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Demetri Kofinas: 00:00:17 If you want access to overtime segments, episode transcripts, and show rundowns full of links and detailed information related to each and every episode, check out our premium subscription, available through the Hidden Forces website or through our Patreon page. And, remember, if you listen to the show on your Apple Podcast app, you can give us a review. Each review helps more people find the show and join our amazing community.

Demetri Kofinas: 00:00:45 And, with that, please enjoy this week's episode.

Demetri Kofinas: 00:01:06 What's up, everybody? This week's episode of Hidden Forces is phenomenal, and the overtime is even better, because Jamie Metzl and I spent it talking about all the crazy geopolitical news that dropped last week. I know what you're all thinking. "Wait, I thought this episode was about futuristic stuff, like bio-hacking and gene editing?" It is, and it's a testament to Jamie's intellect that he can write a book on genetic engineering while also being an expert in national security and foreign affairs with a PhD in Asian History from Oxford.

Demetri Kofinas: 00:01:42 Wikipedia describes Jamie Metzl as, "an American technology futurist, geopolitical expert, and writer," but he's also a novelist, entrepreneur, and media commentator. He's authored six books, including one with his former boss Richard Clarke, who he worked for at the State Department and during his time serving in the National Security Council.

Demetri Kofinas: 00:02:05 If that name sounds familiar, it's because it's the same Richard Clarke who was National Coordinator for Counter-terrorism during the late Clinton and early Bush administrations. Clarke became the stand-in whipping boy for anyone opposed to the Iraq war in the spring of 2004, when he published a memoir about his service in government, which was highly critical of the Bush administration's attitude towards counter-terrorism before the 9/11 attacks. He also testified before the 9/11 Commission, which we discussed during the overtime of episode 72 with Senator Bob Kerry, who served on that commission.

Demetri Kofinas: 00:02:45 If any of this sounds remotely interesting to you, I suggest you subscribe to our Patreon overtime feed, and delight yourself with 30 minutes of hardcore geopolitical history and current

affairs, including a discussion about US-China relations, North Korea's nuclear program, post-Soviet Russian history, Iraq, Iran, and so much more.

- Demetri Kofinas:** 00:03:08 In terms of the full episode that you're all about to listen to today, it focuses on the subject of Jamie's latest book, *Hacking Darwin*, and about what's happening at the cutting edge of genomic science, synthetic biology and big data. Stuff like designer babies, bio-hacking, bringing back the woolly mammoth, and creating hard drives out of organic tissue dense enough to store the entire internet 10 times over.
- Demetri Kofinas:** 00:03:37 But it's also an honest conversation about the ethics and prudence of human innovation, and how it's creating a world that, to many of us, no longer feels like home. I asked Jamie about the social, political, and economic implications of such a world where wealthy, well-connected elites or nations with authoritarian governments and little regard for human rights are able to get their hands on these technologies before the general public, how we can expect to navigate such a world, and what it all means for you.
- Demetri Kofinas:** 00:04:12 So with that, please enjoy my very geeky conversation with Jamie Metzl.
- Demetri Kofinas:** 00:04:22 Jamie Metzl, welcome to *Hidden Forces*.
- Jamie Metzl:** 00:04:25 Thanks, Demetri. Happy to be here.
- Demetri Kofinas:** 00:04:26 I just asked you before we turned on the microphones how you pronounced your name, and it reminded me of a conversation I had with ... I can't remember who it was. We were talking about ... Oh, it was David Weinberger! And I was screwing up his name, and he said that when he was growing up, kids would say, "Do you want some wine with that burger?" Did people come up with names for you, like pretzel? Like Jamie "Pretzel" Metzl, or something?
- Jamie Metzl:** 00:04:49 This is this kind of thing where for everybody who has a name that's at all interesting. At various points in your life, people will get this little light bulb above their head, and they're like, "Oh, I'm the first person to think that Metzl rhymes with pretzel. This is going to be really witty!" It's like, God, you know, you're like the 10,000th person. It's the first time you've figured it out, which is great.

Demetri Kofinas: 00:05:11 [Laughter] Oh, man. That's exactly what happened before we turned on the microphones. I was like "Pretzel! Like pretzel!"

Jamie Metzl: 00:05:15 Yep.

Demetri Kofinas: 00:05:17 Well, I'm glad I made fun of it afterwards because it brought some levity to it.

Demetri Kofinas: 00:05:21 It's great having you on the show.

Jamie Metzl: 00:05:22 Thanks.

Demetri Kofinas: 00:05:23 I told you, I read your book. Great book. I watched your episode with Joe Rogan. How was that, by the way?

Jamie Metzl: 00:05:28 It was great. I mean, Joe's a great guy. We had a wonderful conversation, and so for someone like me, I write a book like this. If the only people who read this book are people who listen to NPR, I've failed. I've written a book about the future of genetic engineering, which is going to touch everybody, and I'm really trying to reach everybody. I did an interview yesterday with this wonderful guy, a comedian who does a lot of his interviews from a rig of his truck. Joe Rogan, it's been downloaded three million times. It's just connect with people all around the world, and that's what I'm trying to do, so I'm thrilled to be here with you.

Demetri Kofinas: 00:06:05 Doing Joe Rogan's podcast is like doing a network. Bigger than any network today.

Jamie Metzl: 00:06:09 It's bigger.

Demetri Kofinas: 00:06:10 Yeah, bigger. Like the old days.

Jamie Metzl: 00:06:12 People are trying to get into the Today Show and all these-

Demetri Kofinas: 00:06:15 Who cares?

Jamie Metzl: 00:06:15 Good Morning America. Joe Rogan is way bigger. And the thing I loved about Joe, he's just really open minded. He's just kind of "Let's see where the wind takes us," which is great.

Demetri Kofinas: 00:06:26 Yeah, he is. Joe's no idiot-

Jamie Metzl: 00:06:27 Not at all.

Demetri Kofinas: 00:06:27 But there's some subjects he knows better than others, and I was really surprised about how much he knew about this.

Jamie Metz: 00:06:32 Yeah. No, he was great.

Demetri Kofinas: 00:06:34 Well, it's great having you on. There's so much to talk about. I put together this rundown here, and it's focused mainly on genetic engineering. I also threw in syn-bio and biotech, and some stuff around AI just because a lot of that stuff touches on it, and I know that you talk about it and think about it.

Demetri Kofinas: 00:06:51 What do you consider yourself?

Jamie Metz: 00:06:53 I'm a technology futurist and geopolitical expert.

Demetri Kofinas: 00:06:56 Right, okay.

Jamie Metz: 00:06:56 And basically what I'm trying to do is to look at what are the biggest forces changing the world around us, and to understand them and to explain them. And because these issues, the geopolitical changes, primarily the rise of China, and the technological changes, this super convergence of technologies that are going to change our lives across the board, there's two huge stories, and they're connected to each other. So I'm really trying to tell the story of everything in the way people can understand.

Demetri Kofinas: 00:07:24 Well, we're recording this on Wednesday that 29th, right?

Jamie Metz: 00:07:27 Yep.

Demetri Kofinas: 00:07:28 Today is the 29th of May. That story came out about rare earth minerals and the Chinese restricting their export. What do you think of that?

Jamie Metz: 00:07:35 Well, China is going to use the leverage that it has to fight in this trade war. Certainly, China has taken advantage of its access to the global trading community, particularly since it joined the WTO. It was inevitable because of China's strategy of stealing as much as it could and gaming the system that there was going to be a response. And now we're in a bit of a knife fight. I certainly wouldn't have done it the way that Donald Trump has done it. I think that we would've been in a much stronger position had we had the Trans-Pacific Partnership and the T-TIP, the Atlantic free trade agreement, because then the US would have been this colossus basically, dominating global trade.

Jamie Metzl: 00:08:11 We're in a much weaker position, but this is a fight, and it's really serious. And the leadership of the world in the 21st century is in many ways at stake.

Demetri Kofinas: 00:08:20 You mean you would've done TPP and focused on, let's say, holding them accountable for IP and stuff like that separately?

Jamie Metzl: 00:08:28 Yeah, so I think what I would've done is I would've rallied the rest of the world because everybody is worried about China.

Demetri Kofinas: 00:08:33 Yeah, that's another thing that's totally crazy.

Jamie Metzl: 00:08:33 Yeah, so don't pick a fight with Canada. Don't pick a fight with Europe. Just say that we, Canada, Europe, Japan, we are all going to stand together, and we're going to say these is what we expect for anybody, China or any other country, that wants to access and benefit from this free trade system. If you do it, we welcome you. If not, we are going to box you out.

Jamie Metzl: 00:08:52 So right now, China has this opportunity to go around us, to go to our allies and make side deals with them. So we're in a much weaker position than we otherwise could be.

Demetri Kofinas: 00:09:01 Yeah. Also, you don't prod North Korea with a stick, pull out of the Iran nuclear deal, piss off Europe, piss off the Canadians, and then try to negotiate a deal with China. It makes no sense at all.

Jamie Metzl: 00:09:12 It makes no sense.

Demetri Kofinas: 00:09:14 But a lot of people think that Donald Trump, that there's a method to the madness. I don't think so. I think there is a method to it, but I don't know that that method is ... First of all, even if that method works in other domains, let's say it does, it doesn't mean that it works when you're President of the United States, right?

Jamie Metzl: 00:09:30 There may be a method, but it may not be a method that benefits the United States. I think what the method is is that he has this one thesis, which is true, and he's proven true, is that if you dominate the media, it doesn't matter how ... It doesn't matter whether there's good stories or bad stories, the goal, even this whole negotiation with North Korea in mind, and I've been saying this publicly since the beginning, it's been a sham. There has never been any prospect of North Korean denuclearization, but the goal was to generate stories to have media buzz. And so every one of these problems that are created, that's the goal, and it's working.

Demetri Kofinas: 00:10:05 What a stupid thing to attack North Korea ... Not literally militarily, but in the way he has, and then pull out of the Iran nuclear deal. Why on earth would North Korea ever give up their nuclear missiles if you just pulled out of the Iran nuclear deal?

Jamie Metzl: 00:10:19 Yeah, so if-

Demetri Kofinas: 00:10:20 But that makes no sense at all.

Jamie Metzl: 00:10:22 If we were able to get basically the exact Iran nuclear deal with North Korea ... Just cross out Iran and put in North Korea, it would be this incredible triumph. Donald Trump would be jumping up and down for joy, and it's way more than we could ever dream of getting with North Korea. So there's this chaos, and even his own advisors are trying to hold the line.

Jamie Metzl: 00:10:42 There was a thing in the New York Times yesterday, John Bolton, and John Bolton is kind of a lunatic himself, but at least he has a consistent philosophy. And it's really worrying because this isn't reality television. This is the United States of America, and there's a reason why the US plays the role that we do in the world is that we didn't used to play it. And certainly in the period leading up to and the first world war, and between the first and second world war, the world fell apart. And the US is playing this role for our own good, and we've done a great job. And we're just hacking away at this international system that we've helped build without a sense of what comes next.

Demetri Kofinas: 00:11:19 I think it's great. I think there are positives to having Donald Trump in office because I think he's been a catalyst for much needed change and debate, because I think the Washington establishment has gone off its rocker. And also the establishment, to use that term, is responsible for the Iraq War. So they're not exactly omniscient, and the public knows that.

Jamie Metzl: 00:11:37 Yeah, I agree. And certainly we need some change, but throwing a hand grenade is a form of change, and I think that given-

Demetri Kofinas: 00:11:45 It's super dangerous.

Jamie Metzl: 00:11:45 It's dangerous.

Demetri Kofinas: 00:11:46 And John Bolton, you mentioned it, he's the only neocon in the administration, right?

Jamie Metzl: 00:11:49 Well, yes-

Demetri Kofinas: 00:11:51 Cristal's on the outs with the Trump administration.

Jamie Metzl: 00:11:54 The whole thing is it doesn't even matter what these individuals' philosophies are because wherever you go to have power, you need to suck up to Donald Trump. Look at Mike Pompeo. I mean, who knows what he stands for, if anything, but the mission is Donald Trump says something or tweets something, and then you have to strike a balance. If you're a cabinet secretary, strike a balance between doing your job and not violating whatever has been said or tweeted. So it's really an unfortunate and chaotic situation.

Jamie Metzl: 00:12:22 I've worked with Democrats and Republicans my whole life, and, yes, the post-war consensus, that was bound to fray anyway. And, yes, we need change, we need to do things differently, but this is not, in my mind, the best way to do it.

Demetri Kofinas: 00:12:35 I want to get to your book and to the subject of the episode, the formal subject, though I do want to get back to these topics. But I want to ask you one more thing. Are you concerned about the geopolitical dynamics, and particularly, there's been a lot of talk about sending troops to Iran.

Jamie Metzl: 00:12:52 We are sending troops to Iran.

Demetri Kofinas: 00:12:53 So we are sending them.

Jamie Metzl: 00:12:54 Yeah, 1500.

Demetri Kofinas: 00:12:55 Are they on their way already?

Jamie Metzl: 00:12:56 They're on their way, yeah.

Demetri Kofinas: 00:12:56 Really?

Jamie Metzl: 00:12:57 Yeah.

Demetri Kofinas: 00:12:57 Where are they going there from?

Jamie Metzl: 00:12:59 From here. Yeah.

Demetri Kofinas: 00:13:00 From here?

Jamie Metzl: 00:13:01 Yeah, yeah.

Demetri Kofinas: 00:13:02 So when they say that they're sending them to Iran, what does that mean?

Jamie Metz: 00:13:03 They're not direct there. They're going to the border, to the Persian Gulf.

Demetri Kofinas: 00:13:07 Wow.

Jamie Metz: 00:13:09 Yeah. No, this is-

Demetri Kofinas: 00:13:09 What if there's crossfire? What if something happens? What if a mistake happens?

Jamie Metz: 00:13:13 Yeah. The US has a really important global role of maintaining peace and security, but we need to do it wisely, and we need to have consistency. One of the reasons it's important that the US President of the United States have a credible voice is when the President of the United States says something, it has to mean something. That's why we can survive without an army of 10 million people to help police the world. And so right now, there's just a lot of uncertainty. Nobody knows what Trump is going to do. In some ways, maybe that creates advantages, but it really makes everybody around the world feel uneasy. And what we want is security and stability. What we want is trade, and growth, and all of those things. And there certainly are some countries, particularly China, that have been gaming us for a lot of years, and we need to stand up to that, but we need to be smart.

Demetri Kofinas: 00:13:57 Did you see the Mueller press conference at DOJ?

Jamie Metz: 00:14:01 I did, yep.

Demetri Kofinas: 00:14:02 What do you think of that?

Jamie Metz: 00:14:05 He is such a conservative guy. His whole brand is he's by the book, and he's a Boy Scout, but certainly he was delivering a message to Barr, and saying, "Hey, your characterization of the report is not wrong." And he said, "If we had found that the Trump administration and Donald Trump had not broken the law, we would've said so."

Demetri Kofinas: 00:14:27 Yeah, that's pretty damning.

Jamie Metz: 00:14:28 So that means if we didn't find that he didn't break the law ... And he said, "We were bound to not charge. We had no option of charging the President, and every American should be concerned about Russian interference, and other branches of Congress should investigate." So I think it was pretty clear.

Demetri Kofinas: 00:14:46 I mean, you're depicting it correctly, but listening to it sounded much worse than that. If I was the President of the United States, I'd be shitting my pants.

Jamie Metz: 00:14:54 Well, every time we say that, and yet there's this momentum. And Donald Trump has done just a great job of controlling the narrative. I think, again, that's his great insight is if you control the narrative, everything else just kind of passes through. Every day, there's another big expose somewhere, and it just kind of passes through. Maybe it will all add up, and certainly we thought that with Democratic control of the House, there was going to be more accountability. We haven't seen that. The administration is just flagrantly flouting the norms of our democracy, not sending people to testify in contempt of Congress. And so, hopefully, there'll be some accountability, and that's not a Democratic position. I think all of us, all Americans, we live in a system that's based on this balance of power, and we don't know who's going to be the president. These issues could be just as well the issues with a Democratic president. We need to really focus on strong institutions and the culture of our democracy.

Demetri Kofinas: 00:15:48 I think both sides of the aisle have lost so much credibility, and so has the media. I think we're in a very different place politically and culturally than we were during Watergate, you know what I mean? Because I think they see it politically. People see it through a political lens.

Jamie Metz: 00:16:03 Yeah. Well, in Watergate, we still had this political culture. We had the culture in the 1940s where it was everybody was together, and we were fighting this war. And then in the later 40s and the 50s, there was a sense we have this great, new responsibility. We're building our country, rebuilding the world, and then things started to break down. Watergate was this low point of feeling that, well, this culture of confidence and certainty that we'd had in our democracy was breaking down.

Jamie Metz: 00:16:34 But now it's so much worse. I mean, when people think about our democracy, they think it's stable because you go to Washington, you see these buildings. They're concrete buildings. You're voting for people. But all democracy, all political systems, are cultures. The stuff that you don't see is more important than the stuff you see, and so there's a reason why people don't go around running every red light, or killing people, and that we internalize these structures. But once we have the voice from the top saying, "Hey, it's okay. You don't need to follow the law. Culture doesn't matter," you see what happens in society. I lived in Cambodia for two years, and I saw

firsthand what happens when a political culture breaks down, and that's really scary for everybody.

- Demetri Kofinas:** 00:17:15 I'm also worried that Donald Trump will welcome a conflict, that he'll push it. This is not the first time that presidents have either gone to war or used foreign policy as a tool for domestic advantage. Even the Nixon team before Nixon became president, I think before he even won the Republican nomination ... I can't remember when it was, when he and Kissinger undermined talks that LBJ was having with Vietnam. Clinton bombed Bosnia during the Lewinsky scandal. Whether that was done in order to distract the nation's attention or not, it certainly did, and Wag the Dog was a movie that was made based off of that war, right?
- Demetri Kofinas:** 00:17:54 Of all the people in the world, I would imagine Donald Trump would feel the least conflicted about using foreign policy as a tool to distract the nation, or to create some kind of national emergency. By the way, I don't talk politics on the program, so listeners should know I'm not making a political statement here. I'm just stating the obvious. I just think it seems very obvious to me, and it's not a political critique.
- Jamie Metz:** 00:18:16 Well, this feels like a very volatile time. This center of our political culture is breaking down, and we don't have anything new to replace it. And so it's a very vulnerable time. People are afraid. The President of the United States is stoking fear and stoking division, and there's just a lot of unease. Crazy stuff can happen. We've been relatively lucky that really bad things haven't happened, but you just never know. That's why in peace times, like now, we need to be investing in the things that bring us together, and having a political culture that's cohesive. And not pitting people against each other, but saying how can we collaborate? Because there will be tough times, and if we haven't prepared in the easy times for the tough times, then we're really in trouble.
- Demetri Kofinas:** 00:19:00 I'm with you 100%. The very last episode that I did was with Eve Ensler.
- Jamie Metz:** 00:19:05 Right. Sure.
- Demetri Kofinas:** 00:19:06 Right, exactly. And this is what I said, which is that I don't see eye to eye with Eve Ensler. We come from completely different perspectives, but I didn't bring her on the program so I could debate with her, or have some sort of adversarial discussion. I brought her on because I genuinely want to learn her perspective because she's from a different world than I am.

Jamie Metzl: 00:19:23 That's the whole point.

Demetri Kofinas: 00:19:23 If we can't listen to each other-

Jamie Metzl: 00:19:23 Yeah, what happens?

Demetri Kofinas: 00:19:23 Exactly. We're in total agreement, Jamie.

Jamie Metzl: 00:19:29 Yeah.

Demetri Kofinas: 00:19:29 So let's get to the subject of your really great book, and then I'm sure we'll get back into what we're talking about now, because it's so timely and interesting. Your book begins by ... We did an episode with Eric Schadt, I should let listeners note, Episode 15, where we spent a good chunk of the beginning of the episode ... Eric Schadt of the Icahn Institute and Center for Genomics, and we spent the beginning of that episode discussing what a gene is, the chemistry and molecular chemistry of DNA. So for anyone that's interested in getting into that stuff, because Jamie talks about that in Chapter One. I think that Chapter One is devoted to that, so we're not going to discuss that here because there's so much other interesting stuff to discuss.

Demetri Kofinas: 00:20:12 But, Jamie, do you want to give me a synopsis, or for our listeners a synopsis of the book, and why you wanted to write it?

Jamie Metzl: 00:20:18 Yeah, that's great. As everybody knows, the blueprint for us is our genome, and so when you have your mother's egg, your father's sperm fertilizes that egg, and that begins the process of you, and every one of your cells has that code, which tells the whole story of what you are going to be in many ways. And for four billion years, since we and all of life on earth began as single cell organisms, we've evolved by these tools of random mutation and natural selection we call Darwinian evolution. And now, for the first time ever, we are increasingly gaining the ability to rewrite the code of life, of the life around us and the life within us. And that is going to change everything.

Jamie Metzl: 00:21:00 We understand that our information technology is readable and writeable and hackable, but we are increasingly going to appreciate that our genetic code is increasingly readable, writeable, and hackable. And that's going to change the way we do health care. It's going to change the way we make babies, and ultimately, it's going to change the nature of the babies we make and our evolutionary trajectory as a species.

Jamie Metz: 00:21:21 And I've written the book because this is the story of us, and it's real, and it's imminent, and it's going to touch all of our lives really soon. And there are huge ethical issues, and the only way we're going to make sure that these incredibly powerful technologies are used to help us and less to hurt us is if we are all part of the process. If we have an engaged dialogue about what are the better uses and what are the worse uses of these technologies. And the book, it's written to be totally digestible. Any high school student could read it very comfortably. There's jokes in there. It has a very conversational style.

Demetri Kofinas: 00:21:57 It's a very good book. It's very comprehensive.

Jamie Metz: 00:21:59 Yeah, good. That's the goal.

Demetri Kofinas: 00:22:00 How did a guy who worked for Richard Clarke at the State Department and for the National Security Council get involved in this stuff?

Jamie Metz: 00:22:08 Yeah. It's a great question. So Dick, who is my former boss when I was on the National Security Council in the Clinton Administration, he was really one of the inspirations for this book because he then used to say if everyone in Washington is focusing on one thing, you can be sure there's something much more important that's being missed.

Demetri Kofinas: 00:22:24 For those who either need a memory jog, or who don't know who Dick Clarke is, he wrote Against All Enemies. I think that was published in 2004?

Jamie Metz: 00:22:33 Yeah.

Demetri Kofinas: 00:22:33 He was railroaded by the Republicans and by Fox News in particular for coming out against the administration. In fact, he was also railroaded by certain people on the left, as well, because many people had aligned themselves with the Iraq War. And Dick came out against it, and he criticized the Bush administration for missing red flags that he threw up about Osama bin Laden.

Jamie Metz: 00:22:55 Yeah, and I was in that office, and Dick used to always say that if everyone is focusing on one thing, everyone in Washington, you can be sure there is something much more important that's being missed. And so, at that time, his issues were terrorism and cyber, and so starting more than 20 years ago, I started thinking really deeply about what are those issues that are being missed? And I kept coming back to the burgeoning then

genetics and biotech revolutions, and so I started educating myself, reading everything that I could get my hands on, talking to people. And then I started writing articles. A member of Congress, Brad Sherman, read one of my articles and asked me to help him organize a hearing, and be the lead witness. I was doing a lot of writing.

- Jamie Metzl:** 00:23:31 And then I realized this was such an important story. I wasn't breaking through to people. So then I wrote two near-term science fiction novels that deal with the issues of the science but in a fictionalized story. And then when I was on my book tours for those novels, and when I explained the science to people the way a novelist would explain science, I could just see in their eyes people are saying, "Holy shit. That's what this is?" They'd heard these words: Genetics, DNA, whatever ... But they didn't know the story of how all the pieces fit together. And so that's when I realized I needed to write the story of the greatest transformation probably in the history of our species.
- Jamie Metzl:** 00:24:08 And right now, people get that there are big changes that are happening. People understand China's rising. People get that AI is a big deal. Some people appreciate climate change. The story of the genetics revolution is bigger, and most people aren't really aware of what's happening. Because it's going to touch everybody, we have to change that.
- Demetri Kofinas:** 00:24:26 Why is it bigger?
- Jamie Metzl:** 00:24:28 It's bigger because how do we perceive the world? We perceive the world through who and what we are, and we are going to change that. So I said life has been on earth, and so our precursor species go back almost four billion years. We've only been homo sapiens for about 300,000 of those years. We've only been the only humans on earth for about 40,000 years. So we're a really young species, and this was never the end point. Homo sapiens was never the end point. We're this buggy species. We have all these terrible diseases. We die young. So we were always going to change, and we are going to change, but now we are going to take active control of that process.
- Jamie Metzl:** 00:25:12 And you can see how we're changing the world around us already with farming, and industry, and cities, but now we will have access to the source code of all of life, and that's a big deal.
- Demetri Kofinas:** 00:25:25 How do you feel about that?

Jamie Metzl: 00:25:27 Mixed. On one hand, the history of our species is the history of our use of technology. If we didn't use our technology, we'd still be running around in the savannas. And so I kind of like technology. I like that I don't have to die of terrible diseases, that I have a home that has heating in the winter and cooling in the summer. But there are real dangers. We have the ability, like with nuclear weapons, to wipe out life on earth if we're not careful. We have the ability to use these technologies in ways that will undermine our humanity. And this is really sensitive stuff.

Jamie Metzl: 00:26:03 If you had asked the Nazis what they thought they were doing, they would've said "We're implementing Darwin's theories." That was the core philosophical foundation of Nazism. And so I'm very sensitive.

Jamie Metzl: 00:26:14 When I was giving a talk in Berkeley a few weeks ago with this wonderful man, a poet, whose daughter has Down Syndrome, and he was talking about what a blessing she has been in his life, and that's true for everybody. It was very sensitive for me to say that in 20 years from now, I don't think there are going to be very many kids born at least in the developed world with Down Syndrome. That's already the case. But what does that say about us, about our sense of what is normal and abnormal, about what are our values? So this is really sensitive stuff, and we need to be very prudent, and we need to be very thoughtful.

Demetri Kofinas: 00:26:48 Well, I was meditating on identity. I was meditating on what makes me feel uncomfortable, and what I think will make people feel uncomfortable, and what seems okay. And it seems to me that diseases, that things like Parkinson's, or sickle cell anemia, no one has a problem getting rid of those. I'm sure some people do, but when it comes to Down Syndrome, when it comes to deafness, when it comes to homosexuality, when it comes to some of these other genetically inheritable traits ... Or what would the term be?

Jamie Metzl: 00:27:22 Heritable.

Demetri Kofinas: 00:27:22 Heritable. In the latter cases, those are identity related ones. These are related to identity, and in cases like Down Syndrome, I was thinking about Life Goes On. Remember that show, Life Goes On?

Jamie Metzl: 00:27:34 Sure, yeah.

- Demetri Kofinas:** 00:27:34 I think that was the first show, at least the first show I know of, that not necessarily normalized ... I don't know, maybe that's the right word, but it brought Down Syndrome into the public consciousness, and it took it out of the closet. It made it somehow people with Down Syndrome are also people, and they have an identity. Not exactly the way that Tyrion Lannister did it for dwarfism because it's a fictional world, Game of Thrones, and Caitlyn Jenner with transgender, I think that what I wonder ...
- Demetri Kofinas:** 00:28:07 So, one, there's that, right? There's the fact that these people, let's say, won't exist anymore, and these are people. They're not diseases, right? And then also, what does that do in terms of our diversity? What do we lose by losing people who aren't, quote, "perfect?"
- Jamie Metzl:** 00:28:23 Yeah, and these are great and in many ways unanswerable questions, but we have to answer them anyway. And that is the first thing is how do we think about what's normal? How do we think about what is or isn't okay? And it's an illusion to think that we can just get outside of our culture, that there's some kind of objective reality of what is a disease, what is normal, what's abnormal. And yet we are going to be faced with these kinds of choices because this diversity has just happened to use for four billion years. It was built into our biology, and now this force that was just built in, it wasn't optional, is something we are going to have to choose. So we better articulate what we mean by diversity.
- Jamie Metzl:** 00:29:06 And certainly you take something like Down Syndrome, people who already exist with Down Syndrome are wonderful people. Many of them, a very significant number, have pretty significant health issues. They have a shorter life span. Lots of them have heart problems. But really wonderful people who have an equal right as anybody else to thrive.
- Jamie Metzl:** 00:29:26 But that's not the question that we're going to be asking. The question that we're going to be asking is if you are having a baby, and you have, let's say, 10 fertilized eggs, pre-implanted embryos in a lab, and you have to pick one of them to implant in the mother ... They're all your natural children ... Which is the one you will pick, and what will be the criteria you'll use to make that choice? And there's going to be a lot of culture that goes into that. There are going to be a lot of all our biases in the world will apply to those kinds of decisions.
- Jamie Metzl:** 00:29:58 And I do think that it's extremely likely that people in that scenario will not choose to implant embryos with Down

Syndrome because we already know that in northern Europe, for example, where they have prenatal genetic testing, so you're already pregnant and then you get tested at around three months ... When there's a diagnosis of Down Syndrome, the abortion rate is about 97%. So if people are already in parts of the world choosing to abort at almost 100%, they very likely aren't going to select to implant embryos with Down Syndrome.

Jamie Metz: 00:30:33 And so we really need to think about what diversity do we want, and who is the carrier of that diversity? So if we say that right now there's a certain percentage of the population that has Down Syndrome, and we want to maintain that percentage across the population in the future, how are we going to convince parents who people who are already pregnant are already aborting embryos with that diagnosis, how are we going to convince them to have those kids, to choose to implant those embryos? And it's really complicated.

Demetri Kofinas: 00:31:05 So that brings up something that we'll touch on later which is the game theory of all of this, that what you think other people are going to do with this technology will impact what you do. So I think that number would likely be smaller of the number of abortions if people didn't think that other people were going to do the same thing, and then thinking that their child is going to be basically one of only few with this particular disorder or mental disability or whatever it is. Where are we now? Let's bring it back here.

Demetri Kofinas: 00:31:35 So I said we're not going to cover how we got here, the revolution in genomics, but where are we today? What is standard practice, and what is cutting edge, and what's experimental that's happening?

Jamie Metz: 00:31:46 Right. So let me break it down into three areas. The first is in health care because health care is the most significant near term application of genetic technologies, and so we are in a process of moving from our system of generalized medicine based on population averages to precision medicine based on each person's individual biology. So you'll get drugs based on analysis of your own biology, which will be measured in many different ways, but the most important will be through having your sequenced genome as the foundation of your electronic health record.

Jamie Metz: 00:32:16 And then we have millions and then billions of people whose genetic information and phenotypic information of how those genes are expressed are in these big data pools. We're going to

increasingly unlock the secrets of the genome, and so that's going to move us into this world of predictive health.

- Demetri Kofinas:** 00:32:31 How many million genomes have been sequenced so far?
- Jamie Metzl:** 00:32:33 Well, it depends on what you mean by sequenced. So in terms of the genotyping, which is like the mouth swabs, that's probably, let's say, 20 million. In terms of whole genome sequencing-
- Demetri Kofinas:** 00:32:44 Very few, right?
- Jamie Metzl:** 00:32:45 I've done it, but relatively small numbers of people have done it. But we're going to move, because the cost of sequencing is moving toward negligibility, there'll be about two billion people within a decade who have been sequenced.
- Demetri Kofinas:** 00:32:55 When people talk about genomic science moving at a rate faster than Moore's law, are they referring to the cost of sequencing?
- Jamie Metzl:** 00:33:01 Yes. Yeah, the cost and the quality of sequencing. So, yeah, about a billion dollars in 2003, \$800 now, and it'll be \$50 within a decade.
- Demetri Kofinas:** 00:33:09 Wow.
- Jamie Metzl:** 00:33:09 And so we're going to move into this world of predictive health, and that means you're going to be taking your baby home from the hospital, and the doctor is going to say, "Congratulations, it's a boy, and just FYI, this boy has a 50% greater than average chance of getting early onset familial Alzheimer's."
- Demetri Kofinas:** 00:33:25 Straight out of Gattaca.
- Jamie Metzl:** 00:33:26 Yeah, yeah. And then you say, "Oh, shit. What does that mean? What do I do?" But it's not just that.
- Jamie Metzl:** 00:33:32 So then the second transformation will be this direct-to-consumer genetics. We don't have a disease genome, we don't have a health care genome. We have a human genome, and so as we unlock the secrets of the genome, it will be not just health information, it will be life information. This same doctor coming home from the hospital will also say something like "Your kid has a greater than average chance of being really fantastic at abstract math, or at sprinting," or something else. How do we think about fate? How do we think about destiny? How do we

think about choice when we start life with that information?
And that's all happening already.

- Jamie Metzl:** 00:34:06 And then the third area is in assisted reproduction. So right now, when a person goes for in vitro fertilization for a woman, and then you can do embryo screening called pre-implantation genetic diagnosis, and we can screen for mostly Mendelian single gene mutation disorders. Things like sickle cell and [crosstalk 00:34:23]-
- Demetri Kofinas:** 00:34:23 Hodgkin's.
- Jamie Metzl:** 00:34:23 Yes, and for chromosomal disorders, like Down Syndrome, and then some small number of other things. But all this information that I've been talking about we're going to have for these pre-implanted embryos, so we're going to be able to choose based on ranking embryos from likely tallest to shortest, likely highest IQ to lowest IQ, all of these kinds of things.
- Demetri Kofinas:** 00:34:43 How far are we from being able to do that, because height and intelligence, these are very complicated.
- Jamie Metzl:** 00:34:50 Exactly.
- Demetri Kofinas:** 00:34:50 There's not one gene for these things.
- Jamie Metzl:** 00:34:51 So height is being cracked now, so there's a lot of progress that's being made on genomic predictors for height. And so now it's not done, but it could be done. The science exists for a fertility clinic to say "We are going to make our best guess of ranking your, let's say, 15 or 10, whatever, pre-implanted embryos based on likely tallest to likely shortest. It's not fully accurate, but directionally, and certainly you could identify outliers like super tall, or super short.
- Jamie Metzl:** 00:35:21 When will we be able to do that for the genetic component of IQ? My friend, Stephen Hsu, who is probably the leading expert on this, he thinks it's within a decade. Maybe he's right, maybe he's wrong. Maybe it's 20 years, but it's coming.
- Demetri Kofinas:** 00:35:35 Crazy. Everyone in my family is a physician.
- Jamie Metzl:** 00:35:38 Me, too.
- Demetri Kofinas:** 00:35:39 Yeah, that's interesting. What are your ...

Jamie Metzl: 00:35:41 My father is a pediatrician. My mother is a psychologist. My oldest brother is a PhD MD in psychiatry. My middle brother is a sports medicine doctor.

Demetri Kofinas: 00:35:48 That's cool.

Jamie Metzl: 00:35:49 And my baby brother is an orthopedic surgeon.

Demetri Kofinas: 00:35:51 Oh, that's cool. My father is a prenatal diagnostic surgeon, perinatologist.

Jamie Metzl: 00:35:54 Oh, great. Yeah.

Demetri Kofinas: 00:35:55 And my uncle is a fertility doctor, and so is my cousin.

Jamie Metzl: 00:35:57 Oh, perfect. Yeah. I'm speaking to the Fertility Doctors Association next week in Chicago.

Demetri Kofinas: 00:36:03 Okay, cool. So they have a huge surgical center downtown. I think their results are, by far, the best of any that exist in certainly New York, but my cousin recently had a baby, his first child, and he selected the embryo himself.

Jamie Metzl: 00:36:18 Yeah. Based on what criteria?

Demetri Kofinas: 00:36:21 Oh, I don't know. You'd have to ask him.

Jamie Metzl: 00:36:22 Yeah.

Demetri Kofinas: 00:36:23 But I think that's interesting. The doctor himself, that's a unique case.

Jamie Metzl: 00:36:27 Yeah, but I think we're all going to want to do that. Right now, it's so scary for people because it's just different, but people are going to want to say ... Like if there's a three percent chance your kid is going to have some sort of harmful genetic abnormality, you're going to want to say, well, can we reduce that risk? Because that three percent is not insignificant. And if you have these options for things that you really value, and I think health first and foremost, longevity, living a long and health life, people are going to want that. And so we're going to have to figure out what is okay and what isn't okay?

Demetri Kofinas: 00:36:58 I was telling you before we turned on the microphones ... I don't think I mentioned it when we turned them on, but when I was writing the Why Do I Care thing, I realized that what I was focused on, what mattered to me, was affecting me emotionally

or that was speaking to me were not the technical questions. They were really the ethical, cultural ones. I think these are the most interesting and the most meaningful to people.

- Demetri Kofinas:** 00:37:25 Another thing that you talk about in the book, which I think is interesting and pertinent, is the differences between regions, countries, cultures, religions. You touched on it a little bit earlier. The Chinese, as far as I understand, are way out in front in terms of experimenting with this stuff, right? There was a physician-
- Jamie Metzl:** 00:37:46 He Jiankui.
- Demetri Kofinas:** 00:37:47 Yeah, exactly. You pronounced that name correctly ... Who I think he's going to go to jail or something like that because he didn't get consent. He didn't get informed consent from the parents.
- Jamie Metzl:** 00:37:56 I just did an event last night at the World Science Festival here in New York with Jennifer Doudna, who is the inventor of CRISPR/Cas9, a future Nobel laureate. I remember talking about this, and there was kind of a mini-debate between me and a Stanford bioethics professor, who was also on the panel. And he was very sympathetic to He, and I said, this guy, I think he's a villain. He's a rogue. Maybe he wasn't acting alone, but this is really just outrageous. And what he did was he genetically altered the embryos of what became two little girls born in China last October. And the reason it was so bad is, one, he was extremely secretive. He fudged the internal review board application, which was not for the hospital in which he was operating, but another one where he was an investor. He didn't get proper consents from the parents who were receiving these treatments for their embryos. He lied to them about what it was that they were getting. They weren't treating something, a disorder that existed. He was trying, it looks like unsuccessfully, to confer an enhancement.
- Demetri Kofinas:** 00:38:58 He tried to disable the CCR5 gene-
- Jamie Metzl:** 00:39:01 Correct.
- Demetri Kofinas:** 00:39:02 ... which has to do with HIV resistance. But it also is linked to higher levels of intelligence, right?
- Jamie Metzl:** 00:39:06 Well, there's some mouse studies that suggest that it could be, but there have been no human studies, so nobody really knows whether that's applicable to humans.

Demetri Kofinas: 00:39:14 There's some other thing that came up when I was doing that research. It starts with an M. I'm not remembering.

Jamie Metzl: 00:39:19 Mitochondrial transfer?

Demetri Kofinas: 00:39:20 No, it's not a mitochondrial transfer. We're going to talk about that, but in any case, it's some of the genes inherit-

Jamie Metzl: 00:39:25 Mosaicism. Yeah.

Demetri Kofinas: 00:39:25 That's it. So it's also mosaicism happening.

Jamie Metzl: 00:39:28 Exactly. And so for something like what he was trying to do, which is to increase resistance to HIV, if you become a mosaic person, and some of your cells are more resistant and some of your cells are less resistant, then you probably are overall less resistant.

Demetri Kofinas: 00:39:43 Right. Disaster, basically.

Jamie Metzl: 00:39:45 Yeah.

Demetri Kofinas: 00:39:45 Well, this is the thing that people worry about. It's because the Chinese have an authoritarian government. They have high levels of central control. Corporations, academia, et cetera, all these things function in a much more centralized way in terms of the party control that they're going to make huge leaps and advancements in this field and also in artificial intelligence, and given the fact that the hostilities that we talked about earlier, this is concerning. One of the things you talk about at the end of your book is that we need to have some sort of international approach to dealing with these problems. Good luck. Does not seem like it's even close to remotely possible, and the Chinese, by the way, don't seem like they have any intention to cooperate on any level.

Jamie Metzl: 00:40:34 Yes and no.

Demetri Kofinas: 00:40:34 And I don't necessarily blame them either, by the way.

Jamie Metzl: 00:40:36 Yes and no. So there's a lot there. Let me just try to unpack it a little.

Demetri Kofinas: 00:40:39 Sure.

Jamie Metzl: 00:40:40 It's certainly the story of the 21st century. One of the biggest stories will be this technology competition between China and

the United States. The US has the role we have in the world, we have been able to guide the world to build this post-war international order that's benefited everybody because of the economic and geopolitical advantages that we have. China does not like that structure of the world, and China is gunning for something that's very different.

- Jamie Metzl:** 00:41:08 I, for one, am much more comfortable with a world based around American values than I am for a world based on China's values.
- Demetri Kofinas:** 00:41:16 I would never choose to live in that world.
- Jamie Metzl:** 00:41:17 Yeah, but that may be-
- Demetri Kofinas:** 00:41:18 Our world's imperfect. Their world is dystopian.
- Jamie Metzl:** 00:41:21 Well, yes, in many ways. And so what we need to do is to make sure that we continue to lead the world, and the United States has dropped the ball, certainly in these recent years, and China recognizes that leading technology is a major part of its agenda for having a much greater say in the world, and their stated goal of being the world's leading country by the year 2050.
- Jamie Metzl:** 00:41:47 And so there's a lot that's at stake here, and China has a political culture that's very different from ours. This technology, you get a Nobel Prize for figuring out how to do CRISPR/Cas9, and last night I was saying and you get an A in your high school biology class for applying it. But then this high school biology teacher who was at my talk last night said, "Hey, you said you get an A in high school biology for applying CRISPR? You don't. Just applying, you get a B or a C, and you have to do it really well." So this is out of the bag.
- Jamie Metzl:** 00:42:15 And so we don't know where this is going to go. So the question is will we have a genetic free-for-all? There's a real chance for that. This book was already in production when the news came out that these genetically engineered babies, genetically altered babies had been born in China. I had to pull it back out of production, but I didn't have to make very significant changes because I had already said this is going to happen, it's going to happen in China, and here's why. And then I just added a few sentences, "and it did on this day."
- Jamie Metzl:** 00:42:40 And when the news first broke, in the first few hours after this story came out, there was a lot of triumphalism in China. Like "We did it. We're going to win this Nobel Prize. This is China

leapfrogging over the West, and now we're this leading technological country." But then when there was-

- Demetri Kofinas:** 00:42:56 Don't say we didn't warn you, right?
- Jamie Metzl:** 00:42:57 Yeah, exactly. But then when there was this international backlash, China immediately, and to its credit, its government leaders recognized that, hey, wait a second. If we want to lead the world, if we want to be a science powerhouse, we can't be this wild west. And so China has now pulled back, at least in public ways, and so I do think that China is a stakeholder because they don't want to be North Korea. They don't want to be a rogue actor. They want to be this central power in the world.
- Jamie Metzl:** 00:43:24 So I think there is an opportunity for us to find some common ground. Maybe it's not entire common ground, but some common ground.
- Demetri Kofinas:** 00:43:32 So you mentioned mitochondrial transfer. Was that the word you used?
- Jamie Metzl:** 00:43:35 Yes.
- Demetri Kofinas:** 00:43:38 So I think the first time that was done was, what, 2014?
- Jamie Metzl:** 00:43:39 Yeah, very recent. Yeah.
- Demetri Kofinas:** 00:43:41 Yeah. It's basically where you take a fertilized egg, an egg that's been fertilized, a mother's egg. The parents, let's say, a mother and father.
- Jamie Metzl:** 00:43:50 Right.
- Demetri Kofinas:** 00:43:51 The egg's been fertilized. You then take a donor egg. You take out the nucleus from the donor egg. You take the nucleus from the fertilized egg of the parents, and you put it in the donor egg. And now what you've done is you have 99% parents' DNA, but you've got a small amount of ...
- Jamie Metzl:** 00:44:05 Of mitochondrial DNA.
- Demetri Kofinas:** 00:44:08 Of mitochondrial DNA, and that was done originally for mitochondrial disease, but recently this was done in Greece. Very recently, like in May some results came out about this having been done to deal with chronically infertile patient.

Jamie Metz: 00:44:21 Yeah. So there's two ways of doing it. One is that at the egg level, and one is at the early stage embryo level, zygote level. And, yes, so this case happened in Greece, it happened once in Mexico. It's happened in Ukraine. It's almost certainly happened now in the United Kingdom, proved by their government through a very elaborate and responsible process. It's not yet authorized in the United States and it's very controversial because it's gotten wrapped up a little bit in the abortion-

Demetri Kofinas: 00:44:48 Are we going to fall behind because we have such a religious community?

Jamie Metz: 00:44:52 Well, we need to find a way to move forward with our religious community. I certainly would never begrudge anybody for their philosophy, especially something that's so sacred and intimate about their sense of when life begins. But-

Demetri Kofinas: 00:45:09 Because I remember, I just want for the audience as well, I remember when the Bush administration put a hold on stem cell research, and Michael J. Fox came out with an ad on the Superbowl, and Rush Limbaugh was making fun of him flailing around, and saying that he hadn't taken his medication when, in fact, he had actually been overdosing on his medication.

Jamie Metz: 00:45:28 Yeah.

Demetri Kofinas: 00:45:28 I mean, it's clearly a very sensitive issue.

Jamie Metz: 00:45:31 And we need to find a way to have this conversation together. Right now, we can't have a conversation about abortion. You just say the word, everybody runs, scurries behind their barricades, and we can't have that conversation. We have to have this conversation because why is it that we have people picketing outside of clinics that perform abortions, but nobody's picketing outside of clinics that are fertility clinics where people are getting IVF? And the reason is because people, even in the most conservative evangelical communities-

Demetri Kofinas: 00:46:03 They want to have babies.

Jamie Metz: 00:46:04 They're seeing these older parents coming with babies. These high risk people are getting babies, and they recognize that this is the miracle of life. Maybe there are some outliers in the traditional religious conservative community who think that it's okay, that it's good to implant an embryo, let's say, of a child who is going to have incredible suffering and die before they're one. Let's say you're choosing from among these 10 embryos,

some people will say that, but I think other people recognize that there's a difference between a fertilized egg in a dish in a lab and a 30 year old human being.

- Jamie Metzl:** 00:46:48 And I think that this is really, really difficult, and it's difficult for people to be honest about compromises that they have already made. But we have to find a way to have this balance, and we have to find a way to build a table that's big enough for everyone to sit at. Because what happens if we say, "All right, we're having this conversation about where our species is going, but you," and "you" could be religious conservatives, or it could be trans-humanist bio-hackers, "there's not a seat for you at this table." People are going to do their own thing, and then we're worse off.
- Demetri Kofinas:** 00:47:20 Yeah, of course. I agree with that.
- Demetri Kofinas:** 00:47:21 When we were talking about mitochondrial transfer, that was technically three parents.
- Jamie Metzl:** 00:47:25 Correct.
- Demetri Kofinas:** 00:47:26 I said 99%. It was like 99.99-whatever percent. How many genes are there in mitochondria?
- Jamie Metzl:** 00:47:31 It's like 37.
- Demetri Kofinas:** 00:47:32 Right. Nothing.
- Jamie Metzl:** 00:47:33 Yeah.
- Demetri Kofinas:** 00:47:34 How far are we from being able to have children from multiple parents where the genes are more evenly expressed? What would it take to get to that place?
- Jamie Metzl:** 00:47:45 We're not going to want to.
- Demetri Kofinas:** 00:47:45 You don't think so?
- Jamie Metzl:** 00:47:48 I think it would be very, very difficult. People have this conception. I think it's a misconception that we're going to sit at a computer, and you're just going to have a menu of all the different ... It's like Build-a-Bear.
- Demetri Kofinas:** 00:48:00 What an awful, awful, awful vision.

Jamie Metzl: 00:48:03 Yeah. I know, but I don't think that's even within the realm, because the complexity of our biology is just monumental. So that's what I think embryo selection, in my mind, and write about this ... I think that's the killer application.

Demetri Kofinas: 00:48:12 Why wouldn't you be able to do what I'm suggesting? Couldn't you fertilize an egg, and then fertilize another one?

Jamie Metzl: 00:48:18 Yes, but if you wanted to mix and match that DNA, you'd have to cut and paste. So you'd have to take big sections of DNA from one of these embryos-

Demetri Kofinas: 00:48:28 Oh, right. Super messy.

Jamie Metzl: 00:48:29 And place it into others. And because our genes are all doing so many different things, it gets really complicated. So, in my mind, the greatest living geneticists, the world's Charles Darwin of today is George Church, who is a Harvard professor. And George and I do a decent amount of events.

Demetri Kofinas: 00:48:47 He's a funny guy. What an interesting humor he has.

Jamie Metzl: 00:48:49 Oh, he's wonderful.

Demetri Kofinas: 00:48:50 He has under-the-radar humor. I bet he make jokes all the time people don't catch. They don't know him.

Jamie Metzl: 00:48:54 No, no. He's incredible, and so creative.

Demetri Kofinas: 00:48:56 Very creative.

Jamie Metzl: 00:48:57 We were just speaking together at Harvard a month ago, and he said that he thought within 10 years we'd be able to make thousands of concurrent genetic changes to human cells, and the way he's imagining doing it is not making changes at the early stage embryo level, but doing it at the egg and sperm precursor level. Because when you do that, you don't yet have the ethical issue of a potential or early stage human. This is just gene editing, egg precursor cells, and sperm precursor cells, and you can do it in the millions, and so you don't need to be maybe as careful, and throwing away things that don't work is easier.

Jamie Metzl: 00:49:38 So he thinks that we're going to be making many thousands of gene edits to these egg and sperm precursor cells, and it's possible, but my view is that there is just such an incredible complexity to our biology that interventions that don't require a complete understanding of how everything works, and I

certainly put embryo selection in that category, I think will be prioritized. And then small numbers of gene edits, either that significantly reduce risks or confer advantages, I think that we'll do that. But in 20 years, do I think we'll be making five or 10 individual edits to pre-implanted embryos? I think almost certainly. Do I think we're going to be making 10,000? No.

- Demetri Kofinas:** 00:50:21 Right. Well, there are two parallel tracks here. One is the editing technologies, and the ability to make those edits, and the other one is the genomic science, the mapping of the genome. Understanding what you're looking at and what you're doing.
- Jamie Metz:** 00:50:33 Right.
- Demetri Kofinas:** 00:50:33 Something that George highlights the dangers of working on a genome that you don't understand.
- Demetri Kofinas:** 00:50:38 Speaking of George though, is he going to bring back the wooly mammoth?
- Jamie Metz:** 00:50:42 So the thing that he's talking of bringing back is not, in fact, a wooly mammoth. It's like a funky Asian elephant.
- Demetri Kofinas:** 00:50:48 With hair.
- Jamie Metz:** 00:50:49 With hair, with a lot of mutations that could make it function like a wooly mammoth. And it's probably doable. I think whether it's going to happen-
- Demetri Kofinas:** 00:50:59 How far along is it?
- Jamie Metz:** 00:51:01 I don't know. I've talked to him about that, and nobody really knows. It's possible to gene edit embryos. It's possible to confer traits, and if it looks enough like a wooly mammoth, it's kind of like a wooly mammoth. And so that's kind of the basic message of this is that we recognize that our information technology is variable, but we think about our biology as being fixed. But biology is variable. Biology is hackable, and we are going to have the increasing ability to hack it.
- Demetri Kofinas:** 00:51:35 Right. Well, they got that DNA from some frozen specimen that he said was majestic. He said it was an entire specimen, and it was staring at him.
- Jamie Metz:** 00:51:42 And so that ability to sequence genomes from entities that exist a very long time, [crosstalk 00:51:49].

Demetri Kofinas: 00:51:48 That's called de-extinction. Well, not the actual sequencing, but-

Jamie Metzl: 00:51:50 The sequencing, it's basically what you need to do is amplify genetic information so you can tell the full story. And that's what's helping to get all this information about neanderthals, about the Denisovans, and also other extinct species.

Demetri Kofinas: 00:52:04 When you say "amplify," how do you mean that word?

Jamie Metzl: 00:52:06 So when you get the cells, the biological material deteriorates over time.

Demetri Kofinas: 00:52:10 Do you get noise though?

Jamie Metzl: 00:52:13 Well, you do, but that's why having these algorithms that help identify what's what.

Demetri Kofinas: 00:52:19 That's crazy.

Jamie Metzl: 00:52:20 So just imagine you have an old book, and you get the old book, and it's got water damage. And there's some places where there's letters, and some where there's not, and then how do you begin to tell the story of the whole book?

Demetri Kofinas: 00:52:32 Because most of that stuff is present in other animals in the species, so they can tell.

Jamie Metzl: 00:52:35 That's part of it. You can fill in. You can look at related animals, and you can start to fill in some of the story. And then once you do it once, once you have a reference genome, then it changes the game because with all this new information, you can map onto what you have.

Demetri Kofinas: 00:52:51 But you can only recover lost parts if those aren't unique to that particular species, if it's the first time that you're sequencing its genome, or to that animal, right?

Jamie Metzl: 00:53:02 I guess so it would be as you would just need enough genetic information to tell the story.

Demetri Kofinas: 00:53:05 This brings us to big data and machine intelligence part of this.

Jamie Metzl: 00:53:08 Yeah, right.

Demetri Kofinas: 00:53:08 And so he would implant this in a soon-to-be very surprised matriarch elephant.

Jamie Metzl: 00:53:14 Not even surprised. Who looks into themselves when they're pregnant? It's like, oh, I'm pregnant.

Demetri Kofinas: 00:53:18 But when it would come out, she'd see it. She'd see the baby with hair on it. She'd be like, "What happened to my kid?"

Jamie Metzl: 00:53:22 And she'd think, "Maybe it was that one night in the bar."

Demetri Kofinas: 00:53:27 "When I screwed that gorilla."

Jamie Metzl: 00:53:28 Exactly. But, no, that elephant. That hairy elephant.

Demetri Kofinas: 00:53:33 Yeah, exactly.

Demetri Kofinas: 00:53:34 There was another interesting thing that I read about this which is that the idea is to also actually use ... I don't know how much this is just kind of after the fact, trying to push the research forward, but to use the elephant to help combat issues around methane gas emissions from permafrost in the arctic.

Jamie Metzl: 00:53:51 That's the justification, and I'm sure that with that goal, there are different ways to do it. Resuscitating the woolly mammoth is probably not the top if you're just starting from scratch, but maybe it could do it in a marginal way.

Demetri Kofinas: 00:54:01 So that's a case where they're basically saying ... Because most people would look at this and say, "What are the risks associated with bringing back an endangered or an extinct species?" In this case, they're saying it could actually be helpful.

Jamie Metzl: 00:54:12 We live in these complex ecosystems that are adaptive, so what about bringing back a virus?

Demetri Kofinas: 00:54:19 You could bring back anything, yeah. Church said that they reconstituted the 1918 flu. It wasn't him. It was somebody-

Jamie Metzl: 00:54:24 It was a horse pox. It happened, I think, in Vancouver. Somewhere in Canada, there was a lab. They spent \$100,000 and they created this strain of horse pox, which is very closely connected to small pox. And so all this stuff is possible, and so we are, as I was saying, gaining access to the toolkit of life, and we better use it responsibly.

Demetri Kofinas: 00:54:45 I heard Church also say something about how genetically altering the human genome could actually make people resistant to all viruses.

Jamie Metzl: 00:54:57 Yeah.

Demetri Kofinas: 00:54:57 How does that work?

Jamie Metzl: 00:54:58 There are some people who are more resistant to viruses than others, and so for certain viruses ... We talked about CCR5, and HIV. So we could give people a suite of genetic mutations that would increase their resistance to certain viruses, or maybe many viruses. So all these things happen, but prudence is required because all of our genes are doing a lot of different things. So we need to be careful, but there's no written law. There's no natural law that this form, that this moment of our evolution is this optimal outcome, and you can't do better than this. Even if we didn't have any of this technology, we would still continue to evolve, and there's not better and worse in evolution. It's just that our environment is going to change, and we will have to adapt to fit that environment. And maybe because we are actively changing our environment so rapidly, we may need to change certain parts of ourselves in order to keep up.

Demetri Kofinas: 00:55:56 Yeah. So that brings us to the socioeconomic dimensions of this.

Jamie Metzl: 00:56:01 Right.

Demetri Kofinas: 00:56:02 Who gets access to this technology, and what does it mean practically?

Jamie Metzl: 00:56:05 Right. That's a values question, and the answer is it depends on what our values are. If our values are what they should be, that this is-

Demetri Kofinas: 00:56:14 But money can buy you whatever you want.

Jamie Metzl: 00:56:16 Yeah, but there are some societies ... Right now, when we think of this in the context of health care, there are some societies that have national health care systems, like Israel, where assisted reproduction is provided pretty liberally and paid for by the state. There are others like the United States where people pay a ton of money and get very little back. So it's a values statement about access.

Jamie Metzl: 00:56:39 Every society should have an interest in the long term health and wellbeing of its population.

Demetri Kofinas: 00:56:45 Does China?

Jamie Metzl: 00:56:47 In their way, maybe.

Demetri Kofinas: 00:56:50 As long as ...

Jamie Metzl: 00:56:53 Maybe what you're going to say is as long as the Chinese Communist party is in power? But if you're in the Chinese Communist party, you're thinking, well, we are the best. That's what you tell yourself when you wake up in the morning. We are the best stewards of China.

Demetri Kofinas: 00:57:05 That's what our politicians also say.

Jamie Metzl: 00:57:06 Yeah. And that we need to make collective decisions that sometimes are going to hurt people, and I certainly am not sympathetic. So that we need to murder these protestors at Tienanmen Square because there's this greater vision of China that we believe in. Everybody has a story, but what we need to do is to make sure that we are living our values. If we believe in equity, if we believe that in the future we don't want to have genetic haves and have-nots, we should start applying those values today.

Demetri Kofinas: 00:57:34 But if I'm Bill Gates's kid, or if I'm Barack Obama's daughter, and I'm going to have a baby in 10 years or something like that, can't I just go wherever I want? I'll just pay for it, right?

Jamie Metzl: 00:57:47 Yes.

Demetri Kofinas: 00:57:47 This brings us back to the game theory. The people that are going to have access to it, and other people aren't.

Jamie Metzl: 00:57:52 Absolutely. And there will be jurisdictions, and whether it's little countries, or cruise ships on the high seas-

Demetri Kofinas: 00:57:57 So what does that mean?

Jamie Metzl: 00:57:58 It means that we better have an inclusive global dialogue about where we're going, that we need to make sure that every country has a regulatory system, and we need to help make that happen. And we need to try to build global norms. For many decades, it's impossible to wipe out everyone on earth using biological weapons. It hasn't happened. Why hasn't it happened? One of the reasons is we've established norms against their use. I don't think it's so crazy to think that we can establish norms that aren't going to be perfect, but it's certainly better than the alternative.

Demetri Kofinas: 00:58:29 When were those standards put in place against biological warfare?

Jamie Metzl: 00:58:32 It's been over time, but in the 50s, 60s, and mid-70s.

Demetri Kofinas: 00:58:36 Right. It was after the war.

Jamie Metzl: 00:58:37 Yeah.

Demetri Kofinas: 00:58:37 After the second World War.

Jamie Metzl: 00:58:39 And then there are all the various upgrades. And so I think we have to get started. We're not going to do this all at once.

Demetri Kofinas: 00:58:43 And chemical weapons was after the first world war, right?

Jamie Metzl: 00:58:45 Certainly chemical weapons was ... The horrors of chemical weapons-

Demetri Kofinas: 00:58:48 Mustard gas in the trenches.

Jamie Metzl: 00:58:49 ... were shown in the first World War.

Demetri Kofinas: 00:58:51 That's what worries me. What worries me is that we ban things after they've been proven to be very dangerous.

Jamie Metzl: 00:58:55 Yeah. And that's the challenge of-

Demetri Kofinas: 00:58:58 I mean, if we hadn't dropped the bomb on Hiroshima and Nagasaki, I wonder if we would've been so tight with our usage afterwards.

Jamie Metzl: 00:59:04 Yeah. And the challenge for me ... So my book came out a month ago, and I'm out talking every day to great people like you, and I'm trying to tell people, hey, this is so important. You need to pay attention. And for most people, if you kind of sit down, and if they're 60 minutes into this interview, they say, all right, I get something is important. But for most people in their day to day lives, they're not thinking about the genetics revolution as something that's really going to touch them.

Jamie Metzl: 00:59:32 But if we wait 10 years until when this issue arises, then it's going to be too late because the big decisions will have already been made. So we can't wait for a crisis in order to get smart on this stuff, and also because the technology is moving faster than it ever has. And, again, that's why I've written the book. That's why I really want to bring people into this conversation,

because if you're not educated, if you're not part of this conversation in trying to figure out how best to respond, this is just going to happen to you, and it's going to change your life, and you're not going to be comfortable with that.

- Demetri Kofinas:** 01:00:04 So this is what's disturbing. Again, this brings me back to what I was telling you before we started, and right at the beginning of the episode when I wrote the Why Do I Care part, and I was thinking about how this made me feel. And I remembered one of my favorite movies ever is Gattaca. I watched that back in '98 when it came out, or '99, shortly after it came out. And that movie moved me. It spoke to a lot of the things that I feel to be true, but it never felt like it was something that I would ever have to consider in my lifetime. And perhaps not even in my children's lifetimes.
- Demetri Kofinas:** 01:00:43 You see here, I have a picture also of Captain Kirk and Khan from the episode in the 60s of Gene Roddenberry's Star Trek, not the Wrath of Khan. Khan was some of the super men from the late 90s. The idea was that these people were genetically engineered to be incredibly powerful and everything else, but, again, 1960s, this was science fiction.
- Demetri Kofinas:** 01:01:05 This isn't science fiction anymore, and it feels really uncomfortable, and it feels like the future that we're describing here and we're talking about doesn't feel like home.
- Jamie Metz:** 01:01:17 Yeah. No, I get it.
- Demetri Kofinas:** 01:01:19 I don't know, do you feel that ever?
- Jamie Metz:** 01:01:20 I feel both.
- Demetri Kofinas:** 01:01:20 Do you ever feel like this doesn't feel like home?
- Jamie Metz:** 01:01:21 I feel both because we all have this instinctive pull towards thing. Some of us call it home. Some call it nature. And basically what it means is the thing that we experience when we were young, because all the things that you experienced when you were young that feel like home, those are natural human things. Like being born in a hospital, living in a house, living in a city, agriculture, medicine. These are all just massive applications of technology to the human experience.
- Demetri Kofinas:** 01:01:52 But they're familiar.

Jamie Metzl: 01:01:53 They're familiar to us, but when we went from living on the farm to living in the cities, it freaked people out. That felt so unfamiliar. When we went from hunting to farming, all these technologies don't feel like home.

Demetri Kofinas: 01:02:07 So there is an argument to be made that nature is natural, so to speak. That there is a natural home. That's one thing, right?

Jamie Metzl: 01:02:15 Yeah, but nature is not-

Demetri Kofinas: 01:02:18 The idyllic landscape.

Jamie Metzl: 01:02:18 Yeah, but we call, and I mentioned this with Joe Rogan, what we call nature is not natural at all. In nature, if we mean how our ancestors a long time ago lived, that sucked. You live in a freaking cave. The second you step out, some kind of horrible creature is going to eat you. You die of terrible diseases. That sucked, and that's why we've applied technology to our lives.

Demetri Kofinas: 01:02:37 I agree.

Jamie Metzl: 01:02:38 And we're still going to do it.

Demetri Kofinas: 01:02:39 Right. So there's that one line of reasoning, right? But then there's the other one where I'm going down, which has to do with rate of change. So some people will say people are not built to live in cities. Rogan said, "Of course people are built to live in cities. We made them. We've always been living in them." I'm not making an argument one way or the other about that. What I'm saying is are human beings meant to live in a world that only changes so much in their lifetime? I think the answer to that is resoundingly yes. I don't think people can adjust to any rate of change, and I think we see it politically. When change becomes too quick, people rebel. They reject the program.

Jamie Metzl: 01:03:11 It's true, and yet that is the very nature of change, because change is cumulative.

Demetri Kofinas: 01:03:16 It's not exponential.

Jamie Metzl: 01:03:18 A lot of change is exponential.

Demetri Kofinas: 01:03:19 No, it is, but I'm saying it's not necessarily the nature of change-

Jamie Metzl: 01:03:22 Maybe it is.

Demetri Kofinas:	01:03:23	In the human experience.
Jamie Metz:	01:03:24	Maybe it is because the more you change, the greater your opportunity for change.
Demetri Kofinas:	01:03:30	But we're not evolved to deal with that. We're evolved to deal with linear rates of change.
Jamie Metz:	01:03:33	That's the problem. Our brains formed, in many ways, in the savannas, and if you're the exponential thinker on the savanna, you're kind of looking up, saying, "Wow, some day we're going to have flying machines." You're the first guy who gets eaten by the saber tooth tiger because the other guys have these very practical minds.
Demetri Kofinas:	01:03:49	A simpler time.
Jamie Metz:	01:03:50	When you hear rustling in the bushes, run. And so, yes, our brains aren't set up for that, and we may need to change, and we will change many aspects of how we live. We will co-evolve with our technology. We will alter our biology, but the only way that we slow the pace of change is with some kind of catastrophic outcome like global thermonuclear war.
Demetri Kofinas:	01:04:14	Jesus Christ.
Jamie Metz:	01:04:14	Some kind of pathogen that wipes us out.
Demetri Kofinas:	01:04:15	Jesus Christ.
Jamie Metz:	01:04:16	Change is real, and we have to learn to live with it. But more importantly, we can't hold on to some nostalgic and even false view of this imagined past. What we need to do is to say what's constant for us is not our technology, it's our values. It's our values. And how do we weave our values into the world that we're building so the values are familiar, even though the context will change?
Demetri Kofinas:	01:04:42	I've done a number of episodes. I'm thinking specifically of my episode with Cal Newport on digital minimalism, and the episode we did with Shoshanna Zuboff on surveillance capitalism. Talking about the role of these mobile devices and the behavioral algorithms that run the background on the quality of our lives, I'm of the mindset that I think people are going to kick the bucket on this. At some point, there's going to be a tip, and as simple as people are going to stop using their mobile device. They're going to start using a burner. I think not

because they're afraid that they're being watched, but because having this device, which gives you access to the entire universe, and which is feeding you increasingly curated content and alerts, is going to so destroy the quality of your life that you're going to become aware of it because of the work of people like Shoshanna and other people, that you're just going to stop using it. Because the quality of your life goes down the toilet.

- Jamie Metz:** 01:05:41 I feel that.
- Demetri Kofinas:** 01:05:42 We all feel it.
- Jamie Metz:** 01:05:42 Yeah. I was just on this book tour, and book tours are these crazy things where you have this thing. It's like this baby. Ideas I've been thinking about for two decades, and just kind of launching it into the world. And then you have all this stuff coming at you, interview requests and things, and I found myself just going in with my phone. I'd do an interview with you, I'd leave, I'd check messages, respond, go to the next interview. I was finally going crazy, and like I was talking about, the future of what it means to be a human. And I felt like I was becoming less human. I was becoming less myself without ...
- Jamie Metz:** 01:06:16 So to say that the change is going to just be continuous doesn't mean that every kind of change that we can imagine is good or what we want, but we have to define what it is that we're comfortable with. And this is all going to happen within the context of diverse societies and competitive society. So there will be drivers that won't be entirely individual and personal.
- Demetri Kofinas:** 01:06:41 One of the questions that Shoshanna asks and we discussed on the show is who decides. Who decides? Does it concern you that the engineers, at least the Silicon Valley ones, especially trans-humanists, who are thinking about things like living forever, and who are designing so many of these applications that are running on our devices, and engineering our future, that these people are the least human among us? They're the most on the spectrum. They have the least social skills. The things they value are not the things that I value. They're less artistic, they're less romantic. They're more quantitative, and they're the ones that are selecting what is best for us.
- Demetri Kofinas:** 01:07:20 It's not surprising to me that they say ridiculous things like "We're going to upload our consciousness." That is an absurd statement. When Ray Kurzweil, and I've met Ray, I've heard him speak ... Totally nice guy, whatever ... Totally crazy. Makes no sense. He has absolutely no basis to make that statement.

We have no clue what consciousness is. The entire idea that you're just going to upload your, quote, "consciousness" to the Cloud is ridiculous, and they're saying this stuff like it's real.

- Jamie Metzl:** 01:07:48 About six weeks ago, I was in Japan. I was giving a lecture tour hosted by the Japanese government. It was this great thing where they said, "Just make a list of anyone in Japan you'd like to meet with, and we'll set it up." So one of the people who I listed and who I met with is this incredible guy, Hiroshi Ishiguro. And Ishiguro-san, he's the leading humanoid roboticist in the world. He was on the cover of Wired.
- Jamie Metzl:** 01:08:08 And so this guy, he's incredible. We went there, and he himself, he felt like a robot. As a matter of fact, he has a robot replica of himself, and he keeps getting plastic surgery, because as he gets older, he wants to still look like his robot. I guess it's probably easier to put wrinkles on your robot.
- Demetri Kofinas:** 01:08:23 Crazy.
- Jamie Metzl:** 01:08:23 And so we had this debate about the future of humanity, and he was saying that the future of humanity is non-biological. And I said if our future is non-biological, either we have committed suicide or these non-biological entities have killed us. But there's something that's inherently biological about us.
- Jamie Metzl:** 01:08:41 I do a lot of speaking at big tech events, and I had a lunch once with some of the most well known tech founders of the biggest Silicon Valley companies. It was really interesting. It was me and one other guy who were both speakers at the conference, and then there were all these guys who were the tech founders. And we were like this traveling circus show trying to keep a conversation going, like more familiar people might, and these other guys who were like unbelievable geniuses, it was very clear that they were kind of somewhere on the spectrum. It doesn't make them less or more human.
- Demetri Kofinas:** 01:09:14 Well, some of them, it makes them less human. I understand.
- Jamie Metzl:** 01:09:18 Because what we're talking about is our humanity, and how do we define our humanity.
- Demetri Kofinas:** 01:09:23 If you can't hold what most people consider to be a normal conversation, that's fine. In other words, it's not a criticism of you as a person. You are a person. You are a human. But you don't get to decide in my view what is human. It doesn't make sense to take an outlier person and make him decide what is-

Jamie Metzl: 01:09:39 No, I agree.

Demetri Kofinas: 01:09:39 Yeah.

Jamie Metzl: 01:09:40 And that's why I think my answer for Shoshanna, maybe Shoshanna's answer for you, and my answer for myself is that we have to be the deciders, and for us to be the deciders, we have to empower ourselves. And the way we empower ourselves is first with knowledge and then with voice, and then we have to engage the people. We have to build communities around these ideas. We have to engage our political leaders and say, "Hey, this issue is important. What are you doing about it?" But if we just stand back and let it happen, it will happen led by the people who feel they are the greatest stakeholders.

Demetri Kofinas: 01:10:14 People like Mark Zuckerberg are just trying to railroad this future down people's throats. Joe Rogan said it perfectly. We have a bunch of people who are totally uneducated on these matters who didn't even do the proper job of preparing themselves for their congressional testimony of Mark Zuckerberg when he came there.

Jamie Metzl: 01:10:31 The senators, yeah.

Demetri Kofinas: 01:10:32 Yeah, exactly, senators. I'm not given any confidence in this matter whatsoever.

Jamie Metzl: 01:10:37 But we live in a democracy. We have to organize. It's great for us to talk, and actually being on a podcast like this is an action. It's an important action.

Demetri Kofinas: 01:10:45 Yeah, it's important.

Jamie Metzl: 01:10:46 But then we need to say what's the next action? How do we build these communities? Because in any issue, there are the people who feel there are greater stakeholders and less stakeholders, and the greater stakeholders will always drive issues. Look at gun control in the United States. The majority of Americans want to have sensible restrictions on gun ownership, but they're not that motivated. The people who are the pro-gun people, they're more organized and more motivated around this single issue, and so they get the voice. And what we have to say is this stuff is really important, and we want a voice. But to have that, we have to do the hard work first.

Demetri Kofinas: 01:11:22 Jamie, I want to move us into the overtime.

Jamie Metzl: 01:11:25 Sure.

Demetri Kofinas: 01:11:26 When you were talking about our future being silicone, is that what he said?

Jamie Metzl: 01:11:31 Yeah, non-biological.

Demetri Kofinas: 01:11:32 Non-biological. I think it was Church who was talking about this, but he's not the only one, about the carrying capacity of the human brain in terms of as an information storage device.

Jamie Metzl: 01:11:41 Yeah.

Demetri Kofinas: 01:11:41 And what's resilience.

Jamie Metzl: 01:11:42 Yeah. Kurtzweil also talks about this. There's not enough space. We have to expand it with the Cloud.

Demetri Kofinas: 01:11:47 Right, right, right, but that we would actually be able to use organic material, carbon based storage units in a sense to store information. I think that's what Church was saying in this lecture that I saw.

Jamie Metzl: 01:11:56 I haven't seen that, but I know that Ray Kurtzweil says that we need to have some brain machine interface so that we can have access to storage in the Cloud.

Demetri Kofinas: 01:12:02 He's off the map.

Demetri Kofinas: 01:12:04 There's actually a really cool company here in New York City that has a brain machine interface that uses ... I forget. It's the neural signals myo ... I forget the name of it. But it uses the neural signals from your spine to your hands and your fingers, and it's pretty damn good.

Jamie Metzl: 01:12:21 Yeah.

Demetri Kofinas: 01:12:22 So, anyway, I want to talk a little bit about synthetic biology, some stuff like this. Also biotech and bio-hacking, and what people are doing with that.

Jamie Metzl: 01:12:29 Great. Really important topics.

Demetri Kofinas: 01:12:30 Yeah, I think it's really interesting, and a few other topics. And maybe we can kind of touch a bit on North Korea, because you had visited North Korea.

Jamie Metzl: 01:12:35 Yeah, twice.

Demetri Kofinas: 01:12:36 Which is fascinating. I want to talk to you about that and a few other things.

Demetri Kofinas: 01:12:39 For those who are regular listeners, you know the drill. If you're new to the show, head to [Patreon.com/hiddenforces](https://patreon.com/hiddenforces), or go to hiddenforces.io/subscribe to learn about the subscription, and how you can access the overtime, as well as the transcript of this week's episode, as well as the episode rundown, which I always tell you guys is a beautiful document full of notes and links and charts and pictures of Captain Kirk, in this case.

Jamie Metzl: 01:13:08 I can see the pictures. They look great.

Demetri Kofinas: 01:13:10 Right. And Ethan Hawke.

Jamie Metzl: 01:13:12 Sorry to interrupt you, but I'm going to add to this because podcasts like this are so important. It's a new form of media, and so many people are using it. We've all been socialized to this idea that everything ought to be free, but really it's a lot of hard work that goes into creating this kind of content. It's really important, and you're saying if you subscribe, you'll get this extra stuff, and the extra stuff is great. And now that we're going into overtime, I'm going to tell all of my deepest, darkest secrets I'm not going to tell anybody else, and that's really great.

Jamie Metzl: 01:13:45 But it's not that much. Let's say you have five or six podcasts that you listen to regularly that you feel ... Now, this sounds like NPR.

Demetri Kofinas: 01:13:56 Please don't stop.

Jamie Metzl: 01:13:57 That you feel are giving you something, and it's worth that little bit. The cost of a few coffees a week that just empowers this kind of content. And if we're all using it, we have to recognize that if we don't pay for this stuff that's going to enrich us, we're not going to have it.

Demetri Kofinas: 01:14:13 I really appreciate you saying that. No one's ever done that before, and I feel really uncomfortable saying it, but it's true. The guest I told you before, I'm not going to mention his name to the audience because I want it to be a surprise, but I was contacted by the staff of one of the former secretaries of defense. There are only four of them, okay? Now, I was told

that the staff listens to the show, his wife listens to the show, and I'm assuming he listens to the show.

- Demetri Kofinas:** 01:14:36 So this is an important program, and I have been doing it largely for free. And I have said to my audience that I want to just cover the costs of it. We're one-third of the way there, and I'm very grateful since we launched the subscription in January, but I hope that we can get all the way there. I do appreciate all your support, and I do know that not everyone can support the show. And I want to try to make it possible for some of you to do it at a lower cost and get something in return.
- Demetri Kofinas:** 01:15:00 But, Jamie, thank you so much for staying for the overtime, and let's switch to the overtime.
- Jamie Metz!** 01:15:07 Awesome.
- Demetri Kofinas:** 01:15:08 And that was my episode with Jamie Metz!. I want to thank Jamie for being on my program.
- Demetri Kofinas:** 01:15:14 Today's episode of Hidden Forces was recorded at Creative Media Design Studio in New York City. For more information about this week's episode, or if you want easy access to related programming, visit our website at hiddenforces.io and subscribe to our free email list. If you want access to overtime segments, episode transcripts, and show rundowns full of links and detailed information related to each and every episode, check out our premium subscription available through the Hidden Forces website, or through our Patreon page at Patreon.com/hiddenforces.
- Demetri Kofinas:** 01:15:53 Today's episode was produced by me and edited Stylianos Nicolaou. For more episodes, you can check out our website at hiddenforces.io. Join the conversation at Facebook, Twitter, and Instagram @hiddenforcespod, or send me an email.
- Demetri Kofinas:** 01:16:15 As always, thanks for listening. We'll see you next week.