thing, it has every time they come out with a new version, it has new problems. And if you have to learn how to get around the problems and it's just a little bit clunky the way. The way the software works is a little bit clunky and there's a little bit of a learning curve to it
- 51:17 There's just other weird issues, too, for example my computer, I have to send it in because this screen has an issue, so I, you know, basically clone my computer on this one, but for some completely unknown reason. And you can't do that with a ... And so if you try to open a manuscript, as in no citations in it now with the site while you write feature activated, then it causes word to freeze up in there with some message that doesn't make sense.
- 51:50 And what do you have to do to stop that? Well, I mean, I had to do a Google search and it's really common problem. And people did a variety of things. Most people were uninstalling in there and then reinstalling it. But it turns out I can just turn off the site while you write feature. So and then a huge problem within the is that so the Siwa, you write features fine and good, but if you delete a reference, let's say there are like thousand steps involved in removing that information that you don't really see.
- 52:23 It goes away. But if you so the word keeps track of all those steps. So if you go to undo something, it's impossible. So if you just deleted a citation and then you're like, oh, wait, that thing I did two steps ago I want to do, it's pretty much impossible. Cause it's really like two hundred steps to do that. Even though you really did want to click to delete something, it's actually a thousand things that went on in the background.
- That sounds awful.**
- And yeah, yeah, I could go on all day.
- 52:53 **Yeah, unfortunately, I don't have any really good solutions for you. I recently did a mini study on collaborating with regards to documents and citing and so far, there's nothing that's perfect yet.**
- All right. Yeah.
- So when you're writing these papers and you're working with other people to write these papers, kind of describe what is the workflow or how does the communication.**
- So the writing process.
- 53:25 So if I'm sort of leading the paper is either a lead author or is the corresponding author. And I'm sure of sharing that responsibility of lead authorship with somebody else so that say I'm the CO first out there or corresponding author and there's another first author, right. For me, it's easiest to have somebody write a draft, sort of a rough draft, and then I edited it.
- 53:56 And then if if maybe there's another key person involved in that person, I might add. But usually we go through that process multiple times. And so there's kind of a linear fashion or do you sense if there's a third, if there's a third person, that person, at least in every instance I can think of, that person isn't going to see it as much.

- 54:22 It's going to be the two people usually going back and forth and back and forth and then it goes that third person, and then it might go out to multiple other people, people in the group before it actually gets submitted.
- So do you do it so that, like, only one person is making changes? So what do I track changes? And I mean, that's sort of the rule of thumb, I would say, is that you always when you're editing a manuscript between different people, do you track changes to that person and see what changes you made?**
- 54:52 Unfortunately. And, you know, if you were to look at, like this last paper, you know, we keep track of which draft on. And I think by the time this paper was accepted and all the revisions were made, we were on like draft 52 or something.
- Oh, my goodness.**
- And so there's a lot of going back and forth. And eventually there's way too much red and green and blue from all the track changes.
- 55:20 And you just somebody who will get to accept all the changes and you start to start fresh again back and forth and back and forth, and then eventually somehow change as you go back for the backboard or any challenges to this to this process. I mean, there's always the challenge of, you know.
- 55:44 People just have a tendency to like word things differently or explain things a little bit differently and maybe, you know, somebody does like the way you explain something or you don't like the way they explain something. But, you know, it's not so critical that you have to necessarily argue with them about how it should be done. And you just kind of accept that is not going to be the way you want it done.
- 56:10 But it's not necessarily OK.
- Just to clarify, when you're passing these papers around, is this email or Dropbox?**
- If it's between the two people that are really involved in it, it's mostly Dropbox, And between that third or the fourth, fifth, sixth, seventh person, you know, it's usually email because you don't really want multiple people accessing.
- 56:37 So this comes back to the sort of the Dropbox issue where you don't necessarily want multiple people being able to go in and access your manuscript and make changes to it and then having to keep track of who needs to see it and whose turn it is to see you and stuff problem probably maybe more people trying to open it at the same time and edit it and can really screw things up. So you do have to and I mean, that's one of the issues with Dropbox.
- 57:06 Everyone before is that, you know, it does happen often, but occasionally it is an issue where two of us will try to open the same document and make changes to it. It's not a big deal because then you just say it is a new version, but then taking changes, that other person may combine it with changes you made. That can be a challenge.
- OK, and then how do you it? Like, if you if you have this, there's two key co-authors who are using using Dropbox in the same editing, the same file essentially.**

- 57:39 **How do you coordinate between who has who has the file now and who will?**  
Usually sort of it's almost always like email, like a camera, you know. Make some changes to the manuscript today, too, so, yes, after 5:00 today or tomorrow, you can take a look at it and then the next day I'll take a look at it. And it is of that sort of level of coordination. Sometimes it's like you look at this morning, all of this afternoon.
- 58:12 We'll get a similar tomorrow sort of thing, you know?  
**OK, so do you think we are running a little slightly over? Sorry. I like to ask questions for you. If you can create or had some kind of hypothetical future technology that supported you in collaboration. What would it be or what would it do or what features would it have?**
- 58:42 Yeah. I mean, I can envision, you know, we're talking about Dropbox and everything. If you could somehow just move that whole sort of idea to not only online, but using online software. So like, you know, online word is getting stored in a cloud somewhere. And we're all sort of accessing it from the same point and having sort of more a more interactive type of system where you know, I can be sharing.
- 59:16 The two of us, two authors on paper, could be looking at the same time and just sort of like Skype or whatever, back and forth or some other version of chatting back and forth while we're both kind of making out to it and thinking things through as we go along. And both of our changes are getting saved into the same document. It's going up into the cloud, you know, that sort of thing. I mean, I can envision being really useful in some situations. Theoretically, Google Docs does that, but in practice
- 59:47 it doesn't really work, so I don't think I mean, it's going to take a long time, I think, before I'm willing to move away from word to do things.  
**Yeah, why?**  
Just curiosity. A lot of it just has to do with you know, comfort. But the problem is everybody uses word. Other people might also use the Google or whatever that is or, you know, or pages or whatever else. But everybody uses word.
- 01:00:15 And so if you do something in pages, you know, you go to or the Google Docs presentability is a problem, too. It might not have the same exact font or there might be some weird little formatting things and it starts introducing problems. So people are trying to make edits and one, you know, word processing software and you're making errors in a different word processing software that I mean, in every situation where I've tried to do that, I've run into problems, and especially when you're talking about citations.
- 01:00:45 So, again, it built into words and stuff. And I don't know if you can incorporate it into pages or Google Docs or whatever else. But so I think because it's just such the universal word processor. It's going to be hard to move away from it until there's some software out there that makes it completely seamless to move between word in that other software. Right, right.



01:01:12

For example, where you submit a manuscript, you know, there's a couple of different file types on except Google Docs and thought one of them, as far as I'm aware, in great situations. But I'll always accept the word document. That's a good point.