

## **View from Taipei: Battling Disinformation and Hacking a Pandemic**

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**00:06:** Welcome, Minister Tang. It's such a pleasure to welcome you here, and I know it must be very, very early in the morning for you. We had a little connectivity issues, but we're glad you are with us. Lady and gentlemen, if you're still in the audience, thank you for being with us. We now have the great privilege to welcome Audrey Tang, who's the digital minister from the Republic of China, otherwise known to us as Taiwan. She's the leading open source programmer, and at age 35, became the youngest ever minister in the government of Taiwan, where her responsibilities include citizen engagement online, the e-response to COVID-19. And where, also with several technology companies, she worked to battle disinformation from actors in Taiwan's recent presidential campaign. Minister Tang, thank you so much for being with us.

**01:00:** Hello. I'm Audrey and really happy to be here and good local time everyone.

[laughter]

**01:05:** Thank you. I'm on East Coast time, but our West Coast friends are all still watching because it's only 4:30 there, which is great. Let me start by asking you a little bit about the Sunflower Movement.

**01:14:** Sure.

**01:14:** You were involved in that movement in Taiwan in 2014. It started with some protests against the ruling KMT over the passage of a service trade agreement with Mainland China. Can you explain how you got involved and what the movement really was and how that brought you into public service?

**01:34:** Sure, so at the time, the students occupied the parliament for three weeks, in a demonstration for the idea that we should deliberate more with the society, like with the people, not just for the people, when deliberating important trade agreements such as a Cross Strait Service and Trade Agreement, or CSSTA. And at the time, the parliamentarians were refusing to deliberate as they would actually for any international treaty, because for them it's not constitutionally a international treaty, and so they tried to ram it through. And so in the three weeks that ensued, I helped, along with people from the gov movement, to ensure that more than 20 NGOs deliberate each on one aspect of the CSSTA in the occupied parliament.

**02:19:** For example, there was one aspect that's whether we need to allow PRC, People's Republic China, government components in our then new 4G infrastructure. So the clean path argument that we had on the street was half a million people, and the consensus was no because there's no private sector companies in PRC. And that's actually heeded as one of the rough consensus at the end of the occupy which the head of parliament ratified. And so it was a success. At the end of that year, the mayoral election, all the mayor that supported this kind of open government deliberations won,

sometimes without preparing inauguration speech, and all the mayor that did not, well, did not. And so I was then recruited as a reverse mentor; that is to say people under 35 years old, social innovators that work with existing ministers to design ways to deliberate such issues without occupying the parliament again, necessarily, but we can do so online and with the same simpler technologies.

**03:18:** That's great. Well, it's interesting that you brought so many young people into politics in Taiwan. We're trying to do that here in the United States as well, so maybe you can give us some pointers. But of course, since 2014, there's been a sea change in politics in your country, including President Tsai Ing-Wen of the Democratic Progressive Party won re-election in January of this year in a landslide. And it was partly, I think, because of her strong response to Beijing's increasing pressures on Taiwan. There are many reports that in that election there was some disinformation campaign by the Chinese and possibly by other actors. Of course, that's particularly interesting to a US audience because, as you know, in 2016 Russian actors were very active in our own election.

**04:10:** Now, we just heard from two experts yesterday, Laura Rosenberger and Renee DiResta, who's at Stanford, that we're seeing that again in our own 2020 election. It's not just the Russians, it's also the Chinese. We're seeing it in lots of different places. In our own system, the Russian disinformation campaigns have been far more sophisticated than what you see from China and other actors, to the point where they're so convincing with false personas and things, that the Russian IRA actually got Jack Dorsey to retweet misleading information, and Donald Trump Junior. What we see in the US from China is not quite as sophisticated. How did you see that in your election? Which state actors were involved? And tell me a little bit more about how that disinformation campaign unfolded.

**05:00:** Sure. So in Taiwan... I'm glad you used the term disinformation, because that's the term we use. I never used the F-word, right, to describe memes. And disinformation in Taiwan is defined as intentional untrue information that causes public harm. So not like harming the image of the ministry, which is just good journalism. And because we never do demonstrative take-downs. We, just like in fighting the pandemic, we never do lockdowns either. And that is why we have to kind of race with the disinformation, so whenever there's a piece of disinformation, not even two hours after which, the responsible ministries, which have what we call hashtag officers, participation offices that engage the public. We roll out internet memes that are always very humorous, very funny, but also contains clarifications in a way that's more viral than the disinformation. So that's humor over rumor.

**05:57:** And as for the disinformation campaigns that actually occurred during the presidential election, well, you see, because we negotiated with Facebook and other multi-national social media companies, to make sure that they conform to our norms of campaign donation and expense, meaning that other advertisement from Ads Library that pertains to political or social issues need to disclose its full targets, the price paid, and so on. And it can only come from domestic sources, not from foreign sources. And so it's easier for us to do attribution, which is always the hardest. And so we also work with Facebook so that when people flag something as possible disinformation, there's also a lot of civil sector like Cofacts, Dr.Message and so on. Just like Spamhaus as a spam fingerprint clearing house, we also do a disinformation clearing house. So last November, there was a disinformation piece that I'll use to illustrate a point, which says, "Hong Kong sucks,

compensation exposed," and I quote, "Killing a police and earn up to 20 million."

**07:00:** And that is an actual piece of disinformation making the rounds on Taiwanese social media. It even has pictures to go with it, except of course, the picture is actually a Reuter's picture. And a Taiwan fact check sensor, which is a part of the International Fact-Checking Network, traced this disinformation piece down to the Jǐngzhèngshǔ, the PRC central political and law unit, [07:19]       . So it's not something that's covert, it is a overt narrative that they just push on using local proxy sensor one. So instead of taking it down, we just make sure that we attribute it.

**07:31:** Yeah. Sorry to interrupt you Minister Tang. Can we just dig in a little deeper? You just said a lot about all the amazing things that I wish our government were doing, that you're going to combat the disinformation, but can you say a little bit more about how it actually works? Who do you see in the system? Are they trying to influence... Were they trying to influence your election directly, or were they sowing general disinformation? Who do you think it was? Was it very sophisticated? Was it ham-handed? Was it just flooding social media? Was it thinly disguised personas and bots? Or did you see something more?

**08:10:** All of the above. All of the above. It would be easier if I can illustrate by sharing my screen, which currently is not possible I guess in this format, but I will just say in very broadly terms. I think there's a few things, right, as I just showed, using our strategy of notice and public notice instead of taking down, people learn generally that these are sponsored by... Well, the PRC. And they did not hide from it mostly, they just posted publicly on their Weibo account. And a lot of the work that we see, for example, there was another piece of rumor that's making the rounds immediately before the counting process, but right after the voting finishes, is that quote, "The CIA made this special ink for ballots, so no matter who you vote, Sai always wins." So answering your question, this is basically you're saying...

**09:04:** The CIA doesn't do that, I think.

[chuckle]

**09:07:** No. Right. But the point is that instead of attacking a candidate, it's essentially attacking the democratic process. It's undermining people's trust in the democratic process, so no matter who wins, will lose, and I think that is after all what the playbook is all about is to sow discord in democratic process itself. And we counter it using radical transparency. The counting process can be recorded and even live-streamed by YouTubers, and we invite YouTubers into the counting stations. Because we use a paper-only ballot, it's actually a kind of social ceremony, with more than 70% of people going to the voting booth. The counting process actually brings the YouTubers a lot of views, and so the fact-checking, the counting, and so on. Because it's a participatory accountability, there's less room for the conspiracy theories to spread, because if there is invisible ink appearing and disappearing, you will surely not miss it on a live stream.

**10:03:** That's amazing. It's very interesting because there's just a cultural difference, I'm guessing, between the understanding privacy in your country and what we have in the US. A lot of these ideas that are brilliant ideas from my perspective that I think could work here in the US, we wouldn't be allowed to do. You wouldn't let a YouTuber into the counting because it would be seen as an

invasion of privacy. But tell me a little bit more about... You said you're trying to fight it with humor, and that you're taking it from the government. Now the US government is known for many things, but not for its sense of humor, so maybe you could teach us a little bit.

**10:42:** Certainly. But first of all, before the Sunflower Movement, the live stream was not allowed in the counting process either. Actually recording, unless you are professional hired by one of the parties, was not allowed either. So civic journalism is really the same, that becoming a new political norm after the Sunflower occupy. I'm not advising anyone to occupy their parliament, by the way, but it really is a very effective way. Anyway, so, sorry, back to the humor over rumor. So yeah, I think the humor over rumor's strategy work because we were forced to innovate, that we cannot do take-downs. So we look at how the conspiracy theories spread and outrage. And now if you have seen the movie Inside Out, literally in the one person's mind's control room, one cannot feel simultaneously outrage and joy. So if we bring joy into the political discourse, then that makes people more deliberative instead of just anti-social social media. And so one example, during the pandemic there was a rumor, a disinformation really, intentional one, that says, quote, "Because we're ramping up the facial mask production from 2 million a day to 20 million a day, the rumor says that is the same material as tissue paper, so we will run out of the tissue paper soon." And so people would panic buy.

**12:00:** And I mean, it was a stressful time. People do feel stressed and so outrage travel very fast. That maybe has an R-value of three; every hour, every person on average share to three other people. And so within a couple of hours, our premier, [12:14] [REDACTED] rolls out this internet meme, which is brilliant, and you see his backside, his bottom, wiggling it a little bit, and a very large phone that says, "Each of us have only one pair of buttocks." And it is word play. In Mandarin, twin buttock and twin stockpile sounds the same. And so basically, he is saying in this tissue paper package meme, that there is no way that you can use all that tissue paper you stockpiled. And then a table saying the tissue paper came from South American materials, and medical masks came from domestic materials. And so, right, you just laugh about it, meaning that you cannot feel outrage about this anymore. You're vaccinated, so to speak. And this went absolutely viral, like R-value of five or more, and so within a couple of days, this conspiracy theory just die down, and then we persecuted the three people that started this rumor. Turns out they were tissue paper resellers.

**13:08:** And is your... Is your ministry behind these memes, you guys put them together?

**13:14:** Right, so in 2017, we initially like trained the public servants, higher level officials, participation officers, in this idea of hashtag engagement and memetic engineering. But it would not gain much currency until after the 2018 election, where we see a lot of disinformation at the time. Facebook was not revealing the precision targeted advertisements during the election campaign. And so that led to a lot of social distrust, because unlike our Control Yuan, which is a separate branch that publishes their donation expense, who actually went into those Facebook and other social media targeted advertisements, is anybody's guess.

**13:57:** And so because of that, this memetic response, this humor over rumor start gaining currency, and then we got other social media companies on board. Google and Twitter, for example, simply refused to run political advertisements during our presidential election. So it's a norm-shaping move, and also, I think, very notable because we did not pass any law to do that, just as we

did not pass a law for the spam either. We relied on the civic sector's pressure of this threat of social sanction to the social media companies.

**14:29:** Interesting, and you just mentioned micro-targeting of ads, which is such an issue in our election, which is how you really dice and slice the electorate and give people the outrage that they crave, as you said. So are you saying that the social media companies in Taiwan are not allowed to micro target?

**14:47:** That's exactly right. And if they do... I mean, during election for political and social issues. And if they do, they must always reveal it the same way campaign expenditure is revealed, that is to say, rebuilding the money, the target criteria, in real time; like it's while it's airing in the Ads Library and even after its aired. And so lots of civic sector watchdog groups and so on would publish any dark patterns, and that will actually lead to social sanction too. So during the presidential election, nobody tried, not even the legislative candidates, tried any dark patterns.

**15:22:** Wow, very interesting. Let me change subject just a little bit. You brought it up with the masks and the tissue paper, but, you know, Taiwan has already has also had a huge success in containing the COVID 19 pandemic. And as you know, here in the United States, we opened up briefly, now we're all shut down again, which is why I have a nice virtual background of Aspen behind me rather than being in real Aspen. You have done something really amazing. One, I understand Taiwan's Central Epidemic Command Center that was set up after SARS in 2003 has been enormously helpful. And then you used a digital fence system, which sort of enforced people's quarantine. Can you talk about some of the e-enabled ways that you helped to contain the pandemic?

**16:14:** I like that word, e-enabled ways. [chuckle] So the early response, when Taiwan responded last December, was enabled by e-participation forums. In Taiwan we have this PTT, which is the equivalent of Reddit, but it's owned by the social sector, operated by students of National Taiwan University, and when Dr. Li Wenliang, the PRC whistleblower, posted that there were seven new SARS cases, it got reposted immediately, actually at the same hour as he got inquiries from his institutions. And so while he was being "harmonized" in the PRC in Wuhan, in Taiwan it's making the rounds, it's uploaded, and our medical officers immediately notice the post and issued an order saying, "All passengers flying in from Wuhan to Taiwan need to start health inspection," and that was the first of January. And so I think this is very important that a civil society has this absolute freedom of speech, that they can talk about a SARS outbreak in the public forum. And that the government trust citizens enough to take it seriously, treat it as if SARS happened again, something we've always been preparing since 2003.

**17:22:** And the CECC that you just mentioned is a live press conference that went on for around 140 days or so until that we're post-pandemic now, for I think four months now. But four months ago, they were doing daily live streams, answering all the journalist questions, working with journalists. And a toll-free number, 1922, is I think one of the most important piece because anybody can pick up their phone, call it with a more than 90% pick-up rate, and just inform anything that they see from the ground to the CECC, which will then make into the rounds into the next day's live conference. So just one example. One day in April, a young boy who's family called saying that, "My boy doesn't want to go to school because when you ration masks, you don't get to

pick the color, and all he had was a pink medical mask."

**18:08:** And so that very next day, so he was like, "I'll get bullied. I'm a boy..." whatever. So the very next day, everybody in the CECC press conference started wearing pink medical masks. Making sure that everybody learns about gender mainstreaming, and it's a social innovation. And so this kind of fast response ensure that the boy, now, the most hip boy because only he had a color that the heroes wear, that builds the trust between the government and civil society. And additional fence, that you just mentioned, basically said, "Anybody returning from abroad to Taiwan, they can choose either go to a hotel for quarantine," that's how we keep the hotel business open, "or they can, if they live in a larger home with their own bathroom, and they don't share it with vulnerable group of people, they can choose to place their phone, or if they don't have a phone, we hand them one, into this digital quarantine," and it's basically re-using this earthquake warning that we send people...

**19:00:** And is that required? So if you... If I'm flying into Taiwan from California, and I have to quarantine, I have to put my phone in digital quarantine?

**19:10:** Or you can choose the hotel. Or you... I mean, it's your choice. You either go to a physical quarantine, in which case you're physically barred from leaving, or you go to your own home, but then your phone is put into the digital quarantine. There's a choice between the physical and the digital, but there is no choice of no quarantine. Well, you can choose to break the quarantine, I guess, but then your forfeit 33 US dollar per day stipend, and you have to pay back 1,000 times more up to, and so you will fund 1,000 people's quarantine, I'm sure, but so, very few people did that.

**19:45:** Yeah, and it's an amazing system where culturally in the US, it would just be impossible. You know, we're having people protesting against wearing masks indoors and things, so...

**19:54:** Well, there's something Taiwan can help here too. I mean, we very early on put out a poster, it came from the premier that basically says, "The masks are there to protect yourself from your own unwashed hands." And I think that idea travels much better than pretty much any other incentive design. And we also made sure that we have a spokes-dog that reminds people that, which is less, I guess, controversial. And so this is literally the spokes-dog of the CECC. And the dog says, "Wear a mask to protect you from your own unwashed hands and please use a soap. And that's very important."

**20:32:** That's great. We should tell Dr. Anthony Fauci to get a spokes-dog. I think that would help here as well. [chuckle] I know we're... Our time with you is short. I could keep chatting with you all evening, all morning for you. We have one question from Christie Campbell who's in the audience. So if we could unmute Christie, that would be great. Just takes a few seconds for her to be able to unmute herself. "Hi, Christie."

**20:57:** Hello, I'm here.

**21:00:** Great.

**21:01:** So I actually work for a corporate company but deal in the media, and one of the things that really struck me is that, yes, the humor in rumor, but I'm wondering about the skepticism scale in Taiwan because I think what we're finding here in the US, we tend to be a trusting bunch. If you see it on social media, this concept of disinformation is almost hard to believe. And I think this kind of recent political piece has been something to try and educate a wider range around the fact that not everything you see, not everything you read, not everything you get in an email, not everything that you see it texted to you is true. How did you break through that?

**21:43:** Well, we offered that too. And it's in our K to 12 curriculum, actually. And it's called critical and creative thinking. But in, I think there's a difference though, in our K to 12 curriculum, we do not teach media literacy or digital literacy. We teach media competence and digital competence. And the difference is that instead of treating very young people, primary schoolers, as a consumer of information, we treat them as producer of information. Indeed, many of them maybe have more Instagram followers than I do, because I rarely post on Instagram. But anyway, the point is that they are potentially part time journalist. A lot of primary schoolers actually interviewed me as a kind of intern journalist, and many of them actually fact-checked our president candidates back in a presidential election because the journalist invited everyone, including primary schoolers, to join them online to help transcribing, doing newsroom work, of checking the sources and so on to make sure that we can hold presidential candidates' words to account. And ones you participate from the side of journalists, from media producers, I think one would then learn that journalism is about truth finding together, and that will create a much more symbiotic relationship with the journalistic branch instead of a adversarial relationship. I think that's our main difference in terms of curriculum design.

**23:06:** How many people are participating in that program? It's really...

**23:10:** Thousands and thousands, if you're referring to the presidential candidates fact-checking.

**23:15:** Interesting, amazing. Let me turn to Hector Fuentes. You suddenly have a whole... You've sparked a lot of questions. So I hope you can stay with us for just a couple more minutes.

**23:23:** I don't have a hard stop, actually.

**23:25:** Great, thank you. Hector?

**23:27:** Hey, can you hear me?

**23:30:** Yes.

**23:30:** Alright, thank you. Mr. Dunn... Mrs. Dunn, I have a question for you. I'm from Venezuela. And here the problem is actually the opposite. It's the government will constantly misinforming and play with information. Which role do you think can civil society play to ensure that the information we get is trustworthy? And how can we combat skepticism from civil society? Thanks.



**24:04:** Yeah. And that's what the Sunflower Movement is all about. Because people are, back then, were fed up with this... I still remember back in 2012, the first YouTube advertisement done by the cabinet back then, the Ma Ying-jeou presidency was a economic booster plan promotion. And in the advertisements you see for ordinary citizens of all different job castes, and looking at a booster plan floating past them not understanding any words, and the voiceover says, "Oh, you don't have to understand, just do it." [chuckle] And so that's like, brainwashing or something. And I'm sure that they mean it in a tongue-in-cheek way. I mean, with no malice, but what people are perceive when you see it on YouTube is just that the government doesn't trust its people. And so they're working very hard for the people, but not with the people and certainly not after the people. And so that's what the Occupy is all about. I'm not suggesting you do Occupy, I must say that again. [chuckle] But on the other hand, what we did before the Occupy was essentially culture jamming, is to take all the government's ideas and Digital Services, building in each and every Digital Service, something.gov.tw, a shadow website, something.g0v.tw that delivers the same service but from a civic participation perspective, so it's what we call fork the government, careful with the pronunciation.

**25:32:** So when we all fork the government, it's offers alternative visions, and we don't even have to push out advertisements as the "gov zero" movement, because people will just then change one letter to one digit on their browser and get into the shadow government. And moreover, we always relinquish the copyright involved, for example, on the budget visualization, on the air quality visualization and so on. And so when the middle layer public servants, career public servants actually see it making rounds on the news, they have a much better case to talk to the career politicians saying, "Is something that's for free, or maybe we can do a reverse procurement," and that's reverse procurement culture really builds solidarity between the public servants on one side and the civic movements on the other, kind of ignoring, bypassing the top level politicians, so that's something that you can consider as well.

**26:23:** These are such interesting ideas for us to consider, and we're literally in the US government, just nowhere on any of these, so we may ask you to come over to train us. Let me turn to one last topic while we've still got you, and that is in the US, of course, there's a huge worry now, a national security worry about the technology race with China, and the Trump administration has taken a very tough line recently, the Commerce Department came out saying TSMC and other semiconductor companies that where the chips are partly designed in the US, can't sell to Huawei and others, semiconductors are a key strategic area for us. How do you see that in Taiwan? Do you think the US government is right to restrict these sales to Huawei? Do you think...

[overlapping conversation]

**27:11:** Well, when it comes to 5G core infrastructure, we had that deliberation six years ago, except it's 4G, but the consensus on the street remains true to this day, actually even more true, which is to say that there is no private sector company in the PRC when need it be [27:30]        the party can always through their party branches embed it in the large companies or even swap the leadership through non-market means, and so at that time, our consensus was that we need to just bond in the cling path from end to end, or the 4G supply chain PRC components. I think we're the first one to do that on a National Security Council and National Communication Commission level, and that's because the popular mandate from the occupy was so strong, so in a sense, we welcome US on

board, I guess, in joining us in such considerations, but we also would emphasize the means about which we arrive to these conclusions as people with all the different stakeholder groups actually coming together and deliberate, and so this was not seen as something President Ma Ying-jeou unilaterally imposed on the market, rather this is all the telecom operators, all the experts, all the people who are interested in cyber security and proficient in cyber security and so on, coming in a public debate live stream to the entire country, and they eventually, after three weeks, agree on that.

**28:40:** Yeah, you're absolutely right, and it has been very unilateral from the administration here in the US. I write about this a lot, I have a lot of friends both on the West Coast and East Coast to do as well, both to do exactly what you're saying is, have real consultation with the private sector on rational restrictions rather than imposing them, and then another idea that I'd wanna get your take on is more and more of us, I wrote articles on this, I have friends writing them now, to think through how do we coordinate better with our friends, including Taiwan, South Korea, Germany, in some instances, on these big technology issues, so it's not each country unilaterally. Do you see any of that happening informally, and if not, would you be in favor of more of it?

**29:27:** Yeah, of course.

**29:28:** Coordination between...

**29:29:** Yes, and I think we've already had a US-Taiwan joint statement countering Coronavirus, and that led to directly the Cohack, which you can interpret as Coronavirus Hackathon or Collaboration Hackathon, your choice, and then it led to actually a lot of really good ideas from seven countries, 53 teams, and the idea is that we, again, use the same AI moderated conversation, the Polis method, to make sure that the different norms across UK, Germany, Hungary on one side, Canada, USA on the other, Japan and Taiwan in the middle I guess, well, that's how we paint that map, and can arrive to the middle, and so there were different norms that were controversial, but a good thing about AI moderated conversation is that we can always settle on the things, ignoring really the ideological differences and settling on the things that people have brought agreement on. So like we just said, okay, these are the places where the US norm, the European and the Taiwanese and Japanese do not agree, but these are the things that people do agree most of the time, it was most of their global neighbors on everything.

**30:37:** So the Cohack hackathon led to innovations such as the lock board which traces your own phone's movement, your temperature, whatever, but it doesn't transmit it anywhere, it works entirely in airplane mode, and when the contact traces come to you, you can with one click, generate this one time link that contains only the deidentified information that the medical offices need for to doing their work without divulging more private details of your friends and family, so that's privacy-enhancing technology.

**31:10:** That's very helpful, thank you. Let me just ask you one more, since you're a former, you're an open source coder, you're a big believer in...

**31:20:** Still, still a civic worker.

[overlapping conversation]

**31:20:** Hopefully and still are, many of us are as well, and we're big believers in it. There's a new controversy now, especially on the West Coast of the US about artificial intelligence and open source. As you know, so many new things in AI are just put out immediately on open source because the field is developing so quickly. Now people say, "Well, the Chinese mainland researchers often mine this information, but they don't contribute in kind, so we should stop permitting this." How do you feel about that?

**31:51:** Yeah, there's, I think not entirely everything is open source, like the GPT3 model, I believe, is not yet open source, the huge transformer thing, right? And so, I mean, there's the source code part, which is essential for academic research, but there's also the data, the model, the actual trained material and things like that, the processes. And I think in Taiwan, we mandate open API in our procurement, that is to say, providing the accountability and value alignment for assistive intelligence products, but we do not say that it has to be entirely open source, because if we do that in the procurement laws and regulations, people will just hide everything on the stack beneath it and just open source this very thin code above that, which is not what we want to encourage. We want to encourage people to get into the habit of seeing AI not as artificial but assistive intelligence and start with the design with the social norm in mind, and in that sense then, mining the social norms is not that big a problem because it's essentially qualitative data of what people would agree the AI to do, that's the value alignment.

**33:05:** And then you implement, proving that you align to this value in a way that instead of internet of things, you can build the internet of beings, which is part of my job description anyway, so that will then make a more norm-based innovation, and I think this dilemma only occurs when the private sector innovate, as you said, on a break neck speed, but without taking this full social inputs in mind.

**33:30:** Absolutely, that's a very good answer. Thank you so much for taking the time to be with us. I know it's very early for you, and I hope at some point post-COVID, we can welcome you in person, either out at Stanford where I am, or at Aspen. Thank you so much.

**33:46:** Thank you. Live long and prosper.

**33:47:** Thank you, you too.

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