The Risk Calculus

Into the Vault

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Host: Andrew Reddie
Guest: Reid Pauly
Series: **Shall We Play A Game?**

[MUSIC PLAYING]

Reid Pauly

It's fascinating, right, to hear anybody in a war game express concerns about escalation because it's just a war game, right? They're just sitting in the basement of maybe the Pentagon or somewhere, you know, debating options. But we see them take it incredibly seriously because they know that it could be real.

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Andrew Reddie

Hello and welcome to the Risk Calculus, a podcast from the Berkeley Risk and Security Lab. I'm Andrew Reddy, the lab's founder and your host for this series on wargaming.

In the last episode, John and I talked about the long history of wargaming. You also heard about some of the games that were played in the United States at the dawn of the atomic age.

My guest today has spent a lot of time in the archives trying to reconstruct the decision making inside these Cold War games, exploring nuclear brinkmanship and strategic decisions in Korea and Vietnam.

In this episode, we'll take a closer look at a particular series of war games, what's the legacy of these games and how do they shape the way that we think about geopolitics even now.

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A Podcast from the Berkeley Risk and Security Lab

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Andrew Reddie

We're delighted to be joined by Dr Reid Pauly. Dean's Assistant Professor of Nuclear Security and Policy at Brown University.

So, Reid, can you tell us a little bit about some of the wargames that you focus on?

Reid Pauly

Absolutely. It's a pleasure to be here, Andrew, thanks for having me.

I got fascinated by wargaming when I was a graduate student at MIT, as a scholar of nuclear issues, nuclear strategy and nonproliferation. It's a field that lacks data in the real world, right, so it's very hard to understand the dynamics of nuclear war when you don't have nuclear wars and yet we don't want nuclear wars and so how do we get the data to study them.

When I was at MIT, I discovered through some coursework, some historical posters on the wall ,and through some wonderful archivists that I got chatting with, that there's actually a good history of wargaming at MIT after the second World War. And some of the earliest innovations in the Cold War about running political military war games happened at MIT in a collaboration between a guy named Lincoln Bloomfield and an economist from Harvard, up the road, called Thomas Schelling.

And they designed new kinds of war games that were based on the kinds that militaries around the world, and especially the Pentagon, had been using. But updating them in a way that made them more political, made them more useful for studying strategy, things like how will nuclear weapons affect competition between states and they did some of that earliest work at MIT.

And so I went to the MIT archives and saw some of the records of these war games and that's where it started. But it took me to lots of other presidential archives and on a historical journey to figure out how, how much of this data we could hoover up and what's available, what still needs to be declassified, what I need to file FOIAs for and all that kind of thing.

Andrew Reddie

Obviously, well, one of the parts of your bio is that you got to spend a summer at RAND with one of the shops kind of at the forefront of the defense community wargaming.

I'm just wondering if you can reflect on the fact that Tom Schelling and Lincoln Bloomfield came at gaming as scholars. Did that change the way that they were doing war game design or were they kind of very similar in the way that they were doing the game setups to what you might see inside the defense community? Did it matter at all that they were in the academy?

Reid Pauly

Sure. Yeah. So I think it mattered a great deal.

Unfortunately, neither of them are still with us. Lincoln Bloomfield had passed away before I got interested in this. I did know Thomas Schelling, he was a wonderful man, but he has also passed away now.

So Tom Schelling is an economist who is credited with, by a lot of people, but especially the Nobel Prize Committee, with helping humanity prevent nuclear war.

And the reason is that Schelling's work, even though he's an economist, is all about trying to figure out how nuclear weapons change international politics and how it is that states can still compete under the shadow of nuclear war without actually turning to the use of the weapons and how they can bargain, how they can come to new mutual agreements about what is an acceptable division of whatever pie we're conflicting over while fighting if anything, only limited wars and not total wars that result in nuclear war.

And he's got a lot of fantastic ideas, genius ideas about how that is. He invented the concept compellent, which is different from deterrence. He invented the idea of nuclear brinkmanship, that you can engage in strategies of risk manipulation to try and signal that I'm willing to risk nuclear war more than you're willing to risk nuclear war. And therefore we could in theory, come to a new status quo and resolve our differences simply by comparing who's willing to risk nuclear war more and not actually requiring anyone to fire a shot.

So all that is to say, Schelling has these great ideas and they're all theories especially in the late fifties, 1960s. And he goes and works at the RAND Corporation and he sees how they're doing wargaming. And he thinks, ah, this is a potential method that I could use to test my theories of how different strategic actors are going to interact in a world where they have nuclear weapons. But both of them would like to avoid nuclear war, but both of them would like to threaten nuclear war in order to get what they want.

And so he's thinking about how to design a war game that does that. But he's thinking about it as a scholar and so he makes a couple of key changes to the games that he's observed at the RAND Corporation, im and Lincoln Bloomfield. And they say things like, hey, we can't tell the players when the game is gonna end because that's not like the world. We can't just say, oh, we're gonna have three rounds and in the third round, you feel free to use nuclear weapons because it's over after that.

He's saying that when you see, you look at his writings about it, he thinks it's a shame that the limits of these games are always decided in advance. It's also a shame if you're scoping out the prospect of nuclear escalation. So sometimes you're really interested in studying conventional war and so the designers will tell the teams, ok, so you can't use nuclear weapons in this game because we really want to understand, you know, the limits of combined arms warfare in the inner German border or something. And so they tell them you can't use nuclear weapons. Well, that's not a good way of studying the real world and fighting under the nuclear shadow because nuclear weapons are always in the background.

And he also introduces, or they do, Bloomfield and Schelling, a lot more politics. So war games are in the defense community about war. That is, you are using the tactical conventional forces that have been given to you and saying, you know, I'm gonna move this division over here and it has X amount of firepower and it has X amount of probability of killing, you know, these, this number of troops on the other side, et cetera, et cetera.

And so their games are still allowing for that, but they're much more interested in the political effects of those military forces. So you can do, you can make diplomatic moves in Schelling and Bloomfield's games. You can move military forces around the geographic area for the purpose of signaling resolve and signaling your political intentions to the other side and a lot less for the purpose of using those military forces.

And that's what they're interested in, right, at the end of the day is when one side decides to signal something to the other and they're separated, you know, in separate rooms. So one side is trying to signal something to the other, let's go over to the other room and find out whether that signal came through or not. Did they get that, you know, the blue team was trying to signal that it's willing to go to nuclear war over Berlin or was the signal misperceived and it was taken as something more escalatory or less escalatory because it was simply missed.

So I think all those changes are fascinating and, and incredibly important and allowed Schelling and Bloomfield to, you know, refine their ideas, but also just develop this incredible new way of generating empirical data to try and understand the puzzles of the nuclear age in which they were now living.

Andrew Reddie
Great.

Yeah, it's striking that some of the same challenges that Tom Schelling and Lincoln Bloomfield were facing back in the 1950s and 60s are the very same ones that we kind of face today.

You know, I know that in my work, I struggled to convince the IRB to let me have, you know, games where I lie to the players about when the game is actually going to end, for example. So that's pretty interesting.

Obviously, you know, this is a bit of an unfair question given that your archive captures so many different types of games from those about, you know, the Berlin Crisis to Vietnam and Korean War escalation scenarios.

But just can you kind of take us through the set up of these types of games, how they're getting played? Who's the, who are the people that actually get to play in them?

Reid Pauly
Sure.

So that's one of the most exciting parts, right, is that Shelling and Bloomfield end up getting quite well connected, and already are connected to when they're designing these at MIT, to the US government. And so in the late fifties, when they're starting to run these games at MIT, they're inviting their friends who are essentially high level government, national security bureaucracy folks and they play some of those games at MIT and so you can find those in the MIT archives.

But then even more interesting, right is when the Pentagon sets up a joint war games agency, they get interested in these political military war games, they set up something called Joint War Games Control group that later becomes the Joint War Games agency. And they don't have, you know, like in-house methodologies designing new methods at the time, all they do is they ask Schelling to come in and run them for them, right.

So Schelling comes in and starts running games, the earliest ones he runs at Camp David. And so we know that deputy national security advisor, national security advisor, and Shelling says up to the cabinet level came to these games. And you get a sense when you're reading the participant list, right, that this is a time before the tyranny of the inbox when, you know, a high level national security official actually had three days to sit and think about a potential you know, escalation process in a wargame over Berlin.

In the transcripts of discussion, it's all anonymized. So it is a little frustrating that you can go to the archives and say, well, I know that one of these people is Carl Cason, the national security advisor, but I can't figure out exactly which one. But at least, you know, we know that these players were what I call strategic elites, right. They're hypothetically similar to those who in the real world would actually be empowered to give advice about whether and when to use nuclear weapons and what threats to make and what not to make.

What else, what else should I pick up on Andrew?

Andrew Reddie

No, it's great. I mean, I think that the question that naturally kind of follows from having those strategic elites in the room is, you know, as you look across your now effectively, what is a data set of games, what's your read of what comes out of them?

You know, is it the experiential component that is doing a lot of the work here in terms of the fact that we have these policy makers that get to explore these really hard problems? Or are the're actually analytical findings that are actually changing the way that we actually are thinking about strategy and doctrine in these various different conflict scenarios.

Reid Pauly

Sure. So I think there is a lot to get out of the games, the piece that I published first when I got really into these archives was about testing theories of nuclear non-use.

We have, in political science, a whole bunch of writing by scholars over the years about why is it that nuclear weapons haven't been used in war since 1945. Is it just deterrence? And others argue it can't just be deterrence because there's many circumstances in which, the United States especially, could have used tactical nuclear weapons against somebody like Vietnam who was not capable of retaliating with nuclear weapons. So, you know, it can't just be deterrence.

So we turn to concepts like the nuclear taboo, moral aversion to the use of nuclear weapons, practical constraints of just, you know, the United States is the most powerful conventional military in the world and so maybe it just didn't have to turn to nuclear weapons to achieve battlefield effects.

What we see in the games is that, of course, there's lots of deterrence, but the other ones that leap out of the transcripts are things like reputation. So I do not want to be known as the person that brought up the option or we do not want to be known as the country that turns to nuclear weapons.

You know, on the other side, we see very little ethical discussion in the war games. I don't think that means that it wasn't there at all. It just means that when you're doing a war game in the Pentagon you tend to edit out your language that would otherwise be moral or ethically framed, right? If you believe we shouldn't be using nuclear weapons just as a sort of aughtness principle that it is morally reprehensible to do, you might think that but then come up with an argument about why it is unnecessary in order to convince an audience that is more hard nosed and realist generally, when you're sitting in the basement of the Pentagon.

So I do think, you know, we can look at these games and evaluate what we would call in political science, right, our theories of nuclear non-use. But there's a lot more to do as well, right, we can look at them and assess things like how strategically players think about escalation. How scared are they or cavalier, are they under different circumstances?

It's fascinating, right, to hear anybody in a war game express concerns about escalation because it's just a war game, right, they're just sitting in the basement of maybe the Pentagon or somewhere, you know, debating options. They're testing potential plans that are obviously not being used at that moment in the real world. But we see them take it incredibly seriously because they know that it could be real. What they're trying to do is simulate something that could hypothetically happen.

You know, when they're doing it about Vietnam scenarios, it's about a war that is ongoing and so while the wargame that they're playing, the Sigma series in the 1960s, is about Vietnam and they're testing all these strategies and tactics and doctrines about how to maybe fight this war in Vietnam. And they're being consistently frustrated and the wargames are showing that there's not a clear way that the United States can win this war in Vietnam. But they're taking it incredibly seriously, even though you'd think in a war game, you know, as one player says that if you lose, it's not for keeps.

The biggest finding that surprised me when I have all of this in my mind - we should have seen more uses of nuclear weapons than we did in war games. So I have records from 1958 through 1972, and then only two of them out of at least 26, - 26 is kind of the, the sample that I get down to of saying, ok, these are, these really meet the criteria for, I think, strong tests of nuclear non-use theory - but I surveyed more games than that and in only two of them did they use nuclear weapons. That was the beta series in the sixties. And it's surprising to me, right, that you wouldn't see at least more efforts to just say, well, let's try it and see what happens, right, in a war game setting.

Andrew Reddie

Do you think there, I mean, just taking that series as an example, do you think that it was that nuclear use is driven by the particular sample that happened to be in the room for those playthroughs or do you think there was something intrinsic about the game design that led to dilute some of the aughtness conversation?

Reid Pauly

It's difficult for me to say exactly. I do think that we have lots of reasons to think that personality mattered. Again these transcripts are anonymized, but I have one great quote in them where there's a player in the debrief who says, in a Vietnam scenario, who's saying, 'look, why don't we just use one nuclear weapon? This is sort of reminding me of a 1945 like scenario where the Japanese needed a reason to say quit and so let's use nuclear weapons so that the Vietnamese have a reason to say quit.'

And then it's fascinating that the, whoever was transcribing captured the fact that the room laughs afterward and this player's kind of left all on their own. I do know that in a game around that time, Curtis LeMay participated. And so I suspect that this might be Curtis LeMay suggesting that we use nuclear weapons. And those who know the history, know who Curtis LeMay is, wouldn't be that surprised to hear the personality in the room like Curtis LeMay suggesting maybe we should use nuclear weapons.

So I think personalities matter that said in the beta series that you're talking about, we know that it was misperception or at least that's what the documents suggest it was. So in the beta scenario that goes nuclear in a war in East Germany, the scenario is basically one where the Soviets try and take West Berlin or you know, succeed in taking West Berlin. And then it's up to NATO to decide whether it wants to fight its way through East Germany to get access to West Berlin again.

And so it decides to fight a conventional war. And after a couple of divisions get pinned down, the blue team decides to use tactical nuclear weapons to try and continue the fight up the Autobahn towards Berlin. The red team responds and then this sort of tactical nuclear war goes on until the blue team uses nuclear weapons that are fired from submarines that are stationed in the Atlantic.

And the control team interprets this decision as a use of nuclear weapons from outside the theater of war. The blue team doesn't see it that way, right, they think they're using nuclear assets that are basically in theater and meant to support exactly this scenario. According to the war plans, we're gonna use tactical nuclear weapons if the Soviets are trying to take NATO territory and you know, if we're losing a conventional war we'll turn to tactical nuclear weapons.

And so what ends up happening because this salvo came from submarines in the Atlantic, control picks up a contingency plan that has been submitted by the red team long before the nuclear war began. And the contingency course of action simply says if the blue team uses nuclear weapons from outside the theater of war, we will respond with a counterforce attack against the continental United States. And so the control team decides that this triggers the red counterforce attack and then you get a blue response and you know, everybody loses the game. It's a global thermonuclear war.

And then when the players are talking about it afterwards, they're saying, look, we're not sure we really meant that, you should have given us another opportunity to decide whether in fact, we wanted to start a strategic nuclear exchange. You know, it's hard to know because they're just saying it in retrospect, but I do kind of believe these players when the red team says, 'yeah, I was bluffing, we weren't actually serious about starting a strategic nuclear war and the control team didn't give us another chance to try and avoid it.'

So that's, you know, that's an example of how you can get strategic nuclear war and how it happened in one of the beta series.

Andrew Reddie

I really appreciate you kind of taking us through some of the nitty gritty. And later on in this series, we'll talk about control cells and their pros and cons with Jackie Schneider at Stanford. That's a good example of where maybe the white cell is doing things that the players might not have appreciated.

[MUSIC PLAYING]

Andrew Reddie

And so Reid you know, when you get a wargaming product, if you will, from the 1950, 1960s, how do you actually end up piecing together what happened? Was there somebody in the room at the time taking notes? What are the kinds of data products that you're using to kind of figure out what's happening?

Reid Pauly

First thing to say is that it's challenging and oftentimes you will get pieces of evidence that you have to triangulate and stitch together. So it is rare to go to the archive and have a document in a folder, you know, that's been perfectly curated as here's everything related to beta 67.

They tend not to organize things that way. Papers are organized by, like, who they're produced by or they're consumed by, what agency they made them. And so very often you just stumble across and try and hoover up as much of this as you can and then come back home and triangulate it. So we have things like letters of invitation to say, 'will you please come and participate in this war game?' We have people accepting that. We have people writing after action reports saying, you know, this is what I think I learned from participating in this war game. And the best thing we have, if we can find it from a game, is the post game report.

So generally, when the Joint War Games Agency put on a game, you know, they would justify their existence by putting a report together. This is what we're trying to learn, this is a scenario that we gave to all of the participants. If we're lucky, they'll say who the participants are, then they'll say, you know, this is a summary of what each team decided in each round to do. And then the golden nugget in all of these is if in that report or somewhere else in the archive, you can find the transcript of the after action critique.

After every game, they would get all the players to sit back, come actually back from, you know, wherever they were playing their game separately, come to one room and discuss what happened and why. And that's where you get these fascinating discussions about, well, we were trying to signal resolve with this move, how come you didn't perceive that? And so you get these conversations finally between the teams and usually it's moderated by the director. And sometimes we know that that director was Tom Schelling.

So what you've got is a scholar who is directing and designing the game with all of these participants afterwards saying, OK, what happened, I want to get to the bottom of everyone's perceptions and misperceptions and we can try and understand whether we can distill lessons from this game.

Another reason those are the golden nuggets is that this is the time when somebody was in the back of the room with a stenographer capturing a literal transcript. We know there can be flaws

in transcription, but to the best of their ability, this person is capturing literally what everybody is saying in that room.

This is my point to people who run war games today, both you know, in government or as consultants outside of it, you don't appreciate often how much data you are leaving on the cutting room floor for future generations to learn from. So it is not always the case, right, that you're gonna have a stenographer in the room capturing transcripts today. And it's only really because that was happening in the 1960s and 70s that I can do some of the work that I'm doing today.

Andrew Reddie

Were there things inside of that documentation that you find particularly surprising or that, as a researcher, you were particularly frustrated were not included?

Reid Pauly

Everything is incomplete. So we're, I think that's just the nature of doing historical work, you will constantly be frustrated that there isn't additional data available in the archive. This transcript cuts off here when it shouldn't, where is the rest of the document.

You know, my advice to people is always go make best friends with archivists because they're some of the best people in the world and they might actually be able to help you track down some of this stuff and I met some amazing archivists when I was at doing this work at various archives.But even they, you know, will struggle to find everything and not everything gets preserved perfectly.

So I think we'll always have to just be, issue lots of caveats in our scholarship about what it is we can't find or just be very clear about when we think that we're making sound conclusions and which hypotheses, you know, we can evaluate more strongly than others. And sometimes we say, well, I don't really have a lot of good evidence to evaluate this proposition, you know, someone else should do really good work to do better than me and I'll just speculatively tell you, you know, what we've got.

An example of that in my work is that I don't really have a lot of examples of what you'd call non-elite players playing war games, right. It wasn't often the case that the Pentagon would bring in non-policymaker elites to come and play. They did, interestingly, on one occasion, bring their friends. There's a board game I have that participants included, they're listed as like, business leaders, executives and representatives of the entertainment industry. One of whom we know is like a cartoonist, Milton Kiff.

We've got some great doodles in the archive from this cartoonist, you know, fascinating stuff, but can't really conclude a lot by just comparing, you know, one war game with non-elite players to the rest of the other war games we have with, you know, players up to the national security advisor level. That said there's, you know, suggestive evidence in one of those reports, with the quote non-elite players, says the Pentagon hosts, were surprised at how ready their guests were to go nuclear. And this is just nothing that we can really draw a lot of conclusions from just that it's suggestive evidence that yeah, experience matters, right. If you want nuclear war, you get high schoolers to play your wargame. If you want a more reflection of reality and how complicated a nuclear strategy can be, with all the hesitation about escalation, you're gonna get some experts in to play.

Other examples, right, of things that are really important and fun to come across in the archive as a researcher, is that sometimes you can get notes from the note-takers that help you to interpret what you're finding.

One of the fun ones I found at the MIT archives is that MIT had played a game once where Walt Rostow, who was later, Lyndon Johnson's National Security Advisor, Walt Rostow came to play a game at MIT and you can read the whole regular report, you know, and we could just draw conclusions from that until you get to the end of the file where there's this little note from the RA, and I don't know the name of the RA to thank them, but whoever it was, they're a wonderful person.

The note says, look, it would not be an exaggeration to say that Walt Rostow was the blue team, right, there were other people on the team but Walt Rostow was such a - now I'm paraphrasing, they didn't quite say it this way -   was such a bombastic, you know, large personality that basically no one else got a word in edgewise and this guy took over the group decision making.

That's a really important note, especially if what you're interested in learning about from the archives, or from any war games, is like how groups make decisions or how groups make decisions under pressure, right. Without that note, we would just treat the blue team like they were like any other team. But with that note, we know that whatever the blue team does is basically just Walt Rostow's view of foreign policy.

So that is a good lesson, though, to be cautious because we don't know how often there should have been notes like that in the archive and we simply didn't get them.

Andrew Reddie

Yeah. Well, also too, I mean, that type of insight travels to the laboratory effects conversation that's alive and well in kind of how the scholars are using war games today. I mean, a lot of what you described there is a concern any time that you have groups that are comprised of heterogeneous types of players, right. If I have somebody older in the room, younger players might look up to that individual for approval in terms of a decision that they may might make.

So that kind of laboratory effects, I think that's, that's kind of very insightful and actually takes me into one of the questions I wanted to ask. I mean, obviously, you've got a lot of insight into these games from the 1950s and 1960s. Are there lessons that you think that we ought to be learning sitting here in 2023 from these past examples? Are there creative ways that you think we ought to be using these archival games in order to maximize the types of insights that we're able to get from them.

Reid Pauly

I can answer this question in a lot of ways. One is if you're interested, you're thinking about like, what can we learn from it for war gaming today? We need to be, it would be wonderful if we had time to take some of these games and run them again, with all of the same injects and scenarios, we could replicate some of these games if they go the same way.

But the lesson I think for wargaming today should be taken from the basic premise that Bloomfield and Schelling had going into these, which is that these are tools beyond what people appreciated them for at the time.

So, and you can see that today as well, right, where wargaming can be treated like it is a special provenance of the defense world only and that the best games are the ones that get the nitty gritty details, right, of the range of the Pacific missile systems and most accurately reflects, you know, the balance of power in the Western Pacific and whatever, right.

And like I get it, those details are important but fundamentally what you are engaged in is a political exercise. Even if you are fighting a simulated war in a war game, you cannot lose the fact that these moves, these decisions, you are making these military decisions that you are asking your players to make are having political effects, right? This is all just Clauswitz and war is politics by other means.

So you should be designing your games in a way that allows for deliberation and discussion of those political effects and capturing the, you know, lessons for politics. Every military move regardless of what it's brute force effect is, has a political signaling effect and you should be allowing your game to capture, right, what was, how was that political signal interpreted, was it misperceived or or accurately perceived, and what did it make you think you needed to do differently now to achieve some political objective in the war, not just win a war.

Andrew Reddie
Great, yeah. What a fantastic place to wrap that part of our conversation.

Just as we're leaving, I think one of the things that we're trying to do is to give students or those that might not have engaged in the wargaming community before resources to dig more deeply. And so if you had, you know, a favorite book on the topic or a favorite wargame or film to send over to folks, what would you recommend that they go and take a look at?

Reid Pauly
Well, at the risk of self promotion, I would suggest people who want to go deeper read the article that I was referring to a lot in this podcast and it came out in 2018 in International Security. It's called "Would U.S. Leaders Push the Button?" You know, beyond that, I think you have to keep listening to Andrew Reddie's podcasts.

There is a lot of exciting work being done at the Hoover Institution by Jackie Schneider to capture the archival material in one single place so that researchers can go to a wargaming archive. She's building that at the Hoover Institution.

If you go to my Harvard dataverse website, which will be linked on my website, there is a data just dumping site for all the PDFs that I have of wargame reports. If you really want to get into the weeds, please go read those.

If you are new to all this, and since you asked me for a movie, you have to go watch WarGames.

Andrew Reddie

You are the first one to give us the Matthew Broderick film. But I absolutely, absolutely agree.

Well, thank you, Reid, so much for joining us. Really appreciate your time.

We'll include the links to your suggestions in the show notes and we'll also make sure that they're posted on the BRSL website as well.

In the next episode, I'll be talking to Dr Ellie Bartels at the RAND Corporation and a leading expert on game design. We'll be focusing on the practice of contemporary wargaming and both its educational and analytical applications.I hope you'll join us for that.

With that, thanks Reid for joining us. Thanks to Andre Anderson and Citrus, our recording studio hosts, and special thanks to our amazing producer Jane Darby Menton, and finally to all of you for tuning in.

Until next time, I'm Andrew Reddie, and you've been listening to the Risk Calculus.

[MUSIC PLAYING]

Reid Pauly

I'm still a little quiet.

Can we make mine any louder?

I can just literally, like, go put my face right up into it.

Andrew Reddie

Oh, yeah, I'm getting the big thumbs up from JD.

So if you don't mind.

Reid Pauly

I'm leaning forward into the microphone.

Andrew Reddie

Cool, me too.