This is the 3rd of three optional modules in which I'm going to share a demo edit that I did of a students work in a previous course. This module is optional, but it may help you to see how I approach editing an entire essay. It will help, prepare you for the pure edits that you're going to do in a couple of weeks. So this paper was a biological paper, and what I'm going to have you do now is pause the video and read it over a couple of times so that you're familiar with it, before you restart the video, and I'll lead you through how I would approach editing the paper. So now that you've read the paper a couple of times through, you can see it's about a experimental technique that you can use to actually control cell behaviors. So it's a really cool technique. This is one is actually a little bit more technical than the last two demo edits that I did. The author of this paper has actually done a really good job of trying to explain all of the technical material. So every time he introduced a technical term, he tried to explain what that term was. So he's done a very good job. I think we can even go one step further in making this more understandable to a general audience who doesn't necessarily have a biology background. So especially if you weren't coming from biology, you may have found that you struggled a little bit to get through the technical parts of this. Because, again, it is a much more technical paper than the other edits that I showed you. So I think we can bring it one step further by removing a little bit of clutter and setting the things up a little bit so we get the pertinent details when we're ready for them. I think we can take it one step further to make it even a little bit more understandable. So that's what I'm going to focus on in this edit. Again, the authors done a really good job, and I think we can just take it one step further to make it a little bit more understandable to a general audience. So we want to jump right in with the 1st paragraph. So uh, has a great start to this paper. So it says, traditional methods for controlling biological signals and cells are a sledge hammer. That’s a wonderful picture, right up from front. And then the author says, they are global, slow and often non-specific. We actually don't need that. They are there, so I'm going to get rid of that. But then the global, slow and non-specific. The author starts with that, and then kind of ducktails off of that and says that The authors of this new paper describe a technique to do local, fast and targeted cells signaling. So that's a really nice contrast. The author set up a really nice introduction here. So I'm going to leave those 1st two sentences. I’m going to just change one thing in the 2nd sentence. So the authors of this paper, that's a little bit general, the authors of this paper, ,let's dive write it and say exactly what paper we're talking about in what specific authors in this 1st paragraph. So I said, but in a 2009, uh, paper in nature. So let's just, it is a nature paper, so let's just, uh, we can give that detail, and then let's use the author specific name, so let's cava at all. We’ll just pop that up here, I'll describe, and then I don't think we need there, I think a new technique, a new technique to generate local, fast and targeted cells, signaling and lives cells, so that works really nicely. This idea of genetically altered to have light sensitive proteins, I think that's a little bit too much detail up front, so let's move that down. I’m going to get there detailing back later, but we don't need it quite yet. In the introduction, we want to keep the introduction sort of big picture, so it's easy to, you know, to ease the reader into the story. So we get, um, we get this nice technique to generate local, fast and targeted cell signaling and live cells. Then we get a few extra details here that I'm also going to push down a little bit further into the paper. So they engineered a cellular perturbation system applicable to many signaling parties. That cellular perturbation system is just kind of argoning sitting there. It's a little bit hard to digest early on. I’m going to move that down. We’ll get those, I we'll get those details in back later. So, although those details are going to put back in in various spots in the 2nd paragraph, the idea that the signaling proteins have to be activated by a membrane, that's a very important detail for understanding this system. But I'm again going to move it down a little bit. We’re not quite ready for that detail yet. I think once the system has been described, then that detail makes more sense. So I'm going to push that down in the opening paragraph. What I'm going to add is I'm going to go to the very bottom of this paper to the last sentence. The offer is a great detail in the last sentence. So they show in movies that they effectively guided the direction followed by the new LaMelo podium, the 1st reported control of cell movement in real time using light sensitive proteins. And when I got to that, I thought, well, aha, that's one of the biggest, you know, most significant pieces of this work. So don't put it at the ending. Let’s put that right at the beginning. It’s a nice use of the dash, by the author there, by the way. So we're going to put that at the beginning. The author also did a nice job of using a coal in, So, uh, that's great. And, but let's get this idea right in here. This is one of the most significant things of the work. They actually control, the cell movement of us. So they controlled the movement of, a cell. They were able to force a cell to move in the direction they wanted using light sensitive proteins. So let's just say that right in the 1st paragraph, they reported the 1st control of cell movement in real time using light sensitive proteins. And so we can kind of introduce that idea of the light sensitive proteins being critical to this whole system without getting into too much detail yet. I’m going to get to that detail very quickly in the 2nd paragraph. Again, all of these details here, I'm going to incorporate into this 2nd paragraph, so I'm going to skip them for now. This stuff is going to get put into this paragraph, starting with this genetically altered part. So since we just named the researchers, I'm going to change this to the researchers. So the researchers. And let's instead of saying, built this membrane recruitment system, let's say genetically altered. So we'll start in with that genetically altered idea. Genetically altered cells to contain, and I'm going to say that genetically altered cells to contain these light sensitive proteins. Now, again, this idea of the membrane recruitment system, I don't think we're ready for that concept yet. I’m going to put that further down into this paragraph. So we'll get that, but it's going to come later. So the researchers genetically alter cells to contain photosensitive proteins named fidocrms. And actually, I don't need the word photosensitive here, because I just said in the end of the last paragraph, light sensitive proteins, which is the same thing as photosensitive, so we don't need to repeat that. And I'm also going to very quickly say what these proteins do, which is that they respond to light. So I don't need to use the word photosensitive, it would be repetitive here. So the researchers genetically altered cells to contain proteins named phytocroms. These proteins from plants detect red and near infrared light. OK, well, oh, they're from plants. These proteins are from plants. That's an important detail, ,but I can get that in right here by saying, uh, these the researchers genetically altered cells to contain plant proteins named phytocroms. And then we can just dive right into what they do, which detect red and near infrared light. This detail through the photo, I summarization of a bound Chroma for I think that's quite jargony and technical, and actually is not needed to understand this system. So I'm just going to cut that. I don't think we need that detail. So then let's jump into just exactly how it is that the phytochromes respond to red and near infrared light. So that's what the author does. In this next sentence, I'm just going to streamline this just slightly, So the idea is that the fido crumbs when they get hit with red light.They bind to a particular protein called the p if the Phytochrome interacting factor.When they are exposed to infrared light, they don't buy to that protein.So that's the idea, and I think we can say that just a little bit more quickly.So how about we just say, when exposed to red light, fido chromes, we don't need the pastry asked here, fido crumbs the idea that it changes confirmation, I don't think is important.I think we can just say that it binds phytochromes bind.We don't need the directly bind to a phytochrome interacting factor. We can just say, buying two phytochrome interacting factor P if I'm not going to let the author keep in this one acronym, because they do use this phytochrome interacting factor quite a bit in the article, and it is a little bit long. So, um, if that's the only acronym in the paper, will let that one acronym stay. So when exposed to red light, photochrom’s bind to Phyto from interacting factor. And then when exposed, I'm going to use a semi colon here. When exposed to infrared light, it's just a little quicker to say when exposed to you, ,rather than under a state of When they're exposed to infrared light, they release P-I-F,, rather than saying they don't find A-P-I-F-I think it's a little more active to say they release P-I-F-I like verb there. So that now tells you exactly how it is that Fido comes respond to red and your infrared light. So when exposed to red light, they buying this protein. When they are supposed to infrared life light, they release this protein. Right now, we're going to get into the a most important details of this system. So how does the system work? The scientists added a piece, uh, a domain to the final crime protein that they've engineered, so that it will stick to the cell membrane. So that's one key part. So the fido crumbs are therefore going to be located at the cell membrane. So we need that, uh, detail is important. The other detail that's important is that the scientists attached a signaling protein to this final chrum interacting factor.So that's the whole idea, and you can attach any signaling protein you want there.The important detail is that it has to be a signaling protein that is activated by interactions with the memory.So the system is going to bring that P-I-F into the membrane and bring that signaling protein into the membrane under certain conditions, ,when exposed to red light, and that's going to make the signaling that's going to turn on the signaling protein.So that's the idea, and I think the author's done a good job of describing it.I'm just gonna tweak a few things here.Uh? Since we,already said the researchers, I might go back to using the actual researchers name,here, just for a variety. So let le Ves get the wrong one.So the instead of the scientists, have a le vesket le- Lev Scava at al, added a membrane localization, ,rather than part I kind of prefer the word domain to the phytochrome, and attached a signaling protein to the PF.I don't think we need this to complete their system.I think those are just extra words.We can cut that. So that's the key.They They change the phytocroms in this way.They change the pia in this way.And the key to understanding this whole thing is what you have to know is that you need to bring the signaling protein to the membrane, ,and the signaling protein has to be any signaling protein that's activated by interacting with the membrane.So remember, I already got this idea in this detail here about the candidate signaling protein has to be activated by interactions with the membrane.I'm now going to introduce that idea now that we understand that the fighter crimes are sitting on the membrane.So I'm going to say the system works for any signaling proteins that are activated by interactions with the membrane.So I think we're ready for that detail now, because now, you see, oh, OK, because it's about bringing the signal and protein to the membrane. We weren't quite ready for that detail before.So I think now we've got all of those details in.So we can cut all of that material that was originally in the 1st paragraph.I've now brought it into the 2nd paragraph.We can, we can cut it because we've incorporated it.So now we know the system works for any singly proteins that are activated by interactions with the membrane.Then we get this a cell illuminated with infrared light.We'll have inactive, free floating pia attached signaling proteins.In other words, the signaling proteins will be floating around, they won't be on the member.Actually, I'm going to get rid of that whole sentence and just jump into that, sort of the off state.I'd rather jump into the on state.So the author goes, had described the off state, and then they're going to describe the on state, and then they're going to describe the offstate again at the end of this paragraph.In fact, I think we can just jump in and describe the on state and then describe the offstate, ,and we don't actually need that entire sentence, so we can just start right in on When the scientists points a red laser, ,I'm going to say, add the cell membrane, at the cell membrane, membrane bound phytocromes.So I'm going to get this picture across that these phytochrums are now sitting on the membrane.So I kind of like the idea of membrane bound phytochrome.So when the scientists points a red laser at the cell membrane membrane bound,, so we know that they're sitting on the membrane, phytochrums bind to piaf, thus bringing the signaling proteins, which, of course, are attached to P-I-F.We just said that the signaling proteins close to the membrane and increasing their activities.Since I just said that they need to be next to the membrane, rambrane to have activity,, it makes sense to the reader that if you bring them into the membrane, it will increase their activity.We're kind of now ready for that.So when the scientist points a red laser at the cell membrane, ,membrane bound fighter comes by to p if thus bringing the signaling proteins close, stay close to the membrane, and increasing their activity. And we don't need to repeat of this thing like protein.So that's increasing their activity. And then we get turning off the red laser frees, the proteins, and turns off the cellular signal.Notice how we don't need that whole sentence about, uh, that prior sentence about turning the signaling, uh, the cellulo signal off.So I think now we've streamlined this a little bit, so it's a little bit easier for the reader to to get through, and a little bit easier to understand what's going on here.So the author of this paper is done a nice job of organizing, by the way, because they put all the details about the system in the 2nd paragraph.In the 3rd paragraph, they put all the details about the experiments that were used to test the system.So we have a nice organization here.Again, for this 3rd paragraph, I'm just going to streamline it just slightly.There's a few places where we can condense things so we get it across to the reader a little more quickly.So to demonstrate the feasibility of this new technique, they focused on the signaling proteins.TM And intersect in actually think in this case, we don't need the more details about what the the precursors of the ro G TPA.So that's getting a little bit too technical.And in fact, I don't think you need these details to understand this whole section, so I'm just going to cut all of those and go right into to what TM and intersect.And do they have critical roles in, uh, organizing the act in skeleton?,So we can just jump right into that team and intersect in,which help in the organization of, well, instead of in the organization of which is a noun, let's say, which help,organize, act inside a skellant kit in during cell movement.So you notice that we didn't really need all those extra details, just knowing that these two proteins,that we're going to be attaching to Piaf, their,job is to help organize the act in,cytoskeleton during some movement. That's sufficient.Next day, author said they performed three main experiments.Actually, I can get rid of this three main experience thing and just fold it into the 1st sentence. Just to be a little more concise here, so we are already talking about the experiments of the 1st sentence.So what if, I just said, to demonstrate the feasibility of this new technique, they performed three main experiments, focusing on the signaling proteins.TM and intersecten. So I think we can fold that three main experiments into that 1st.And it's just kind of, again, cutting a little bit here and there, getting rid of clutter, making things a little bit more streamlight.Then what I'm going to do it for the next two sentences.So the author then describes these three experiments as nicely organize this as a very nice logical organization.So the the author goes to the 1st, the 2nd and the 3rd experiment.because, e.g. in the next two sentences, the author, in the 1st sentence, describes what was done in the 1st experiment, and in the 2nd sentence here, ,they described what was found in that 1st experiment.In fact, I think we can say it all in one sentence.We can just directly say what was found, and it sort of implied what was done.So try this the 1st experiment.Let's just go right into the not what they tested, but what it showed.The 1st experiment showed that membrane recruitment of a small part of intersect on and I intersected.And again, I don't think we need this detail about regulating ctc 42, that's not important here.So the 1st experiment showed that membrane recruitment of a small part of intersecting that transiently.So memory recruitment transiently increased local protein activity.That's what it's supposed to do.So that's kind of a proof of principle.And we don't need to know that they showed images.We can just say again what they found.The 1st one showed that memory and recruitment translate increased local protein activity.And then again, we don't need the detail about CDC four activities, so you notice we already get protein activity activities.So we can just get rid of that.And then we can say, and then that this effect disappeared a few seconds after turning off the red laser.To know, how does we get all those two sentences, we condensed them into one.The 1st experiment showed that membrane recruitment of a small part of intersectant transiently increased local protein activity, and that this effect disappeared a few seconds.Need an a there, a few seconds after turning off the red laser, so we get it all in one.We can streamline the 2nd the description of the 2nd experiment a little bit as well.So the 2nd experiment, let's go right into what it showed.The 2nd experiment showed that membrane recruitment of a small part of TM was sufficient to induce changes in the shape of these particular types of cells.And I'm just going to use that.I'm going to have a call in here, so I'm saying, uh, exactly what was shown.I'm going to give the details of what it was shown after the colon.So, uh, when they illuminated the whole cell with red light for 20 min Now, I've noticed we get a lot of details about they counted the le meli, le meli poodia.We can actually go right into what they've found.So I'm going to just say when they alluded the wholesaw with red light for 20 min almost 80% of cells made new Lamelli Podia.So notice how we don't really lose anything by cutting out they counted it's implied that they counted them right if we know how many there were.So we can just go right into that.When they alluminated the whole cell with red light for 20 min almost 80% of cells made new Now,, we need to define this word here, so I'm going to put back in that definition of what a Lamelli podia, that's these little act in skeletal projections on the mobile edge of the cell.So we need that definition. For those who don't know what that is.Now, we don't need to repeat under a red light treatment, so we can delete that.So you know how much we can cut compared with a ten, with 10 %.We don't need the A there with 10% of controlled populations.And I would take control cells here.It's okay to repeat the word cells.So when they illuminated the whole set with red light for 20 min almost 80% of cells made new Limelli Podia. Here's the definition, compared with 10% of control cells.And I think that's sufficient. And then we can jump right into this last thought.So they said, to make things even more interesting, I think we can streamline this just,slightly by saying even more interesting.In a 3rd experiment, they pointed a red laser dot on the edge of one cell and gradually moved it outward, slowly extending this red targeted region from the cell body.I think that's a really nice description, and,it's the good verbs there. I'm going to leave that as is.They show in movies that they effectively guided the direction.Uh, followed by the new lemon Lo podium.And I've already moved this detail up.I'm going to keep this coal in here, though, I was sorry, dash here and say, thus controlling, thus controlling the movement of the cell.So kind of summarizing exactly what's going on here, a little bit, repeating what we said at the beginning.But this is, uh, giving more details about exactly how they're controlling the movement of the cell.And then that's not quite enough to end on.So what I'm going to have the author ad here is add short We need a short conclusion here, um at a short conclusion.And what that conclusion to say is, what are other potential applications of this research?,So I'm going to go back to the author here and say, in the revision, I'd like to know I-I need kind of a concluding paragraph that gives me the wider implications of this work.So I know now that I can control the movement of a cell now with a red laser.What other potential applications does this system have?,I imagine there is a wide variety of potential applications that are pretty important here.So we need a nice conclusion that, uh says, exactly What are those other potential applications?,so I'm going to go back to the author and ask them to add that in, say, what are the other bigger, you know, bigger picture implications of this work?,How else might we be able to apply this?,What other types of cell behavior might we be able to control now that we have this system? Uh, other than that, I think the paper is now reading really well.We've streamlined it a little bit, made it a little bit easier to follow.The technical details the organization was already pretty good.I just moved a few of the technical details out of that 1st paragraph so that the 1st paragraph wasn't too intimidating for the reader.