PROFESSOR: We're going to start with the discussion portion, just to give a little context to the reading that we've been doing. I am a big fan of having designers think about artifacts through the lens of criticism every now and then, and I have a background in games criticism. I did that for about 10 years in parallel with my illustrious academic career when I was still in Sweden. So I also teach games criticism to unrelated students here at MIT.

And when it comes how to do critiques of interactive artifacts, there's still a lot of uncertainty about how to best do it, and how and why it needs to be different from criticism of film or literature, or any of these things that we've been doing analysis of since for it. And one of the approaches is a method called interaction criticism. It's not specifically designed for games or playful interactive experiences, but just interactive, non-production-related artifacts in general.

And the things we've been reading today is, one, from the originator himself, Jeff Bardzell. So we're trying to give an introduction to the method and the theory behind it. And the other one is him and two other interaction design and media studies scholars trying to apply interaction criticism to a particular cultural artifact, and through different senses and seeing what they come up with, and whether that's interesting and fruitful. So with that said, let's start with the one called *Interaction Criticism, an Introduction to the Practice,* and put keywords on the whiteboard.

OK, so maybe we want to start with-- it doesn't matter which one of these-- but subjective. Who put that there?

AUDIENCE: Hello.

PROFESSOR: OK, hello.

AUDIENCE: OK, so one of the interesting things from this paper I noticed is that when you talk about criticism, it's someone's judgment on a thing, and that judgment can often be subjective. And so a lot of the discussion in this paper is reconciling the clearly subjective nature of criticism, but in a way that, they say, is judgments that are subjective, but non-perspectival. Is that how you pronounce that?

PROFESSOR: I think they probably just made up the word, so it's your call.

AUDIENCE: I know what they mean, which ties into perspectives. But the idea is that the judgment itself comes from, they focus on critics that are experts in their fields, and the judgments themselves come from experts who know about many similar types of interaction, I would say. I don't want to say games, because it doesn't say games.

PROFESSOR: Yeah, no, it clearly sort of skirts. So just to interrupt a little bit. Specifically, [INAUDIBLE] is one of the people who are applying it in the second paper, has said that the only professional practice of interaction criticism is games criticism. We don't have any other sort of interactive art form that's sort of strong enough to have people get paid to do this kind of criticism. So for better or worse, that's kind of what we have to look to as an example.

But especially Bardzell, I think, it's very critical to how games criticism is currently done, and thinks that there's a lot to learn from other critical practices, and he comes from a background in those areas. So yeah, he's not going to talk about games, but they're sort of hovering in there.

AUDIENCE: And he also mentions, I guess, also that they're not talking about amateur critics, like the people who go on Amazon or on Steam and rate whatever they want to rate. Because that could be subjective but very based on that person's own experience without trying to see things in a broader context.

PROFESSOR: So to begin with, what do we think of this idea of a somehow more rigorous objectivity?

AUDIENCE: Yeah, that's [INAUDIBLE].

PROFESSOR: Reflections on that? Yes?

AUDIENCE: I put aesthetics. And so it's very similar to what we're talking about right now, which I find that, throughout the readings that we've been doing, design is in the middle of science and art. So a lot of times there's a temptation to do things very scientifically, but that fails when aesthetics come into play, because they're very subjective. And so that's why we need criticism. That's what they're kind of saying.

PROFESSOR: Right, so we don't have a choice but to rely on our subjectivity , because there's no other rules given to us for how to evaluate this kind of stuff. It's not just describable. That misses some important point. By the way, I would say that Bardzell doesn't think of design as something in between science and art, but rather something distinctly different from both. So he wants it to be its own thing. But yes, clearly, all the sources that he is borrowing on when he's creating this method coming from one or the other, so there's that.

But yes, and those were the word pair I was thinking of, when I said we could start in either end. But then what goes into this expertise that he talks about how? Do we justify that someone's subjective opinion of something is more, weighs heavier than someone else's? What makes up for the difference between a critic and someone on Amazon?

AUDIENCE: Well, knowledge about the field and having a very broad experience, and I guess the people who you are critiquing, or who are reading the critiques, knowing that you have that broad experience. Someone that got an espresso machine off Amazon might leave a terrible review being like, oh, it didn't just instantly make me coffee, one star, because they don't understand how the espresso machine works, or what the different grades might be, or how any of the different pieces of the process work. Whereas the critic who will have value behind what they say understands the whole field, and how this helps, and what place it has, and what the context of it, and like other good works in the field are.

PROFESSOR: Right. So a good example, so this is one of those things that are often highlighted in design educations, and I probably have said the word a couple of times during the semester as well. So the way we educate ourselves in design is often looking at what has been established as good examples. And they're good just because someone decided they were good. There's nothing in nature determining that they're good other than ourselves and our community, but that has an important role, I would say, within games criticism.

There's nothing that speaks as loud as having this almost data-based knowledge of the history of video games when you get interviewed for writing for a website or a journal, or something, magazine, I should say. That's what they question you on, do you know about this and that, and that is the most important criteria for whether you're going to get the job or not.

AUDIENCE: It's, do you know the history?

PROFESSOR: Yes. And that is one of the things that Bardzell would say is the problem with games criticism. What do you think could be potentially an issue with that kind of filter for who gets to be a critic?

AUDIENCE: I'm not playing games to know the history of games.

PROFESSOR: Right. But yeah, they actually expect you to not just know it, but have played it. So the most well-played, if we can make up a word based on well-read, so the most well-played people tend to get the jobs as critics. But is there a problem with that? And what would that-- and now we're sort of off the paper already, but we'll get back to it.

AUDIENCE: There's sort of a disconnect between someone who has played a lot of games, with someone who has played no games.

PROFESSOR: Yes. But, yes.

AUDIENCE: Well, I mean, it was a good point. It would be difficult for the folks who played a lot of games to be able to even translate their thoughts to someone who's never played those games.

PROFESSOR: Oh, that's what you were saying. So yes, you will be a little bit like, let's say, a jazz critic that just listens to--

AUDIENCE: Coltrane.

PROFESSOR: Well, not even-- Coltrane is for the masses. They're beyond Coltrane. They might be talking above the heads of most people, so there's a disconnect with the audience. So that might just make the criticism very insular and not really sort of reach the audience who might be interested in evaluation of these cultural artifacts. So that, I think, is a very good point. Anything else along those lines?

AUDIENCE: So what a fix to accommodate for that be to ask for a writing sample and actually judge whether or not that person can communicate at multiple levels of an audience?

PROFESSOR: Actually, the most important skill is not being a very knowledgeable gamer, but being a good writer. Because without that skill, you get nowhere. And no one's going to read you, basically, because you write like a robot, or something.

AUDIENCE: Actually, I want to say even the converse might actually be true, of trying to look for people who don't sort of toe the line of traditional game criticism and become a lot more sought after and invited now. So folks who are expressly stating opinions from or analyzing games are coming up from the lens of something that's not like traditional games criticism. It seems, in this click-hungry media landscape, seemed actually to be a lot more interesting to read. So they're good writers, and they're bringing a new perspective.

PROFESSOR: And I think for, among other things, one important reason is that there is an existing hegemony around the field of what a good game is and should be that may be based on assumptions about gender and culture that should be questioned. It might be white men writing for white men, basically, of a certain age. And if we think, especially back in time, playing video games, having grown up playing all these games on all these consoles implies a very strong privilege when it comes to finance, your family's finances, for instance.

Consoles used to be, I mean, they used to cost the same as they cost today. Games used to cost the same as they cost today, but that was a lot more money in the '80s and '90s than it is now. So someone who had access to all of the existing home consoles was probably a rich kid. So those were the ones who became reviewers and decided what a good game is. So there's something about looking to those good examples that could also need some questioning, and we might need to break with those traditions and look at other potential values in interactive artifacts as the ones that we are creating, those that are maybe more inclusive, or taking other skillsets to heart, rather than just excellent hand-eye coordination, or whatever it is that makes a good gamer.

AUDIENCE: Before we leave this, just one more angle I want to bring up, which is, even if you were expressly looking for people who state that they have a long history with games and can bring up this catalog, which history, right? Because in games, or even digital games, and extend it out to non-digital games, to board games or tabletop and sports, then it's like each country, each region has its own history, and people consider different things canonical.

So a lot of American white men writing for white boys pretty much have a fairly lacking experience of Eastern Bloc games, even games that were released in Asia, for instance. Only a few Japanese games are sort of re-released in America. And they think that's all of Japan, right? And it's like, no, that's not-- that's part of Japan, and not even all of Asia.

So that would be an example. That will be another problem, is that you assume that a long history implies a comprehensive history. But no one really has a comprehensive specific history with the entire world's history of games.

PROFESSOR: And that criticism has been put towards design studies, as well. I mean, we are reading three white men of a somewhat certain age here today. So they are, to some extent, myopic, as well, when it comes to cultural values in these artifacts. And I was thinking maybe we can get back on track by inviting whoever put perspectives on there.

AUDIENCE: It was me. They were talking in this article about the four perspectives of, was it the designer, the user, where they, like the--

AUDIENCE: Artifact and society? Artifact and society?

AUDIENCE: Yeah. It was sort of what I was talking about before. It's like someone who is very well-played is going to have a different interaction with the artifact, compared to someone who does not play a lot of games. You have to consider a lot of different perspectives, and it's very easy to get stuck. And the idea is, you get stuck in one. A creator can't see their own problems, a lot of the time, which is why you need criticism. And the criticiser doesn't have the perspective that the creator does.

PROFESSOR: So that's, I mean, one of the reason we have criticism is to try to improve whatever field we are critiquing. So it's supposed to be a help for the designers to see things that they can't see themselves, as well. And what I would do, if this was a longer class, I would have you write up critiques of each other's work. But we're just, we have so much work to do, so we don't quite have time for it. So I don't want to sort of burden you with that. But it is a very interesting exercise, because you instantly see that people see things in the thing you've been making that you didn't see yourself, and you thought you saw all of it, because you're so engaged with it.

This is also something that breaks with tradition of old-school literary theory, which used to be very heavily focused on artifacts. So you wanted to just look at the text and see what the meaning of the text really is. It comes from religious studies of trying to figure out what the Bible is telling us to do, or something like that. But that was what the academic study of literature used to be, as well, what is the author's intentions with this text, and try to sort of just reverse engineer.

Nowadays, we read, and we can talk about all kinds of artifacts as texts. It seems a little weird to do that, call a game a text, for instance. But if you think of the Latin origin of the word, which *textera* basically means more like a texture, like something that's woven together, then it's easier to think, talk and think about things as texts other than written words on a page.

So when we interpret texts, now, through interaction criticism, for instance, we very much take into account the context it is used in. Because we think that there isn't just one meaning of a cultural artifact. It actually changes meaning depending on who is interacting with it, and under which circumstances. And that is something that has changed literature studies, as well, the idea of it being someone encountering the text, which you can hear in the name of reader response theory for instance, which is, it's not just about what Shakespeare meant when he wrote the text. It's about how a reader now can respond to a text like Hamlet that is of interest.

So this is very much based on that tradition of, we are doing a reading not just of the artifact itself, but the context of use and the identity of the user, and so forth. OK, so what you have left, let's talk about a little bit about balance.

AUDIENCE: So I put that up there, and it was mostly about, he was talking about how, with the criticisms, there's somewhat trying to strike this balance between historical context, cultural significance, and technical descriptions, and how do you, so how do you balance the different elements that you should be looking at? Because these are all different lenses that a different person might evaluate through differently, especially based on what field they're in that is not interaction design, or interaction criticism for design. But scientific design is very much of the, how this was done, or [INAUDIBLE], how was this done, empirical facts. And so there's a lot about different ways to focus those designs, to focus the criticism based on the different aspects that you can be trying to evaluate through.

PROFESSOR: And that is what, I think, for Bardzell, that is one of the things that creates the need for interaction criticism. Because that's somewhat alien to someone who is doing criticism of movies or literature. To them, it's perfectly fine to look at it as just something that is being evaluated for its aesthetics, end of story.

Well, when we evaluate a game, let's say you're driving a car in the game, and the steering works very poorly. It's just, there's a usability issue there that's very similar to when we evaluate cars. So if the steering is bad, that's going to affect the quality of this kind of artwork thing, but it's a very sort of usability-centered thing. So games and interactive artifacts live in this weird space where these things come together, and all of them matter.

So some of it is just matter-of-factly, this steering wheel is bad, while some of it is like, the scenery of the car ride in this game evokes emotions, a lot of that. So to me, it's what makes interaction design cool, because it has all of these very different qualities to it, and they can be foregrounded or sort of be more part of the periphery. But they all have to work in concert for an interaction design for the unity, or organic unity of it, as Bardzell says, to click. OK, so I guess we just have framework. So let's do that one as well, so you don't feel left out.

AUDIENCE: Yeah. I put framework, because this article is a lot about developing a way to criticize interactive material. And I think it mentions how it's about developing skills that enable people to think about interaction. And so that's why I thought framework was a good word.

PROFESSOR: Right. I mean, that's what he's doing here. So it's a somewhat ambitious project to sort of establish, starting the establishment of a framework that goes outside of the tradition of HCI, which is much more usability-focused, on and without losing those qualities, still capturing the things that sort of fall through the net of what that type of criticism or that type of evaluation captures in an experience. OK, are we ready for paper number two, looking at the actual application of interaction criticism?

AUDIENCE: I've got a question.

PROFESSOR: Yes.

AUDIENCE: What's the difference-- so there are-- correct me if I'm wrong-- there are car critics, right?

PROFESSOR: Yes.

AUDIENCE: There are people who review cars professionally.

PROFESSOR: Yes.

AUDIENCE: What's the difference, would that be considered a form of interaction criticism of design?

PROFESSOR: Right. So I think that, to Bardzell, it doesn't.

AUDIENCE: It's not.

PROFESSOR: No. Because the focus is so much on the usability aspects.

AUDIENCE: Not on, like, the interior.

PROFESSOR: Right. I mean, we do sometimes see that kind of approach, where someone is sort of trying to focus more on the experience of a car, or something like that. And that's when it starts coming closer to that line. So he talks about, not in this paper but in another sort of parallel paper, he talks about interior design and things like that, that there's definitely touch points. And when we start talking about stuff like the sound design, what sound a car door makes when it closes, that's very carefully designed nowadays. And that is part of the aesthetic experience of the car.

AUDIENCE: So just going back to balance, there could be a-- one-dimensional, might be two, three dimensions, but there's aesthetics on one side, and usability, technical details on the other. And car critics fall much closer to the technical usability side. Interior design falls much more towards the aesthetic side.

PROFESSOR: Right. But interior design, so maybe it's not a line. Because interior design, interior design critique is still very far from traditional literary theory. So maybe it's some kind of weird polygon. I don't think it's even a triangle. But yeah, it's a field where he sort of tries to visualize some of the--

AUDIENCE: Oh, yeah, the seven values.

PROFESSOR: Right, but maybe not necessarily all of them. I don't think he tries to be comprehensive of what that space looks like. But I feel like the paper is still written as a critique of HCI study. So that's the one he wants to focus on, like you guys are missing things when you decide what gets accepted to Chi, or something.

AUDIENCE: But that's the context of why he's publishing it, right, is interacting with computers, in part, is the magazine, or is the journal. And I'm curious about that other people that you're describing, because you're talking about interior design. I'm thinking there's got to be architectural criticism that's a fairly well-established field, and the only difference that I see between what he's arguing in architectural design is the use of computers in his what he's describing. We're talking about concrete, and steel, and wood, and other kinds of materials, but everything else, architecture is just as interactive as anything built by interaction.

PROFESSOR: Right. The outside of academia professional core of architectural critics is very small. So I don't think it reaches-- so [INAUDIBLE] said it's only the games that really have an established core of professional critics outside of academia. And I think it means he's thinking that the architectural critics are [INAUDIBLE].

AUDIENCE: I mean, that's perfectly fine to argue that it should be a larger thing.

PROFESSOR: Right. And I also think that, when we look towards architecture, we're also seeing this transition where they try to focus more on experience and different perspectives, rather than saying that the quality of the architecture is in the artifact itself. It used to be, if you look at architecture education, the good examples was very much about, like, this is good because this and this and this, rather than talking about, it's good from this perspective, because this and that.

So there is that movement within architectural criticism, as well, to go, maybe-- I usually have architecture students in the other classes, and they always giggle when I mention Gary. Because within architecture, he's seen as kind of a fad, and we have a big wonky example of that here on campus. So that sort of focus on the beautiful shapes and all of that, it's a little old school now in architecture, and now it's more about, how livable is this, or how well can you work in that weird bubble. And it turns out not very well.

AUDIENCE: Just as literary criticism and, no doubt, interactive design criticism is going to go through these waves of different styles of criticism, and they don't invalidate the old ones. They just add to how we look at the same thing.

PROFESSOR: Right, but they might invalidate decisions to hire certain architects to do certain flagship buildings on campus, or something like that. I don't think that choice would be made--

AUDIENCE: Based on criticism?

PROFESSOR: Yeah, well based on, oh, yeah, that was maybe cool because the methods were new, and they're not so new anymore. So yeah, it's a little bit of that hype thing has done away from, oh, we can actually have computers design curves that we couldn't calculate before if they would be load-bearing.

AUDIENCE: Certainly, at MIT, because we have an architecture department and architecture faculty, criticism must influence the choice of architects.

PROFESSOR: Yeah, yeah. I mean, I think for one thing, the MIT campus has a lot more examples of high-profile architectural buildings than almost any other campus, because we have such a prominent architecture department, and through a series of styles that don't necessarily always fit together.

AUDIENCE: They don't. A scrapbook.

PROFESSOR: Yeah, it's very much a scrapbook. Anyway, that's a little bit of a tangent. So any other thoughts on the Bardzell paper, before we leave? We're good? OK, now let's do keywords for a second.

OK, so I'm tempted to-- we had perspectives in the last paper, and now we have lenses. So maybe we can start with lenses, and they can describe what the difference between a lens and a perspective is.

AUDIENCE: So I specifically said lenses, because perspectives can mean personal perspectives. You might have a very different perspective of a game than I do, because of our personal backgrounds, and likes, and whatnot. But the lenses are more, you're viewing this through a performance-based lens, you're viewing this through an interaction-based lens, you're viewing this through the context of a particular thing. So perspectives can be that, but it can also be through your self, or through how we use it, or how certain people might feel. There's why I specifically said lenses.

PROFESSOR: Yeah. And I think, yeah, that's spot-on, what they mean, as well. It's more like, I, as a person, choose to put on this lens, a little bit like you might switch the lens for your camera for a particular purpose. OK, so did you have more to say about your word?

AUDIENCE: Yeah. So one of the big things, as he's talking about in this paper, is how through different lenses, the same thing can be viewed in very different lights, or very different ways, or come out very differently in the criticism. So he has the three different criticism points of Maeve, and is saying at the end about how, just because of these lenses, the criticism of either the interaction, the performance, or the users comes through differently.

PROFESSOR: Yeah. I think we should be able to jump to almost any of the words from there. Let's maybe do interface first.

AUDIENCE: OK, so one of my favorite sentences in this article is that form and content, interface and information are inseparable. And interface describes how you interact with the information that's being presented to you, and can greatly influence how you interpret the information that is presented to you. They use, as an example, I think it was like a Java applet, the word synonym finder, this visual synonym finder. I actually have a memory of using this way back in the day, the early internet days, of having it in this bubble on the screen.

PROFESSOR: Early world wide web base. Internet is, you weren't around.

AUDIENCE: No, that's true. That's what I meant. Back in the days when dial-up was a thing. So I remembered that experience, and so that was a-- the way that they frame it is that experience of seeing words and connection to other words, and how they relate to each other, and being able to make these hops, these may small hops, but end up very far away from the word that you started. It makes language more fluid, instead of like, when you read a dictionary, which has basically the same information-- it contains words and what they mean-- but it's presented in this very logical, strict manner.

And similarly, with this Maeve project, you can think of it as, oh, you just have a collection of files on different-- I think it's architectural, this architectural project-- and you could click through the files, or something, have it on your computer screen. But now they've turned it into, basically, the users of the system are performers. What they choose to view gets presented on a larger screen, and they also get to see how they're, like the cards that they choose, relate to things that other users are choosing. And this adds like a social element, a performative element, and greatly changes the way users can see how each of these different cards are, like they can actually see more direct comparisons and [INAUDIBLE]. So yeah, I [INAUDIBLE].

PROFESSOR: No, no. Yeah, that's a pretty powerful idea. I think that it's not just a quantitative difference between different interfaces. Another example would be the physical typewriter versus a word processor. It's not just that the word processor makes it easier or faster to produce text. We actually write different things. We think differently because of this word processor working in a certain way than we used to think when we had typewriters.

It's somehow changed the world, and not just, again, quantitatively, but qualitatively. People understand texts and themselves differently because of this change of interface. And this is just an extension of that, where we can understand another data set completely differently, depending on how it is, not just presented to us, but how we are allowed to interact with it.

We will get back a little bit to the idea of being able to interact with ideas next week, when we're going to start thinking about how to disseminate the knowledge that we're generating in this class. But I leave that there, for now. I'm just going to keep going here. Distinction?

AUDIENCE: That was me. The article was talking a lot about how, increasingly, we're splitting form and function, and the ideas, the information you want to convey to the user and the way that you do that are considered differently, and that that's not a good thing. It's like the idea of using the lenses and the interface, the stuff we've been talking about, to mix the two, because it's often more successful. You want to get the-- I'm just going to use play a game-- you want to get plot information across to the player, because it's a story, but you also want them to have fun while doing it and interact with the story. So they were talking about the idea of performative experiences.

PROFESSOR: That goes very much along the same lines of what we were talking about, with the interfaces, I think. Let's keep on going, the information.

AUDIENCE: Yeah. The reason I put that down was also because of the way the paper said that interface and information are inseparable.

PROFESSOR: I see you've all caught on to the same idea. I guess that is the big takeaway from this paper. And it's all, I think, the same sort of criticism of, maybe, specifically in software engineering, for reasons of dealing with complexity, we divided different aspects of these artifacts into different roles, and different teams. And it turns out it's kind of a suboptimization, because it all has to work in concert, or it's not going to be successful. And sort of trying to find a way back to ideas of the designer and the one actually manufacturing something being the same person, where they have full control over all aspects of it, to how can we have complex development with a lot of people involved, and still not lose touch of the organic unity of the thing, how it all relates to each other. Did performance have anything else to add that hasn't come up already? I feel like we're beating this to the ground.

AUDIENCE: More information?

PROFESSOR: Yes. Yes, if there was something that you felt hasn't been--

AUDIENCE: Well, I guess we didn't talk about the communication aspect that was in the paper, about how the user is in the loop of application, but also now, with like social media, you're also communicating things to other people.

PROFESSOR: Right. Yeah. And performance, did you have something to add?

AUDIENCE: I don't know if I have much more to add. But I just thought it was really interesting, because I, or at least when I'm designing, I think of my users like in a vacuum, kind of. Or if it's a multiplayer experience, then I think of them working together, but I had never thought of someone being performing, as a user. And so I just thought that was interesting, an interesting takeaway for me and my design endeavors.

PROFESSOR: Right. I don't think it's just pointing towards the importance of user testing, but also trying to challenge your own assumptions, as you're having people test your artifact. Again, the things we create are our babies, and we tend to sort of cradle them a little hard sometimes, and we don't want-- we want people to get how we intended them to be used. And then we might be less open to seeing where the users or the participants actually subvert our intentions, but still make interesting use of the artifacts, and that is something that we could actually benefit from, from allowing and allowing ourselves to see.

And I think just one example was when I was talking to game designers here in Boston about designing co-op games, and I was making a case that they often make a less interesting experience for player 2 than for player 1, I had a guy come up to me afterwards saying, I've made co-op games for 10 years and never thought of myself as anything other than player 1. So if you're making those kinds of experiences, at least try out the different roles that you are designing for, and not make assumptions that, well, the expert or the highly-skilled person is always going to be in this role, and that fits me, so I'm always going to try out that role. Because when you try out the role of player 2, you might find that it's much less either fun or interesting than you intended for it to be, just as one brief example.

AUDIENCE: I also found it really interesting how they connected performance to social media platforms. Because that is an interactive experience that isn't a game, but some people think it's a game. How many likes do you have?

PROFESSOR: Yeah, it can be gamed, for sure.

AUDIENCE: Yeah, or like World of Warcraft, where you create this alternate persona, or you put on this, you perform. You perform the role of knight elf priest, or whatever, or you perform the role of a popular figure on Twitter who talks about puppies, and that sort of thing. And I hadn't thought of it as performance before, but it really comes down to that. And depending on how much community aspect you have inside of whatever you're developing, it seems like there's more of a performance aspect.

PROFESSOR: Yeah. There's a lot of opportunity for designing your own role or identity online than you have in offline performance. I mean, we're still performing a certain role when we're at work versus at home, and so on. But you have a lot more variables to tweak, I think, online.

And it's just something that's inherently in you. It's not something that we have any experience from before this century. We just didn't have massively multi experienced virtual environments, and now we do. So we're struggling a little bit with how to design for them and make sense of them, but no one else is going to do it for us. So you are the ones to solve these issues. Congratulations.