Interviewer #1: Okay... So again, looking at this interface and the prior that you chose, which is written over there, you chose 3.99 and 0.7 and [inaudible] distribution. So could you walk me through what you did with the interface and how you decided to choose that prior?

Participant #6: Yeah, so let's see here. First off, I wanted to use you use this prior information that we had, so let's see... Indirect, right, average number of pumps in previous studies vary between 24 and 44 roughly. So I suppose I wanted most of the mass to be somewhat centered around that region.

Participant #6: The maximum number of pumps was 128 so I wanted there to be some support out to 128 even if it was quite small. But any support over 128 didn't really make any logical sense. So not much support is needed at 200 or something. Yeah. So I chose the T because the tails are a bit fatter. So it covers... I guess it's a little bit more of a conservative prior.

Participant #6: Yeah. So what I have here, that mass is centered around sort of those prior values from the studies. There is some support out to 128, not a whole lot. I guess I thought kind of at the end of the day, there's that saying and I think it was a Gelman paper that's actually titled this is the prior can only be interpreted in the context of the likelihood. So at the end of the day, you're not really sure how informative that prior is. It depends on the data. And so I think it's definitely something you should check afterwards. But I think as a first go, I think this would be a reasonable prior.

Interviewer #1: Yeah. So could you change the interface to the value that you said?

Participant #6: Okay, so change it to this?

Interviewer #1: Yeah, that 3.99.

Participant #6: Yeah.

Interviewer #1: Okay, cool. Okay, I see. So you said there were some probability out in the tails, but not much.

Participant #6: Yeah. So 128 was like about there. Yeah, there's some support there, but most of it is centered around these, the prior values.

Interviewer #1: So I'm curious to know how you arrived at this scale value. Could you talk a little bit about that?

Participant #6: Yeah I mean I guess I didn't want there to be no support. I didn't want it to look something like over here at 250 and 128, I wanted there still to be some probability of that. So I think this is again, a fairly conservative prior, like there's quite a bit of mass still here around 128 so it's possible. And if the data say it's... That's what it is, that's what it is. So I guess I erred on the side of being more conservative.

Interviewer #1: By conservative you mean more permissive?

Participant #6: Exactly, yeah. More diffuse, not just using exactly what the prior information was and just, you know, having a steep drop off after that because there could be many scenarios where that data was collected under one set of circumstances and this other data was collected under some other set of circumstances that were controlled for. So I guess you never know what you might get.

Interviewer #1: And so the other question is, how did you determine this prior fits into that range of like... You said that you consider the range of value is 24 to 44, how did you determine that this fits into that?

Participant #6: Well 24 to 44 is sort of around here. The, I guess mode is sort of centered in that region. So there's quite a bit of mass in that area. So I think it's reasonable.

Interviewer #1: Okay. I guess we can move on to the next one.

Participant #6: Okay.

Interviewer #1: Again, like the same thing. So prior that you chose was over there, how did you decide? Yours was very much zero, 0.02. You don't need to be exact, I think it is roughly distinguished.

Participant #6: Okay, so this was the mean difference parameters. So the effect that the hand placement had on the pumps, was that right?

Interviewer #1: Mm-hmm.

Participant #6: Okay. Yeah. Again, I chose the T because it had fatter tails. You know, you never know what you're going to get. So I guess, maybe it's more reasonable to give at least some weight out to those tails. I started it at one X because that's sort of the null, that hand placement has no effect and I wanted to make sure that if for some reason it had a very strong effect, that the prior wouldn't be restricting that posterior.

Interviewer #1: I see. So I guess more on the scale parameter, so what do you think of the value that you've chosen as a scale and how do you think that would affect the prior?

Participant #6: How would it affect the posterior?

Interviewer #1: Oh, sorry. The posterior.

Participant #6: Yeah, I mean I think it just depends on the data. If the data are very informative then this might not make much of a difference at all. It'd be insensitive to the prior, largely, or if they're very not informative, I guess it's going to look like the prior... I guess it just depends on how informative the data are. But I think this prior, you know it says that even these, what I would consider an extreme effect for X has some amount of a non-negligible amount of a possibility.

Interviewer #1: And so, I mean to understand, you wanted to have some... So based on your prior, you expect that there might be a possibility that there is four times in effect?

Participant #6: There is a chance. I think that's rather unlikely, but I think that we can let the data tell us that. Yeah, the mass is certainly centered on one because that just, sort of the knoll. Yeah and it could be that there is a four X effect. It seems unlikely to me, but I think there should be some support, a non negligible amount of support there.

Interviewer #1: Interesting. I guess the other question is like, did you have any problems while interacting with this interface? Did you face any challenges or difficulties or was there any information that you would have liked while choosing D prior that was not provided to you?

Participant #6: No, I thought it was nice. It was on the response scale here because sometimes you have to do some mental gymnastics about you know, what a prior actually means. So I think that was helpful. I don't think there was anything that was missing here. Again, I think I keep going back to the data thing. You know, you only know how informative your prior is after you fit the model. So I think checking the overlap between your prior and posterior is always helpful. It should be done just to see how informative that prior actually is. But no, I think this was pretty straightforward.

Interviewer #1: I see a lot of your choice of priors for this study is also seems to be influenced by what sort of priors you choose for your work. I mean, this is a very broad question I guess, but is there any sort of principles that you stick to when you choose priors in your own work?

Participant #6: Yeah. So I'm an ecologist so I try to think of what is biologically reasonable and I try to make sure the prior has support over those regions. You know, you might say like, oh well anything is possible. But yeah, I try to use my best judgment as a domain specialist to choose my priors I guess. And sometimes you don't really know and maybe you keep it more of a diffuse prior and at the end of the day, checking to see how much your posterior prior overlap I think is always helpful for trying to understand how your prior choice impacted your posterior.

Interviewer #1: Interesting. I guess we can move on to the next page.

Participant #6: Okay.

Interviewer #1: So this one takes a while to load because it's loading a bunch of data but I can start talking about... So the first visualization that you would see is the density, but it's not on the response scale. It's on the parameters scale, so it's on the log scale. So I guess the question is, if you could interact with it and look at the information that is presented and tell me if it would affect your decision in any way or affect your choice or priors in any way, and how you would be using this information, if at all?

Participant #6: Okay. So this is the same experiment and this is just the prior of the parameter scale and not the response scale.

Interviewer #1: Yes.

Participant #6: Yeah. Very hard to interpret for me. You know, doing mental gymnastics here about like, oh, what does this mean? Yeah. I don't think it's very useful for me. I think I'd have to transform it and look at it on the response scale for it to beat this one.

Interviewer #1: I guess if I just requested... If you were to see this visualization, what prior would you choose? What kind of [inaudible]

Participant #6: Oh God. I guess, yeah, I mean what I would do in my own work-

Interviewer #1: If you would need any calculations, then I can just quickly give you the values, but I'm just curious.

Participant #6: Yeah, sure. What is three on the response scale here?

Interviewer #1: So exponential of three is... It's like 20.

Participant #6: Twenty, okay. What is four?

Interviewer #1: That's 55.

Participant #6: Okay. So most of the mass is here, I guess are in one. And what is five?

Interviewer #1: Exponential of five. It's 148.

Participant #6: Okay. So... Yes, maybe something like that, I would say [Normal(3.6, 0.3)].

Interviewer #1: Mm-hmm.

Participant #6: Yeah, I don't know. Maybe something like that. That's definitely more difficult.

Interviewer #1: You've changed your priors a little. Could you explain what was the decision making behind that?

Participant #6: How I arrived at these particular parameters?

Interviewer #1: Yeah.

Participant #6: I mean I guess I wanted the weight again to be centered around those values from the prior studies. I wanted there to be some support after 128 you know, certainly less support. Yeah.

Interviewer #1: And could you contrast this prior to the one that shows in on the response scale? What do you think?

Participant #6: Yeah. So yeah, I guess it's a little bit hard to interpret here, but it somewhat analogous, I guess I'd be curious to what it looks like transformed actually.

Interviewer #1: You can just scroll down to that. If you set the same prior on this one, you'll see what it looks like on the response scale.

Participant #6: Okay, so that's a little bit different than I had before. So there's a little bit less support out of 128 than my prior one and a little bit less support at zero. So it'd be a less diffused prior there, which doesn't really surprise me that I, that I didn't get it exactly right. Yeah.

Interviewer #1: But which prior would you rather choose? Would you rather choose the less diffused one or the more diffused one?

Participant #6: I suppose I'd rather choose the more diffused one. Yeah.

Interviewer #1: Interesting. Okay, cool. Let's move onto this one. The prior predictive probability density. So just to give you a quick overview of what this is doing, it's calculating the prior predictive probability density and assimilating 20 hypothetical experiments and what the density would look like for each of those experiments. And so we fix [inaudible] in difference parameter, add zeros, so no difference. That's why the two conditions are overlapping and so when you change the prior, it's just changing the prior on the intercept.

Participant #6: Okay, got it. So what should I do here?

Interviewer #1: Again, like if you could interact with it and look at the information that is presented and think about how if at all, you would use it.

Participant #6: Yeah, I think here it'd be helpful if the X axis was fixed. You want to visualize the whole range of values, but... Yeah, a little bit hard to get a sense. But I mean this is somewhat what I had before. Maybe just a little bit different here. Yeah. So I don't know if this is useful in this case beyond just the prior, right. If the condition is fixed.

Interviewer #1: Yeah. What do you mean by that?

Participant #6: Well, if it's just the intercept, this... Okay, I guess what is this giving us beyond what just a prior would give us?

Interviewer #1: I see, it's almost showing the predictions of what kind of values would you expect. I mean, you could just think of it as like what kind of values you can expect in the control condition based on your model.

Participant #6: Yeah, I guess I just feel like these are different realizations of this, but since there's no, you know, in this model since it's a Poisson and there's only the one parameter... The prior on alpha, that's... Yeah.

Interviewer #1: Okay. I see.

Participant #6: So I think it's useful to see the spread in the different realizations of the data here. But I think if I was... Yeah, I don't know if it's contributing a lot beyond what the prior for alpha is already giving us. I could see there being cases... I don't use prior predictive probability at all really. I probably should. And I could see if there were other parameters in there that were affecting this one. Maybe it'd be more useful, but yeah.

Interviewer #1: I see. And I'll just request you to contrast the students T with the normal and see if you can-

Participant #6: Oh okay.

Interviewer #1: ... find any differences.

Participant #6: Yeah, I get the X scales changing here, but I imagined the students t is a wider set of values. So this drops off a bit before 100 really. Let's see... Yes, it's kind of hard to tell because of the X-axis switching a bit. Let's see here. Maybe this will be more... In this case, the student's T is dropping off a little after 50. The normal is... Oh well that's a different parameter.

Interviewer #1: Oh yeah, it refers to the...

Participant #6: Oh, just put it here. Seven out of 20, not much to be honest.

Interviewer #1: That's [inaudible]

Participant #6: Yeah, I don't know. It's kind of hard to tell. I imagine just like from what I know about these two distributions, that the T would have support over a larger set of values than the normal, or would have more support over each of the tails compared to the normal. But yeah, that's a little bit hard to tell.

Interviewer #1: Oh, looking at these two distributions, like would you change your prior in any way or do you keep it?

Participant #6: No, I think I'm happy with the... Yeah, I don't know if it will take this effect.

Interviewer #1: Okay. So I guess let's move onto the next page.

Participant #6: Okay.

Interviewer #1: Again, just takes a while to load, but this is the last page.

Participant #6: Okay.

Interviewer #1: So this is exactly the same as the previous one except that you're looking at the beta parameter, do you mean difference parameter?

Participant #6: Okay.

Interviewer #1: So once it loads, so we'd do the same thing. Look at the parameter on the parameter scale. Did the city of your prior and if you could like look at the information and tell me how are you reading it and how would you use that information if at all.

Participant #6: Okay. So this is on the parameter scale of that beta parameter. Okay. So zero would be no difference. And two, what would two correspond to? So exponentiate two. Well, I imagine this is something around four X over here.

Interviewer #1: Part two is, yeah, I think five or six maybe.

Participant #6: Oh you do the twos, five or six, seven. Okay.

Interviewer #1: It's seven. So I guess as you're interacting with it, what are you thinking?

Participant #6: Yeah again, like the same train of thought I was going through before. I want to give some support out on these maybe what I would consider more extreme values. My preconceived notion, maybe it's incorrect, is that four X should be a very large effect. So I want to give some support for that. Seven X seems like kind of a ridiculously large effect. So maybe very little support at seven, but something like four or five.

Participant #6: Yeah, maybe leave with a little bit more support there. Again, I think this is a fairly conservative diffused prior. Yeah, I imagine this would match up somewhat to what I had put before, but maybe that's not the case.

Interviewer #1: And would you still choose a student's T distribution or would you choose the normal? What are your thoughts on that?

Participant #6: Yeah. So I think that maybe the T would be preferred because it's more fat tailed, more mass to those more extreme values. At the end of the day, it might not make any difference depending on the data. But yeah, I think maybe the T would be preferable because it's giving more support in the tails.

Interviewer #1: I see. Okay cool. So I guess we can move on to the... I guess like one other question is could you contrast this prior visualization to the one on the response scale, which is the one you're looking at right now?

Participant #6: Again, I think the response scale is a lot more interpretable

Interviewer #1: I see. So I guess another question is like... So I've noticed that you said more diffused priors when you're looking at the response scale visualization versus the one when you're looking at the density on the parameter scale, could you explain? I'm pretty concerned about that.

Participant #6: Yeah, I don't think it was intentional. I think that my reasoning, it's just hard for me to think about things on the parameter scale. Yeah. It's a lot easier to see what those parameters actually mean. In this case, not biologically, but I don't know, psychologically. But they mean, in reality. Yeah. Not just some numbers.

Interviewer #1: I see.

Participant #6: It's kind of hard to transform that in my head I guess. So the response scale is helpful.

Interviewer #1: So I guess you would around this side of setting more diffused priors and that is easier on your response scale?

Participant #6: Yeah I mean, I think setting priors period is easier on the response scale because you know what they actually mean. Yeah.

Interviewer #1: Okay. So yeah, this is the last two visualizations that we have. This is again, the prior predictive probability density. And so this time, we fixed the intercept at 3.5 so that is... 3.5 it's around 35.

Participant #6: Okay.

Interviewer #1: And so we're just changing the beta parameter.

Participant #6: Okay. So this would indicate that we thought that when people had an expansive posture, they would have many fewer pumps. This would be the opposite and this would be more diffused to be more formative. I think this is helpful here, more helpful than with the intercept because you can not only see the realizations that's here, but you see the difference between these two groups.

Participant #6: So again, the null here so to speak is that there's no difference between these two groups. I want it to allow there to be a difference between these two groups. They're being fairly diffused, although it is a little bit difficult to think about. Okay, well what does this mean? Like a one X effect, two X effect.

Interviewer #1: I see.

Participant #6: Yeah. So maybe in that sense it's a little bit hard to interpret... Yeah, because I guess in some ways, it's a little bit hard to interpret because I don't know exactly what to think here. So the intercept is 35, this would sort of give support for... Yeah, I'm curious how similar this was to my other one. So this is 0.04, 0.82, okay, so it's about the same location, but the scale is a bit different. So interesting.

Participant #6: 0.42. Right there. Okay. So I said a much more diffused prior using the prior predictive distributions. Yeah, which I guess makes sense. So if it was centered around 35, one could be 20, now there could be 60 if three X effect. Yeah, I guess it's a little bit hard to to think about that transform in my head, but... Yeah.

Interviewer #1: Okay. So I see, so what you're trying to do is again, think in terms of the response scale and what the beta parameter would be in the response scale and this visualization is making it difficult to do that.

Participant #6: Well. Yeah. I guess I was thinking about the actual beta parameter itself, like what that means in terms of you know, one X two X, that sort of thing. You know, I think it's helpful certainly in seeing that the constructive and the expensive overlap here. So essentially the no effect of hand position is... That's where you're centering the distribution here.

Participant #6: The scale parameter for the distribution. Yeah, I mean, I suppose what I said before, it could be all the way out to 128 pumps. So maybe it would make more sense to set it something like here where there's some support but not very much. For the majority, most of the time, these things are going to fall in this range.

Interviewer #1: I see. Okay. And do you have any thoughts on what distribution you would choose, like student's T versus normal?

Participant #6: Well, I mean again I think that students T with a little bit fatter tails might be a better choice. I will admit that in my own work I usually choose a normal just out of habit. Maybe it would be a better choice to choose a T though because you know, you get a little bit more support in those tails. You can always do some sort of sensitivity analysis or check the overlap between the prior posterior again. But, yeah.

Interviewer #1: So yeah, it was interesting you mentioned like in your own work you use normal, is the reason you're erring on the side of students Ts because this is a domain that is not very familiar to you?

Participant #6: Well, you know, when you're given the two options, I think it's like, oh, well students T would be better because there's more support in the tails there. But I think maybe choosing the normal is a habit more than anything. So yeah, I do it out of habit, familiarity, rather than any sort of real logic.

Interviewer #1: Okay, cool. So yeah, we're almost done here. I just have a few other questions to wrap it up. You mentioned doing sensitivity analysis. Could you tell me like how you go about doing that?

Participant #6: Yeah, you could fit your model with one set of priors, fit your model with another set of priors and see if it changed your results much. And if it didn't then maybe it's pretty insensitive to your prior. I think the easiest thing to do though, without having to rerun your model, which might be just prohibitively computationally expensive, you check the overlap between your prior and posterior.

Participant #6: So the percentage overlap between those distributions. If there's a lot of overlap, then you know that your prior was quite influential in your posterior distribution, which might not be a bad thing, but it makes you think about whether that prior should be so informative or you should make it a bit more diffused. So I think that's quite helpful for me.

Interviewer #1: So I guess finally, in your own work, when you choose priors, what information do you consider and what information do you find helpful?

Participant #6: Yeah, so I think again, domain knowledge comes in here, so what is biologically reasonable and fitting something that has support over the region that seems reasonable. You know, many times kind of regardless of the field, when we're fitting slope parameters, they tend to be quite small. So putting a normal prior with a super huge variance of like a 1,000 or something just doesn't make sense when you're reasonable slope values, at least for the kind of work that I do, tend to be negative 10 to positive 10 would be a pretty wide range of slope values. So, yeah. I think the domain knowledge really comes in here.

Interviewer #1: Also, what kind of models do you usually fit?

Participant #6: Typically, hierarchal regression. That's most of what I do.

Interviewer #1: And have you faced any challenges in determining priors for these models or do you just... ?

Participant #6: Sure. Yeah. You know, especially when it comes to, for computational reasons, having too diffuse of a prior, sometimes can make your model kind of freak out. Maybe you're getting divergencies in stan or something. Or it might increase the runtime. So you want to have smaller priors for computational reasons, but you don't want that to unnecessarily impact your posterior distribution. So I think that can be a challenge sometimes and it's a challenge to interpret those priors of what it means to be biologically reasonable sometimes in some of these models.

Interviewer #1: This is the last question. So if you encounter any of these issues, how do you go about resolving them?

Participant #6: Yeah. Again, looking at the prior posterior overlap, I think that's quite helpful to see, you know, how informative that prior is, and can I justify to myself, my choice of that prior, or should I go back and make it a bit more diffused? If there's a low overlap, then I feel pretty good about it. Or if I do a sensitivity analysis and there's not really any reasonable change in my results or my conclusions, then, I'm okay with it. So that's generally the approach I would take.

Interviewer #1: Okay. Cool. I don't have any other questions for you? Do you have any questions for me?

Participant #6: No, I think it's a cool project though, and I'm happy to help out.

Interviewer #1: Great, thank you. So thank you so much for first, participating in survey and giving us more of your time to do this interview. This is really helpful. This is a lot of great insights that we really appreciate your help.

Participant #6: Cool. Yeah, no worries.

Interviewer #1: Right. Thanks. Bye.

Participant #6: Bye, see you.