

Oppenheimer: Babes, Bombs, and Beers

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Larry Bernstein:

Welcome to What Happens Next. My name is Larry Bernstein. What Happens Next is a podcast which covers economics, political science, and culture.

Today's topic is Oppenheimer: Babes, Bombs, and Beers.

The movie Oppenheimer is a blockbuster, and I want to explore the science, the morality, and Christophen Nolan's film making.

We have three speakers for this podcast. The first will be Jeremy Bernstein who was a work colleague of Oppenheimer at the Institute for Advanced Studies and is the author of the book Oppenheimer: Portrait of an Enigma.

I hope to learn from Jeremy about the scientific and engineering challenges that Oppenheimer faced for building the atomic bomb. And I want to hear some of Jeremy's personal anecdotes about interacting with Oppenheimer.

Our What Happens Next culture critic Darren Schwartz will help us find the humor in the atomic bomb.

And in preparing for this podcast, I heard that Billy Herriott the assistant golf pro at the Lake Shore Country Club had made a road trip from Chicago to Indianapolis to watch Oppenheimer on the IMAX screen in its intended 70-millimeter. We are going to do a deep into that experience as well.

Let's now begin this podcast with Jeremy.

When did you first meet Oppenheimer?

Jeremy Bernstein:

I graduated from Harvard in 1951, and I had a job at the Harvard cyclotron which lasted until 1957. And then I got an appointment at the Institute for Advanced Study as a postdoc. At the spring of 1957, Oppenheimer came to Harvard to give some lectures. And I went with the idea of saying hello, I'm going to be at the institute next year. So, after his lecture, I climbed onstage and he gave me a look of incredible hostility. I didn't know what to do exactly. I thought, well, nothing ventured, nothing gained. So I proceeded till I got next to him. I said who I was. He transformed completely. He turned into an absolute ray of sunshine. And, he said to me, Lee's

going to be there. Yang's going to be there. The two Chinese physicists and we're going to have a ball. That's what he said to me. We're going to have a ball. I thought I would go through bloody hell for this guy.

Larry Bernstein:

Lee and Yang would both later earn the Nobel Prize for their contributions to physics.

In your book, you describe Oppenheimer as weird and eccentric. Yet, Oppenheimer's success depended on his convincing people to work with him. How did he pull that off?

Jeremy Bernstein:

Well, because people wanted to please him. And people were very impressed. He understood everything immediately. And my interaction with him, I understand now why this guy was a success, because of how he managed people.

Larry Bernstein:

Oppenheimer ran the Manhattan Project to build the atomic bomb. What were the physics and engineering problems that needed to be solved to build an atomic bomb based on nuclear fission of Uranium?

Jeremy Bernstein:

Uranium, like all other elements, comes in isotopes, which are versions of the same chemical atom, but with different numbers of neutrons. It turned out only one that was fissionable; it was Uranium 235. And that barely existed as a natural isotope. So, first thing that they had to do is take the uranium out of the mine, which is mainly uranium 238 and separated so that we get enough Uranium 235. This is a very complicated engineering problem. Then once they had uranium 235, questions about how much do you need, what shape should it be in?

Larry Bernstein:

Just for clarification, there are two types of Uranium atoms found in nature. The much more common one is Uranium 238 that has three more neutrons in its nucleus than Uranium 235. The reason that Uranium 235 can be split easily is because its nucleus has an odd shape and is unstable, and when you fire a fast-moving neutron at its nucleus, it splits and then releases a lot of energy.

How did Oppenheimer's team design the bomb?

Jeremy Bernstein:

So, what you have to do is assemble enough uranium to make a critical radius and then you get a chain reaction. You did that basically by firing a shell of uranium into a target so that eventually

you get a fissionable arrangement. So all that had to be worked out. It was a very complicated scientific engineering job. And they had this unbelievable assembly of geniuses working on it.

Larry Bernstein:

How does the chain reaction work?

Jeremy Bernstein:

The uranium nucleus splits and a certain number of neutrons are released. These neutrons penetrate neighboring uranium, those uranium nuclei fission produce more neutrons. So, it's a question of dimension. If you're talking about a sphere, the sphere has to be large enough just a critical size that works. And they partly figured this out theoretically, partly with experiments. And they did it.

Larry Bernstein:

How did Oppenheimer assemble such brilliant minds to work on the Manhattan Project?

Jeremy Bernstein:

There weren't very many of them. The theorists that worked on it were Hans Bethe and Victor Weisskopf. These are people who have been German refugees, and they did not need much encouragement. They were worried that Heisenberg was in the process of making a bomb for the Germans. They were very scared that the Germans would beat them at this race.

Larry Bernstein:

Einstein sent a letter to Roosevelt encouraging that the US work on the nuclear bomb because he feared that the Germans would get the A-bomb first. What progress were the Germans making on their nuclear program?

Jeremy Bernstein:

The Germans never got anywhere. They couldn't even build a reactor. And that's largely because they relied on Heisenberg. Heisenberg was a great physicist but not a very good one. And he was not really good at making a practical machine that functioned. Whereas Enrico Fermi was absolutely genius at that. So, the Huns were stuck with Heisenberg.

Larry Bernstein:

Why were the Americans freaked out when they heard that the Germans were collecting heavy water. And, what role does heavy water play in building an atomic bomb?

Jeremy Bernstein:

You have to slow the neutrons down to get them to react. You slow them down by having them collide with what's called a moderator. You want a moderator which doesn't absorb neutrons, but

which is massive enough so it slows them down when they bounce off of it. And it turns out that heavy water is a very, very good moderator. So, we used it. The Germans used it, but they never really quite made enough heavy water. And Heisenberg's designed reactor was never very good. So they never made a single reactor that worked.

Larry Bernstein:

What is heavy water and where do you find it?

Jeremy Bernstein:

Well, it's available in a small percentage of the ocean. It consists of two neutrons and one proton. That's what makes it heavy, because ordinary hydrogen is one neutron and one proton.

Larry Bernstein:

How were they able to separate Uranium 238 from Uranium 235?

Jeremy Bernstein:

To separate the uranium isotopes, you make use of the fact that one isotope is more massive than the other. So, if you get it moving in a circle, the heavier isotope will come to the edge of the circle and you can separate it that way.

Larry Bernstein:

Let see if I got this right. You heat up Uranium so it turns from a solid rock into a gas, just like melting an ice cube and turning it into steam. Then you whip that uranium gas around in a circle really fast, and then the heavy Uranium 238 moves to the edge of the circle and the lighter U235 stays near the center, and then you simply grab the U235 at the center?

Jeremy Bernstein:

You got it.

Larry Bernstein:

In 2000, I saw the Michael Frayn play called Copenhagen which won the Tony award for best play that year. And the play was set in Copenhagen in 1941 and it was based on a meeting between the famous physicists Bohr and Heisenberg. Bohr previously made major contributions on the structure of atoms and quantum theory, and Heisenberg managed Hitler's nuclear bomb project. Heisenberg was desperate to find out from Bohr what he was hearing from the British and Americans on the allies' nuclear program, and at the same time Bohr wanted to find out from Heisenberg about the German's progress. Is the story true and what happened?

Jeremy Bernstein:

I have seen the play. I think much of it is true. I had communication with the author of the play. There were different motivations. Bohr wanted to find out what the Germans were doing, and Heisenberg wanted to find out what the allies were doing. And, they did their best not to tell each other what they were doing. And, that worked pretty well. Although Heisenberg told Bohr more about what the Germans were doing than Bohr told Heisenberg what the Allies were doing. Because at that time, Bohr really didn't know. He only learned what they were doing when he escaped from Denmark and went to England. Heisenberg knew what the Germans were doing because he ran the project. But I have said, Heisenberg is a great physicist but not a very good one.

Larry Bernstein:

Was Oppenheimer a great physicist?

Jeremy Bernstein:

He was a theoretical physicist. He did a lot of work on different things. He jumped from one thing to another. The important thing that he did was to figure out how to form a black hole, which he did with a student. They wrote a paper on the formation of black holes and that would've won him a Nobel Prize if he lived long enough. At that time, it was not considered to be very serious. That paper might've awarded him the Nobel Prize because it's a clear outline of how you collapse a white dwarf star into a black hole.

Larry Bernstein:

When Oppenheimer was in charge of the Manhattan Project, did he make contributions on the theoretical physics side? Or, as you said, he was very quick, was he good at figuring out which problems needed to be solved, and then managing the process by assigning the right resources and people to solve those problems in a timely manner?

Jeremy Bernstein:

All the above. For example, there came a moment when he had to appoint somebody to direct a theory group. And Edward Teller very much wanted the job. Teller was not interested in the ordinary bomb. He was only interested in fusion. He was not interested in fission.

To keep him moderately happy, Oppenheimer created a small group of three or four people, which Teller operated and then complained incessantly. I met him once, and I decided that this man is impossible. If I have to go work for this man, I will jump out the nearest window.

Larry Bernstein:

Teller is famous as the father of the Hydrogen Bomb. Why was it impossible to work with him?

Jeremy Bernstein:

Well, he was eccentric. He worked on his ideas or no ideas. To give an example, a Harvard physicist told Teller about me that I was somebody that he might hire. So, we met in Washington. It turned out, at the very time we were meeting, was the very time he was testifying against Oppenheimer. I knew nothing about that. And the only thing he said to me was that he was glad to talk about physics rather than he'd been talking about. But he suggested we come up to his suite and he would give me a lecture. He said, the way I prepare for a talk is I give it to somebody and you don't understand something, you interrupt me. So, we started on this talk. I didn't understand without any interest. So I sat totally numb. <laugh> not saying a word, <laugh>. I later learned that was the very day he testified against Oppenheimer in Washington. I never heard from him again which is just as well.

Larry Bernstein:

Tell me about how Oppenheimer managed the Manhattan Project. Why was he the right man for the job?

Jeremy Bernstein:

Everybody thought he was the wrong man for the job. Nobody understood why he was selected. He had no experience in anything involving practical physics. He was a theorist. But somehow he fitted right in. I guess he was a good mechanic. He knew how to talk to people. he asked the right question. He knew how to turn them on.

Larry Bernstein:

There is a documentary entitled A Day after Trinity that interviews the major players in the Manhattan Project. Do you recommend this documentary film for this audience?

Jeremy Bernstein:

A Day after Trinity? You must see this movie. Check it out.

Larry Bernstein:

The movie Oppenheimer begins with him working as a lab technician at Cambridge. But your biography of him starts with his growing up in New York City. Why is Oppenheimer's youth important to understanding him?

Jeremy Bernstein:

Well, it was very important. His father was a rather wealthy German Jew. Oppenheimer was named Julius after his father. But asked what the J stood for in J. Robert, and he always said J was for nothing. That's what he said, which is an interesting comment if it happens to stand for your father.

He had a lot of trouble being a Jew, but I don't blame him because there was a lot of antisemitism at that time. There is a letter, which I have in my biography of Oppenheimer, a letter of recommendation to a British physicist saying, not to worry, Oppenheimer is Jewish, he's not really too Jewish. It's an amazing letter. But it was a very anti-Semitic time.

I had an uncle who went to Harvard as a graduate student in the thirties. And when I got accepted there in the forties, he told me not to go. He said, it's a very anti-Semitic place. You'll not be happy there. Well, it turned out there were places where Jews could not go. A Jew could not get into a final club, but who the hell wanted to get into a final club?

I never found it difficult to be a Jew at Harvard.

Larry Bernstein:

In your book you mentioned that Oppenheimer was accepted to Harvard as an undergraduate but took a gap year because of an illness. The year he started at Harvard its president adopted a Jewish quota limiting all future classes to be up to 15% Jewish.

Jeremy Bernstein:

Well, I don't know if he knew about it. I don't think there were any ads, we limit the number of Jews to 15%. I think they just did it. Now when I applied with my friend Henry Steiner in the 1940s, I don't know if there was still a quota. We were both admitted. We were both Jewish. I encountered a few anti-Semitic people when I was there. A few not many.

Larry Bernstein:

Do you think Harvard for the Jews in the 1920s is like it is for the Asians at Harvard today. There is a quota limiting the number of Asian students, but they do not face direct discrimination at the school by its faculty, administration, or other students?

Jeremy Bernstein:

I think that's about right.

There's a book written about anti-Semitism in the math department at Harvard, which is worth reading. They had an explicit policy, which was actually put into writing that no Jew would ever get tenure. For example, Stan Ulam came from Poland and was a junior fellow at Harvard. He didn't get tenure. No Jew ever got tenure in the math department at Harvard until after the war.

Larry Bernstein:

The book you referenced is A History in Sum by Steve Nadis and Shing-Tung Yau. Why were there so many Jews working at Los Alamos?

Jeremy Bernstein:

Part of the answer to that question is that a great many of the Jews were refugees. And refugees were not allowed to work on radar. And the atomic bomb was considered to be a less sensitive project than radar. For example, Hans Bethe could not work on radar, but he was a very important figure at the atomic bomb. So that's why there were a lot of Jews at Los Alamos, because they couldn't work on radar.

Larry Bernstein:

Next topic is how to keep military secrets like the A-bomb while employing so many talented scientists without proper vetting.

The method to keep secrets at Los Alamos was compartmentalization. You could only work on a narrow problem. You couldn't talk to people working on different problems. And so, if there was a leak with respect to any specific problem, it wouldn't give too much away to our enemies. There were Russian spies at Los Alamos, the most famous was the British physicist Fuchs. Why did the compartmentalization secrecy strategy fail?

Jeremy Bernstein:

Well, in the first place, Fuchs knew everything.

He was very, very central. He had a design for the hydrogen bomb. He was able to tell the Russians our design for the hydrogen bombs, such as it was, he knew all about our design for regular nuclear weapons. Now there was a second American. Roy Lauber, was an undergraduate when he went to Los Alamos. He was the youngest member of the technical staff. He later became professor at Harvard, won the Nobel Prize. His roommate was the other Russian spy.

Larry Bernstein:

That American spy was Ted Hall.

In the movie, there's a discussion between Oppenheimer and Einstein about the question about whether a nuclear weapon explosion might cause an ongoing chain reaction that would destroy the entire planet. In the film, Einstein asks Oppenheimer how that work was going, and Oppenheimer responds that they calculated that there is an infinitesimal probability but not zero of the end of the world. Was this conversation based on fact?

Jeremy Bernstein:

The question was raised long before Einstein had anything to do with it. It had been worked on at Los Alamos. I think Hans Bethe worked on it. People concluded that it was not going to blow up. So whatever Einstein had to say about it was irrelevant.

Larry Bernstein:

Einstein had been the central figure in physics at the turn of the 20th century. Einstein wrote his best papers on Brownian Motion and the Photoelectric effect in 1905 for which he received the Nobel Prize. Einstein retired to the Institute of Advanced Studies in Princeton, where you worked in the 1950s. What was Einstein's continuing relevance to physics when Oppenheimer was working on the atomic bomb?

Jeremy Bernstein:

He thought that physics was on the wrong track. That quantum mechanics, while successful was basically incomplete. There had to be a more basic theory which he spent most of the latter part of his life trying unsuccessfully to find. He was looking for something that didn't exist, and he was very stubborn and wouldn't give up.

Larry Bernstein

Einstein questioned some of the key precepts of quantum mechanics. Did anyone follow him on this intellectual path?

Jeremy Bernstein:

Nobody pays the slightest attention.

If you teach a class in the quantum theory and you want to give a lecture on what we might call a physical, philosophical foundations of theory, you might talk about the Einstein-Podolsky-Rosen paper, which was written in the early 1930s. And that's the last thing that he said about quantum theory. In fact, he wrote at least one paper in which he has the quantum theory completely wrong. He really checked out.

Larry Bernstein:

Einstein said, "God doesn't play with dice." What does that mean and is that idea still considered relevant by leaders in the field?

Jeremy Bernstein:

He meant that he did not think that quantum theory deals with probabilities. Quantum theory does not tell you what something is. It tells you how probable it is that something is. And he felt that a fundamental theory to ground itself on probabilities was simply wrong. So that's what he was talking about. Nobody cares. I might tell you what Einstein thought, but for teaching a class in the quantum theory, I would not pay the slightest attention to what he thought, because I don't care.

Larry Bernstein:

The movie Oppenheimer delves into his private life in detail. Did you know his wife Kitty when he was your colleague at the Institute of Advanced Studies?

Jeremy Bernstein:

I never liked her. I never thought she was very attractive. I never thought she was terribly nice. I never understood it, but I've always felt it's not my business. Obviously, she meant something to him. They got married and had two children. They stuck together.

Larry Bernstein:

In the book, you described your first meeting at the Institute with Oppenheimer.

Jeremy Bernstein:

I had just driven from my parents' house in Rochester. All I wanted to do was to take a bath. And I went into the office and the secretary said, Dr. Bob wants to see you. I told her, no, he doesn't. There's no reason he wants to see me. Oh, yes, he wants to see you. So, I walk into Oppenheimer's office, and he's impeccably dressed in one of these handmade suits that he had. And, the first thing he says to me, he doesn't say aloha or anything. He says, what is new and firm in physics?

Thank God the phone rang. And it was his wife. He talked to her. And when he hung up, he said to me, it's Kitty. And he said, she's been drinking again. I said, nothing. And I excused myself and left. So there you are.

Larry Bernstein:

Can you explain what the expression “new and firm in physics” means?

Jeremy Bernstein:

Well, he did not want to know a rumor. He wanted to know a new result, which had been established.

He wasn't interested in rumors. There's a lot of rumors, experiments that are half done, theories that are partly right. He didn't want to know. He wanted to know a true experiment, true theory, what is new and firm.

Larry Bernstein:

When the movie begins, Oppenheimer is studying physics in Europe. Why were the Europeans at the forefront at that time? And how did the US become a powerhouse in physics by the time of the Manhattan Project?

Jeremy Bernstein:

You have excellent research in Europe. Oppenheimer and Rabi went to Europe in the late twenties, early thirties, and discovered that American physics was looked down on, and they decided that they were going to revive it. Rabi created the Department at Columbia, and Oppenheimer created the departments on the West Coast: Berkeley and Caltech. And they did it.

Larry Bernstein:

In the movie Oppenheimer, they show the meeting when Oppie meets President Truman in the Oval Office and he tells the President that he has blood on his hands. What was that all about?

Jeremy Bernstein:

The person who has the most interesting things to say about it is Dyson. Dyson asked the question, what did Oppenheimer mean? And he comes to the conclusion, Oppenheimer meant was not that guilt for making it but that they had such fun.

Larry Bernstein:

Does it go back to that same concept that you mentioned earlier when you first discussed with Oppenheimer the chance to work together at the Institute for Advanced Studies. And he said join me in Princeton at the Institute and we'll have such a ball. "The blood on my hands" reflected his acknowledgement of the perversity that he had such a good time while making a bomb of mass destruction.

Jeremy Bernstein:

Correct.

Larry Bernstein:

Why did Truman take Oppenheimer's statement about blood on his hands so badly?

Jeremy Bernstein:

Because he thought that Oppenheimer had no right to that attitude.

Larry Bernstein:

In essence, Truman was the one ultimately responsible for Hiroshima because he was the one who gave the direct order to drop the atomic bombs on the Japanese.

Jeremy Bernstein:

Oppenheimer had no right to that guilt.

Larry Bernstein:

The Manhattan Project was an incredible feat in terms of applied science, engineering, and management under extreme war conditions. Oppenheimer effectively ran the project over two years with a multi-billion-dollar budget. Do you think someone else could have done it besides him?

Jeremy Bernstein:

No, nobody else could have done it. Because no one else had those qualities. His brilliance, a command of people, a command of language. He was totally unique.

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Larry Bernstein:

Did you enjoy the new film Oppenheimer?

Darren Schwartz:

I thought it was excellent. It's a story that needed to be told. It was well done. Although, definitely complex, which is typical Christopher Nolan.

Larry Bernstein:

Christopher Nolan is one of top directors working today. You've watched the Batman movies, what other Nolan directed films have you seen?

Darren Schwartz:

I've seen a lot of them: Memento, Prestige, Interstellar, Inception, Dunkirk. Doodlebug was good. And his most complex movie that people have complained broadly about is Tenet. It's a time travel movie that you wouldn't like.

Larry Bernstein:

The movie Oppenheimer had various layers of stories that many people found confusing.

Darren Schwartz:

In Oppenheimer, there were a lot of interlaced storylines. I personally had an issue because the theater I saw it in the audio wasn't great. So, I missed some dialogue. If you go online, some people were totally confused. Nolan said he tries to balance giving away too much information too early to the audience versus holding it back. Overall, he might've erred on the side of complexity a little bit.

Larry Bernstein:

The film lasted three hours. Was it too long?

Darren Schwartz:

A lot it could be cut out. The nudity, you got to cut that. We'll get into that. I don't want to see him sitting there smoking, naked with his legs crossed. Could you do it in two and a half hours? Probably.

Larry Bernstein:

Cillian Murphy plays Oppenheimer and his performance is fabulous. Will he win the Oscar for best actor?

He'll get nominated. I don't know who he's competing against. Not only was he excellent and outstanding, but he looks like him. It's amazing. He's thin, but Cillian Murphy, by the way, he's shorter than you. I mean, he's like five two.

Larry Bernstein:

What did you think of Matt Damon's performance as General Leslie Groves? And will he get nominated for best supporting actor?

Darren Schwartz:

Yeah, probably get the nod. Who knows? I thought it was great. Because you had to have the offset of the intellectual, somber simmering guy with the belligerent army guy who's like, do it. Go ahead. Get it done. Yeah.

Larry Bernstein:

Emily Blunt played the part of his wife Kitty Oppenheimer.

Darren Schwartz:

She did a great job. Overall, the women, they were not done justice in this film. The mistress Jean came off as needy and whiny. And Kitty, there was just a lot of focus that she was an alcoholic and she just couldn't take life as a mother, and with things in general. And it was constantly having to catch her as she was falling. But she was his biggest supporter, and she played a huge role at the end during the tribunal if he gets the security clearance back or not.

Larry Bernstein:

The movie goes into detail about his personal relationships, the making of the bomb, and the loss of his security clearance. This is the most important science movie of the year, and one of the most important of the decade, and yet none of the important science or engineering problems that were critical to making the bomb were examined in a serious way. Why do you think Christopher Nolan did this?

Darren Schwartz:

They could have done so much more with explaining it. My criticism of the film; they didn't really go deep enough on some of the relationship stuff and with the science, but they didn't really give you the deep down on what the science was.

Larry Bernstein:

The mumbo jumbo in Oppenheimer reminded me of the film the Big Short about the mortgage crisis. We had our hero Margot Robbie explaining CLOs in a bubble bath.

Darren Schwartz:

She's a friend of the show, Margot Robbie.

Larry Bernstein:

I took my 12-year-old son to see the Big Short and I asked him if he understood what was going on, and he said no, so I explained it to him in two minutes, and he said, "why didn't they explain it like that." And I think that Hollywood-types think that the audience is too unsophisticated to understand big ideas and therefore, the focus is on action and personal relationships.

Darren Schwartz:

There would have to be a creative way to do it, which I think they did in the Big Short where there's like a voiceover.

Larry Bernstein:

Yesterday in preparation for this podcast, we watched together the documentary film The Day After Trinity. This movie is about Oppenheimer and the making of the atomic bomb that came highly recommended by our previous speaker Jeremy Bernstein. It included interviews with all the major players like Frank Oppenheimer, Nobel Prize Winner Hans Bethe, and Freeman Dyson. If I remember your favorite part of the movie, were the wagers placed by the physicists about the results of the first test of the atomic bomb. For example, Fermi wanted to make a bet that the entire state of New Mexico would be incinerated.

Darren Schwartz:

There was also another bet that this could lead to the destruction of the atmosphere and the world.

Larry Bernstein:

They interviewed a rancher living 20 miles from the nuclear test site, and the rancher asked his wife was that an earthquake, and then he said, well that's odd, look the Sun is rising from the West today.

Darren Schwartz:

Well, what I liked is they interviewed a woman driving her sister to college. And she said the bomb went off, and it was as bright as the sun. And my sister said, what was that? And the interviewer said, well, why was that notable? And she said, well, my sister's blind.

Larry Bernstein:

This documentary *The Day After Trinity* was really additive to the movie *Oppenheimer*. It had a lot of additional information and added some fantastic archival footage. The movie was nominated for the Oscar for Best Documentary Feature and won the Peabody Award.

Yes. It's a well renowned documentary. Overall, it was excellent. Yeah. It's detail heavy. You learn about the man as well. Like when he was younger, he was quick and impatient and would terrorize the students.

He was a bit irascible and kind of bossy. He would take colleagues to the ranch in the remote part of New Mexico. There was no heat. We're freezing. He'd take us on these multi-day horse trips, you know, no one could ride a horse. <laugh> And it was cold and rainy. And remember everybody said, okay, fine, we'll just do it at night. Well now it was just cold and difficult and rainy and dark. <laugh>

They touched on he wasn't political. And he started paying attention when the war in Europe started raging. And then when he became a little more aware, you remember what he read?

Larry Bernstein:

He read *Das Kapital* in German.

Darren Schwartz:

He read the entire works of Lenin, which actually came back to haunt him. But he wasn't a zealot. He was just trying to educate himself. And I think that definitely came back to bite him. He was kind of naive. He was in his own scientific world. When the war in Europe was happening, then he made this very patriotic switch.

Larry Bernstein:

What else did you learn in the documentary?

Darren Schwartz:

They called the Bomb the Gadget. I don't think that was said in the movie.

Larry Bernstein:

And what surprised you about Oppenheimer in Jeremy Bernstein's remarks who spoke first on this podcast?

Darren Schwartz:

It sounded like he didn't have the utmost respect for him as a physicist. I think he scoffed. He said, "Oppenheimer was probably good at fixing his automobile. He is probably handy with a wrench."

Larry Bernstein:

Jeremy did say that Oppenheimer would have won a Nobel Prize for his work on black holes if he had lived longer. How would you describe Oppenheimer's success with the Manhattan Project.

Darren Schwartz:

He's a project manager.

Larry Bernstein:

I find it mindboggling. Here is a theoretical physicist given the task of building an atomic bomb from scratch in the middle of a war with a multi-billion-dollar budget. And he has no experience in being a project manager of any sort, and he is placed in charge of the largest scientific project ever. How could General Leslie Grove pick this guy?

Darren Schwartz:

It seemed like there weren't a lot of other better choices. Grove thought, okay, this is a guy that I can boss around, or I can give him the space he needs but still hold the marionette.

He is a skinny guy. He didn't eat. He was constantly smoking.

Larry Bernstein):

He died young from lung cancer, go figure. He looked so old.

Darren Schwartz:

It would make sense that it really accelerated after his security clearance. It was really dragged in the mud and the McCarthy stuff. And he really was villainized. The guy was on the cover of Life! The father of the bomb. And then literally it all got taken away.

Larry Bernstein:

The issue of Oppenheimer losing his security clearance drives the movie's plot. Was there too much focus on it?

Darren Schwartz:

It was critical to the movie because it talked about the fall of a giant. He went from the guy who saved the world to this guy who we're saying, wait a second, we can't trust this guy with America's secrets. He could be a spy. He's a bad guy.

You had to tell the story of the scientists who came to his defense, those that turned their back on him. Kitty really shined. She goes toe to toe, word for word with Jason Clark.

It was a hit job. He was sent in there by Strauss. He doesn't do a very good job defending himself. He seemed a little feeble.

Groves went in there and they asked some very direct questions. At the end, he said, these are good Americans.

Larry Bernstein:

I thought General Groves when asked if Oppie would meet the standards for security clearance, he said he did not, but that nobody could meet that standard. And I thought this was a real help for him.

Darren Schwartz:

Is it "Oppie" or "Oppee?"

Larry Bernstein:

Oppee is the kid on the Andy Griffith show played by the young Ron Howard. Oppie is short for Oppenheimer.

Darren Schwartz:

Is it unreasonable that they would call him "Oppee" and his name is Oppenheimer?

Larry Bernstein:

Yes, it is completely unreasonable.

Let's delve into Oppenheimer's relationship with Kitty. He is in love with Jean Tatlock, but she refuses to marry him. So, he starts dating Kitty, and she gets pregnant.

Darren Schwartz:

She was married by the way.

Larry Bernstein:

Okay, divorced, remarried, then has his kid.

Darren Schwartz:

They had a baby, and she was struggling. She's like, I'm not enjoying this. Next thing we know, there's a knock at the door. Someone answers it; they give the kid. The kid's gone. We never heard from the kid again.

Larry Bernstein:

You have to be a good friend to take your buddy's kid for an indefinite period when your wife is having a bad day.

Darren Schwartz:

Mm-hmm. <affirmative>.

Larry Bernstein:

The choice of Los Alamos for the site of the Atomic Bomb project seems incredible. It is in a remote desert location with no infrastructure, and 100,000 people are going to move-in within a few months.

Darren Schwartz:

They patched it together and it was barely functional. They said they had five bathtubs for the entire place. And one of the guys in his documentary said, "You turn on the water in the morning and worms would come out."

The other thing they said was, they were young people and so they still wanted to blow off steam, but they didn't have a lot of store-bought liquor. So, they would make lab produced alcohol, which was hundred percent alcohol. Then they would just get ripped and then be back in the lab at 6:00 AM.

Larry Bernstein:

Darren, you managed young people when you ran sales at Groupon. How would you have managed the Manhattan Project differently from Oppenheimer?

Darren Schwartz:

Well, listen, I've never managed scientists. I don't think anybody in their right mind would put me in charge of scientists unless it was literally a science experiment. Listen, my perspective is you manage people, you collaborate, you get consensus, and you get buy-in when that's possible. And, when it's not possible, you got to do the mission and get up and march in the right

direction. I think Oppie literally built things by consensus. I mean, that's how he project-managed. That's like what his magic was.

Larry Bernstein:

Jeremy Bernstein emphasized Oppenheimer's intellectual quickness. How important do you think quickness is as an attribute to managerial success?

Darren Schwartz:

I think problem solving is; it takes quickness, but it doesn't mean you have to come to the ultimate solution.

Larry Bernstein:

What do you think that was really important that was missing in the Oppenheimer movie? The horrors of war were not really truly recognized or represented. This race to save the world and to create this bomb. But the result of the bomb was you killed 250,000 people, just eviscerated them. And so the only thing they really did is at the end when Oppie was looking in the crowd, a few people kind of morphed into skeletons. But what I think they should show actual footage of Nagasaki flattened.

Remember from the documentary where the kids were given bandages and their flesh like peeled off. I think that was a huge miss. It missed how the science ultimately caused devastating results.

Larry Bernstein:

25 years ago, I managed Salomon's Tokyo arbitrage trading department. Every weekend my wife and I would go traveling around Japan, and we wanted to go visit Hiroshima. I asked in a meeting if any of my dozen Japanese colleagues had ever visited Hiroshima so I could get some suggestions for restaurants and things to do. But none of them had ever been there. Then I asked if any of them had visited Las Vegas, and they all had.

Darren Schwartz:

Was there any resentment that you felt towards an American, specifically you?

Larry Bernstein:

None. There was a sense that the Japanese started the war with Pearl Harbor, so the Americans use of unlimited warfare seemed appropriate.

When I was living in Japan the newspapers were filled with stories about teaching the history of WW2. The Japanese textbooks took the approach that the war was justified and that they acted honorably. Meanwhile, the Koreans and Chinese were outraged because of the Rape of Nanking,

the brutal treatment of prisoners of war, and forced prostitution at Japanese military camps. These topics were red hot in Asia when I lived there in 1998.

Next topic: What did you find interesting about Nolan's production choices?

Darren Schwartz:

Chris shot this thing in IMAX 70 millimeter! Now there are 80 IMAX theaters in the country. There's only 19 of the 80 IMAX theaters in the country that you could truly get the experience that he wanted you to have. There's some level of arrogance there. Now we know that Billy, didn't he drive to Indianapolis to go see it? Oh my God.

Larry Bernstein:

My experience was not comparable. I saw Oppenheimer at the Wilmette theater, which is old and lacks the latest audio and video technology. In fact, they ripped out all the seats in the theater and replaced them with used sofas.

Darren Schwartz:

That's amazing.

Larry Bernstein:

The audio was terrible. Julie kept asking me, "what did he say?"

Do you think that first-run movies in the theater should have subtitles?

Darren Schwartz:

No.

Larry Bernstein:

But you did use subtitles when we watched the documentary film at home.

Darren Schwartz:

We did, because the documentary, there's a lot of people coming in. Who's that guy? Who's that guy? I turned the subtitles on. You're welcome. So, we could see who was talking.

Larry Bernstein:

When do you use subtitles?

Darren Schwartz:

I needed subtitles for Peaky Blinders, Cillian Murphy also, how about that? You watch Peaky Blinders, and literally it's a cockney accent. You can't understand it. Blinders, subtitles for that,

by the way. Beyond that. Don't need it. Now, Oppenheimer, my experience, very similar. It was Oak Park Theater, which was an awesome theater.

It was refurbished. It was very large and there was an echo. Some people, maybe they're a little older, they went back, they complained and they gave them like old-school headphones. So that's a solution.

Yeah. I couldn't hear. I was very frustrated because I invested three hours. I heard 80% of the dialogue. What is he saying? And people look at me like, what's wrong with this guy?

Larry Bernstein:

This is the part of the podcast where I ask you to compare other great movies with Oppenheimer. Back to the Future vs. Oppenheimer.

Darren Schwartz:

I like the scientific relevance. Okay, fine. I'll say this. I think the Fluxx capacitor was explained better at a detailed level that I was like, "I get it." And I knew somewhere in my head, it doesn't exist yet. It's coming. Yeah. Get it.

Larry Bernstein:

Ok, Band of Brothers.

Darren Schwartz:

Well, I think it's certainly represented the war, it was one of the best television experiences ever. It did a way better job talking about the impact of the war from a soldier's perspective.

Larry Bernstein:

Christopher Nolan's Dunkirk vs. Christopher Nolan's Oppenheimer?

Darren Schwartz:

I liked Dunkirk better.

Larry Bernstein:

Dunkirk showed the war from the perspective of the individual soldier in battle with less emphasis on the interplay between the generals and the politicians.

Darren Schwartz:

So now let me ask you another question. How many total bombs have been tested or dropped?

Larry Bernstein:

2000 nuclear bombs have been detonated in tests since Hiroshima.

Darren Schwartz:

2000.

Larry Bernstein:

The radioactive waste created is a huge health risk; it is no wonder that we negotiated a test ban treaty with the Russians.

What do you think was important about the Manhattan Project that has not gotten enough press?

Darren Schwartz:

Well, I mean, one of the things that I found is that Canada was significant in the Manhattan project especially in the early stages of research and development. And more importantly, the Northwest Territories were a critical source of raw uranium. I feel like Canada's always whitewashed, like they get nothing.

Larry Bernstein:

Darren, you are the What Happens Next Film Critic. What are the other movie critics, your peers saying about Oppenheimer and its director Christopher Nolan?

Darren Schwartz:

One of the quotes was that his sense of self-importance made it seem like the movie could have been done by any journeyman director. There was so much going on that it seemed like he was trying to accomplish this for his own personal self-interest. I didn't agree with that.

In this New Yorker article was that they could have done as good a job by just essentially copying and pasting a Wikipedia page about Oppenheimer. I think it's unfair too. I don't know what this guy's deal is.

Larry Bernstein:

Next topic is Robert Downey Jr.'s character Strauss. He was the one that held a grudge against Oppenheimer and was successful in revoking his security clearance and shaming him. What did you think of Downey's character Strauss?

Darren Schwartz:

I found it a little confusing. That part was in black and white. There's like three storylines that were interlaced. It needed to be told because Strauss was so petty. It led to the destruction of the

Oppenheimer legacy, which maybe only now with this retelling is coming back. On an actor's note, I thought it was amazing for Robert Downey Jr.

Larry Bernstein:

Will Robert Downey Jr. win the Academy Award for Best Supporting Actor?

Darren Schwartz:

He gets nominated and maybe Golden Globe.

Larry Bernstein:

Darren, will he win?

Darren Schwartz:

For Golden Globe, yes, he will. And what I loved about him being in the movie is that this is a new career launch for him.

He's not Ironman anymore. And that resurrected his career. Got him on the map. If you remember the movie before that was Sherlock Holmes. And then you start with Ironman and boom, you're a superhero.

Larry Bernstein:

New topic: Albert Einstein in the movie.

Darren Schwartz:

Einstein apparently is an idiot <laugh> who is just checked out. He wasn't plugged in, and he didn't really know what fission is or what's a bomb. It seems like they put him at the Institute just to put him out to pasture.

It's like a running back in the NFL three, four years, you're done.

Larry Bernstein:

Where are you on Einstein bagels?

Darren Schwartz.

Well, they closed in Highland Park. I mean nothing stays open in Highland Park. Once Upon a Bagel that's open, but the car wash that's gone. Boom. So, what we are we going to do? I think there's a parallel between Einstein Bagels and Oppenheimer.

Larry Bernstein:

Is it Einstein?

Darren Schwartz:

It's Einstein. Yeah. So, I think that's really the only crossover.

Larry Bernstein:

Let's take the nakedness in the movie Oppenheimer seriously.

Darren Schwartz:

Okay.

Larry Bernstein:

When we were kids, people didn't get naked and then talk about serious topics.

Darren Schwartz:

Yeah.

Larry Bernstein:

But in this movie, Oppenheimer is naked, albeit with his legs crossed, smoking a cigarette, having a serious conversation.

Darren Schwartz:

Yeah.

Larry Bernstein:

This seems like a totally bizarre choice by the director Christopher Nolan, what happened?

Darren Schwartz:

The only thing I can think of is there was maybe some theme that he was exposed or he was vulnerable. But that's just digging too deep. Like, who cares? Just cut the scene or put clothes on, man, like, I can't take it anymore. Come on. Where's he ashing? Is he ashing? I mean, that's dangerous. Come on.

Larry Bernstein:

I had not thought about it, but you are right, where is the ash tray?

Oppenheimer is three hours long. Did you sit through the whole movie?

Darren Schwartz:

Truth be told, because it's going to probably come out anyways, is I did doze off a bit. Six minutes. <laugh>. I was nudged. I woke up with a start, realized where I was, and then I did get

popcorn and a massive Coke slushie. And yeah, I was probably gone for four minutes. So 10 minutes? Yes. Six minutes sleeping, four minutes on a food run.

Larry Bernstein:

I end each episode with a note of optimism. What are you optimistic about with regard to building a nuclear bomb?

Darren Schwartz:

Yes. It's a tough one. It's tough to be optimistic. So, I'd say that I'm optimistic that having seen the horrors, and now for people to be reintroduced to that, that it will be a deterrent and it will never happen again.

—

Larry Bernstein:

Christopher Nolan used 70-millimeter film for *Oppenheimer* to watch it on an IMAX screen. There are only 19 IMAX theaters in the United States that can properly show this movie. Billy, you made the trek from Chicago to Indianapolis to see it. What happened?

Billy Herriott:

My childhood best friends and I made the decision about a month ago to see *Oppenheimer* and figured might as well go drive three and a half hours South Indianapolis to see it on the big screen. And it was a fantastic decision.

Larry Bernstein:

Is this the first time you've ever traveled for an IMAX theater?

Billy Herriott:

Yes. First time.

Larry Bernstein:

IMAX is fantastic if there is a lot of action or special effects, but here with *Oppenheimer*, it is a serious drama. I don't get it.

Billy Herriott:

Shooting on 70-millimeter film is not a cheap thing to do, so Christopher Nolan had to have been up to something.

We bought the tickets about a month early and the theater was pretty much already sold out. We were third row out of about 15, and you had to pretty much look directly up to see the top of the screen.

Larry Bernstein:

I want to understand the logistics of your trip to Indiana, was this going to be a day-trip, when did you leave, what happened?

Billy Herriott:

So, it turns out Indianapolis is Eastern time zone.

<laugh>, I mean, none of us knew, so we thought get dinner, some drinks. Turns out we got there about 15 minutes early to a line of about 300 people. Chaos.

Larry Bernstein:

I know you get hungry. You were looking at a 3 and half hour drive and then the prospect of a 3-hour film, what happened?

Billy Herriott:

I had a tube of scorching barbecue Pringles and about six Modelos on the way down.

Larry Bernstein:

Ok, your late, you sit down in the third row. You are a big guy, 6 feet 5, 270 pounds were you comfortable in the seat?

Billy Herriott:

They tried to fit as many people in that theater as they possibly could. It was a small uncomfortable seat. The people in front of us leaned back about seven inches. I've got long legs and these guys jamming it into my knees. It was very uncomfortable. They actually sold bottles of wine, so I had a Pinot Grigio.

Larry Bernstein:

Let me get this straight, so after the six Modelos, you decided to take down some Pinot Grigio. Let's bring in our alcohol expert. Darren, what do you think about Billy's decision to mix Modelo with a Pinot Grigio?

Darren Schwartz:

Well, what year was the Pinot Grigio?

Billy Herriott:
It might've been a 2024. Yeah, <laugh>.

Larry Bernstein:
Sounds young.

Billy Herriott:
Very young.

Larry Bernstein:
We are ready for the big event. Billy, what did you think of the movie?

Billy Herriott:
I thought it was an incredible. Definitely dialogue heavy with one exciting scene, the test bomb. Everyone living in the USA should see it.

Larry Bernstein:
Darren and I were very disappointed with the audio quality in our rather pedestrian movie theaters. My wife had real trouble hearing some of the dialogue.

How was the audio quality in the special IMAX theater?

Billy Herriott:
It was the best audio from any movie I've ever heard. Oh my God. Dialogue was perfectly crisp. The soundtrack was incredible. It was extremely loud, but it needed to be loud. It's intense dialogue. They're not talking about what they had for lunch. They're talking about serious matters.

Larry Bernstein:
There is a scene where Oppenheimer and his girlfriend Jean Tatlock where they are having a very serious conversation, and they show her oiled up and topless. What did you think of that?

Billy Herriott:
Unbelievable. Yeah. I would sit in there and watch it over and over again.

Larry Bernstein:
Got it. Darren and I concluded that that topless scene was ridiculous and should have been cut. Do you agree?

Billy Herriott:

Yeah. Had no importance. <laugh> <laugh>, zero importance. <laugh> Personally, I wouldn't take it out, but I get it. No importance to the movie.

Larry Bernstein:

The movie ends. You and your two childhood buddies walk out. You're facing a three-and-a-half-hour commute back. Billy, did you go straight home? You were probably starving because you missed dinner due to the Eastern Time Zone snafu. What'd you do?

Billy Herriott:

Well, at this point it's 10 o'clock at night. So White Castle.

Larry Bernstein:

Great call.

Billy Herriott:

Yeah. Crave Box 20-Pack.

Larry Bernstein:

So, you bought 20 hamburgers?

Billy Herriott:

We did a 20 pack between the three of us. We did not eat them all.

Larry Bernstein:

How many did you eat?

Billy Herriott:

I want to say around nine <laugh>.

Darren Schwartz:

Billy, you did your part and then some. It wasn't on you this thing didn't get finished.

Billy Herriott:

Yeah, I had more than the third for sure. Stopped at the gas station, got gas. I ended up getting a couple scratch off tickets.

Larry Bernstein:

Billy, are you of age to be gambling?

Billy Herriott:

I'm 25 so perfectly of age to get scratch offs, <laugh>. I got a \$20 scratch off ticket. I won 40 <laugh>. I'm up, I'm up 20 bucks. She was allowed to sell them to me, but she said it was too late to cash them out. I'm never coming back to Indiana ever in my life. I mean, ridiculous. So, I give it to some guy with kids and a family.

Larry Bernstein:

Oh my God, you're charitable.

Billy Herriott:

It made me feel really good.

Larry Bernstein:

Billy, let's say we are playing golf together. There is money on the line and my first putt goes long like three and a half feet past. Will you give it to me?

Billy Herriott:

Mark it.

Larry Bernstein:

Back to the ride home.

Darren Schwartz:

Billy, just because I'm getting a real strong visual here. What kind of car was it?

Billy Herriott:

It was a 2023 Volkswagen Jetta turbo four with a good driver.

Darren Schwartz:

Were you in the back seat or front seat?

Billy Herriott:

Front seat.

Larry Bernstein:

Billy should definitely be driving shot gun.

Darren Schwartz:

My visual is the guy's zipping through. You're past the White Castle.

The seat almost all the way back. White Castle wrappers on you. Maybe a few pickles and you just snoring with some drool.

Billy Herriott:

A hundred percent. If Christopher Nolan <laugh> was in the car I think he'd probably have the 70-millimeter out.

Darren Schwartz:

Nolan, first of all, I think he would've been very happy to know that a film buff guy is going to make the commitment and drive and make this trek.

Billy Herriott:

Oh, a hundred. that's what it's all about.

And I think he might even find some screen time for me somewhere in the future.

Larry Bernstein:

Next topic is the visual quality of the film. Did the film look different in the IMAX theater? Was it bigger and crisper? What makes it special?

Billy Herriott

If you see it in a normal movie house that does not use the 70-millimeter film, it is completely cut down. They pop a CD in and call it a night. The image quality was more HD than anything you've ever seen in your entire life. There were the scenes with the atoms flying around.

Larry Bernstein:

Billy, just to confirm, are you referencing the scene when Oppenheimer was a lab technician at Cambridge, he was dreaming of abstract math and Christopher Nolan used a meteorite shower as a metaphor for his thinking process?

Billy Herriott:

Absolutely. Yeah. Just as an example, that scene was probably one of the most incredible things I've ever seen.

Larry Bernstein:

Our film critic Darren Schwartz fell asleep for around six minutes during the film Oppenheimer when he was sober. You had six beers before showtime. Did you fall asleep during the film?

Billy Herriott:

I was locked in. Eyes wide open the entire time. <laugh>, I don't think it would've been possible. I really don't.

I mean with the seat in front of me jamming into my knees <laugh> and the strength of the audio, the room and the brightness of the big screen, I don't think it was physically possible for me to sleep. <laugh>.

Larry Bernstein:

If I drank six beers, there is no way I could watch a three-hour film without going to the bathroom, what happened with you?

Billy Herriott:

Definitely broke the seal early on the trip down <laugh>. This theater you were not getting out. It was go to the bathroom on yourself. <laugh>. I don't think I saw a single person leave the theater. It was physically impossible to do so. I was locked in.

Larry Bernstein:

Billy, I end each episode with a note of optimism. What are you optimistic about as it relates to IMAX and the use of 70-millimeter film?

Billy Herriott:

Personally, I hope nothing really good comes out of it because I'm not doing that again.

Larry Bernstein:

What? I thought this was the trip of a lifetime.

Billy Herriott:

A hundred percent worth it.

Larry Bernstein:

Wait a minute. My impression is this was a great bonding experience with your best friends. You got in the VW Jetta, you had the BBQ Pringles, the Modelos, the Pinot Grigio, the White Castle, the excitement of winning the scratch off, the time zone change. This was hugely memorable, so why only one time?

Billy Herriott:

I guess you're right, but it has to be something that would blow my socks off.

Larry Bernstein:
Oppenheimer two?

Billy Herriott:
You know what <laugh> I don't think they need to do that.

Larry Bernstein:
Fine. Barbie the sequel?

Billy Herriott:
No, definitely not. Another 70-millimeter film that Christopher Nolan did was Dark Knight and that's an all-time movie.

Larry Bernstein:
What if they were showing Dark Night on IMAX, one night only?

Billy Herriott:
Yes. I would make the drive.

Larry Bernstein:
Aha. So once in a lifetime turns into twice in a lifetime.

Billy Herriott:
Yeah, you're right.

Larry Bernstein:
Thanks to Jeremy Bernstein, Darren, and Billy Herriott for joining us today.

If you missed last week's show, check it out. Last week's podcast was entitled Barbie is the Bomb! Global tickets have already exceeded \$1 billion.

The podcast included four speakers. The first was Sophia Saker who is an intern with What Happens Next. Sophia recently graduated from Brown and will be working for a Hollywood talent agency after the writers' strike is over. Her talk centered on why Barbie has become a cultural phenomenon!

Our second guest was Kay Hymowitz from the Manhattan Institute and the author of the book Manning Up: How the Rise of Women has Turned Men into Boys. Kay discussed the battle of the sexes in both Barbie Land and the Real World.

My sister Debbie Warren spoke about her graduate school application essay to Northwestern's Kellogg School about collaboration when playing with barbie dolls as a kid.

Our final speaker was our film critic Darren Schwartz.

I now want to make a plug for next week's podcast with Aaron Tang who is a law school professor at UC Davis. Aaron is the author of the new book entitled Supreme Hubris: How Overconfidence is Destroying the Court and How We Can Fix It.

Aaron thinks that the court should be humbler in its rule making and do the least harm instead of solving society's problems.

You can find our previous episodes and transcripts on our website whathappensnextin6minutes.com. Please subscribe to our weekly emails and follow us on Apple Podcasts or Spotify.

Thank you for joining me, good-bye.