



Nobel Voices Video History Project, 2000-2001

Interviewee: Jack Steinberger
Interviewer: Neil Hollander
Date: June 28, 2000
Repository: Archives Center, National Museum of American History

STEINBERGER:

Introduce myself? What would you like me to say about myself?

HOLLANDER:

Your name and who you are.

STEINBERGER:

My name is Jack Steinberger. And what am I? I am a retired physicist, because I did teaching and research in physics during my paid life.

HOLLANDER:

We were talking as we were walking up here. You were saying you don't quite agree, you're a little hostile to what we're trying to do.

STEINBERGER:

Well, I'm hostile to many things, and I don't know really so well what you're trying to do. But you told me that you are going to interview me in order to present this to younger people.

HOLLANDER:

Right.

STEINBERGER:

My impression is that you imagine that we old and a little bit particularly successful people might have a message for the young people. But I think if we were successful that may be in part because we did some thinking in our lives, but it may also be in much larger part due to luck. I think that one thing which is very sure is that older people are not as clever as younger people, and I think that these younger people would probably be better able to figure out what's good for them than I can tell them.

Nobel Voices Video History Project, 2000-2001

Jack Steinberger, June 28, 2000, Archives Center, National Museum of American History

HOLLANDER:

What then do you consider the significance of the Nobel Prize?

STEINBERGER:

Oh, I'm not very, very happy about the Nobel Prize altogether in the sense, well, I have some personal benefits from the Nobel Prize. It's very [inaudible]. Prizes in science are not uncommon. There are many prizes which are given, and I have maybe a few other prizes, but the Nobel Prize has a particular notoriety in the public due to some m_____ evolution. I am also a little bit hostile to it because I think it is not really fair to imagine that modern science or medicine advances because of the particular contributions of a few individuals.

I think that modern science, which is carried on by tens of thousands of researchers, goes forward on the basis of the work of many people working on the similar subject and sharing their knowledge. Sometimes it may be a particularly more dramatic step occurs, but it's always maybe carried forward by some small group of people, but it's always based on the work of many others who laid the foundation for it. So I think it's unfair to imagine that these people are particularly better than the other people who work in the field. It's often, of course, not true, and there are many people I can think of from physics who have not gotten a prize who are better than I am myself.

HOLLANDER:

What exactly did you get the Prize for?

STEINBERGER:

I did an experiment, together with several other people at Brookhaven National Laboratory in America, which showed that there is a second kind of neutrino. The neutrino has elementary particles. Elementary particles exist in families of particles, it's now known. At the time, the elementary particles which were involved were the electrons and the neutrino. There were also other elementary particles at the time, but the ones which are particularly relevant here are the electrons and the neutrino.

We were able at Brookhaven, for the first time, there was an accelerator which was adequate for doing such an experiment. So, for instance, in this experiment, we required the accelerator, which was the effort of very many people making this accelerator, and this allowed to make a beam of these neutrinos, and we were able to convince ourselves that these neutrinos were not the same kind of neutrinos as those which had been seen before. They were associated with not electrons, but with something called neurons. So we were able to understand that there is a different neutrino associated with the neuron than with the electron.

Nobel Voices Video History Project, 2000-2001

Jack Steinberger, June 28, 2000, Archives Center, National Museum of American History

It also allowed one to understand perhaps for the first time that particles are associated in particular ways, electrons with neutrinos of their sort, neurons with neutrinos of their sort. Now we know that there are three such families. This is a basic fact of our understanding of particle physics today.

HOLLANDER:

Before we come back to the Nobel, could you please tell us why did you become a physicist? At what point in your life did you decide, "I'm going to be a physicist"?

STEINBERGER:

Well, I'm glad you asked that question, because one thing which is absolutely clear in my life, that nothing is a matter of foresight or particular understanding. Everything is chance, chance and luck. My chance and luck has been good, and I hope those who see this who are young people will also have luck. But some will and some won't.

I started out to be a chemist, and in fact, I started out to be a chemical engineer. Then I couldn't continue my studies. I had to interrupt. I went to night school where I could only study chemistry. So I became a chemist, and then the war came. The war needed some young people who understood a bit about some physics for the new radar which was being developed. So I took some courses which were encouraged by the army, and joined the army to do this. Then during the war and later after this course, I was able to work in the laboratory which developed these radar sets for bombers for killing German civilians, I'm sorry to say. I would like to underline that.

After the war, while I was doing that, I could take some courses in physics. So I continued in physics. After a while, I liked that better.

HOLLANDER:

So if we sort of ratchet all the back to your becoming a chemist, why did you decide to become a chemist and not become a poet?

STEINBERGER:

Well, it was a chemical engineer. What I wanted to do was to be a doctor, but there wasn't enough money in the family to send me to medical school. I was told that I'd better study something where I could start working before. So I had a nice chemistry teacher in high school, and I like working with my hands also, so I took chemical engineering as a subject.

HOLLANDER:

Nobel Voices Video History Project, 2000-2001

Jack Steinberger, June 28, 2000, Archives Center, National Museum of American History

Doctor, coming back to your Nobel, are you, in essence, saying that you didn't deserve the Prize?

STEINBERGER:

Yes, I can say that. I can also say that no one—well, a very few people—deserve as much recognition as comes with that prize. I don't mind the Prize. The money, in fact, I gave away to institutions. But the notion that I'm better than somebody else is very difficult for me to agree to. If I look around the fifty or so Nobel Prizes which I see in our meeting today, there are few people I can respect maybe a good bit more than a few people, a few other people, but there's no Einstein. And Einsteins don't come along every year. I'm not an Einstein. That's sure. Okay.

HOLLANDER:

You mentioned that you gave your money away. Could you—

STEINBERGER:

Well, I was exaggerating. I gave half of it away. There wasn't all that much anyway, because there were three of us who shared it. I regret now that I didn't give all of it away, because it doesn't do me any good whatsoever.

HOLLANDER:

Can we ask you who you gave it away to?

STEINBERGER:

You can ask me, yes. I split it between the University of Chicago, where I had a very good experience in being taught. If I became a good physicist, it's because I had a very good physics teacher at the University of Chicago in graduate school. And I gave it to the organization, the Jewish charitable organization which allowed German children to escape from Germany before the war came.

HOLLANDER:

That wasn't your case, was it?

STEINBERGER:

Yes, it was my case.

HOLLANDER:

Nobel Voices Video History Project, 2000-2001

Jack Steinberger, June 28, 2000, Archives Center, National Museum of American History

It was. How did you escape?

STEINBERGER:

Well, *escape* may be not quite the right word. But Hitler came to power in 1933. The programmed anti-Semitism was very clear. It didn't have to be explained to anyone. It wasn't always easy for people to just emigrate. Certainly Jews were encouraged to leave. They weren't wanted. My father couldn't leave. We had no relatives outside of Germany that they could send us to, but then this organization, this charitable organization in America, in 1934 offered the chance to three hundred, if I remember that right, Jewish children to come. So my father thought we should leave, two of us, two brothers. The third younger brother they kept at home. So the two of us went on a steamship to America.

HOLLANDER:

What age were you?

STEINBERGER:

I was fourteen, thirteen. Thirteen.

HOLLANDER:

What happened when you arrived in the States?

STEINBERGER:

First, we were put into an orphan asylum so we could be fed. We were in New York. We were able to go to school in New York. One thing which I remember, which was very interesting, is that in one month I could speak English and work in school like anybody else. For a young person learning a new language, it was extremely easy. Then I was put, in fact, eventually with a very rich man in Chicago—rich by my standards, in Chicago, a grain broker. So I went to high school sometimes driven to school with a Lincoln eight-cylinder car or something like that. So I didn't suffer for that time. I had good luck all of my life. This is what I already said once before.

HOLLANDER:

And your brother?

STEINBERGER:

My brother was put with some other family. He was also well taken care of and could go to university and could have a life that suited him afterward.

Nobel Voices Video History Project, 2000-2001

Jack Steinberger, June 28, 2000, Archives Center, National Museum of American History

HOLLANDER:

So really your development into physics came in the States, your [inaudible].

STEINBERGER:

Yes, yes, yes, all of this was in the States. As a fourteen-year-old, a thirteen-year-old, I was in America.

HOLLANDER:

And your parents, did they survive the war?

STEINBERGER:

Also by some good luck. The good luck of my parents, may shock you a little bit. The good luck of my parents was that my grandmother died at an appropriate time, otherwise they never could have left. But my grandmother died in 1936, and so they were free. She had lived with them. Then in 1937, the same man who was rich, who took care of me, could provide for them. But it was necessary then to emigrate to America with what was called an affidavit, some statement that they would not fall to the care of the state, by somebody who could pay for it. So they got this, and they came to America and so to Chicago.

But we were then—then I left Mr. Farrell's house, the rich house, and we were quite poor together. My father, he was a cantor in the synagogue in P____, and in America there was no job for him. He was already sixty-five also. So we opened some little store, but we were not good businessmen either. It was not a rich life, but we also survived.

HOLLANDER:

You mentioned with regret that you worked on radar, the development of radar.

STEINBERGER:

I wanted to underline this. This is for a German audience?

HOLLANDER:

Yes.

STEINBERGER:

And we—

Nobel Voices Video History Project, 2000-2001

Jack Steinberger, June 28, 2000, Archives Center, National Museum of American History

HOLLANDER:

Both. It's for German and American.

STEINBERGER:

Okay, well, don't mind also for the American audience. It's very common, in remembering the war, to remember the German atrocities and to forget the Allied atrocities, and the civilian bombing during the war is something if it had been done by the losers in that war and to the extent to which it was done by the losers in the war was very much condemned afterwards. But the comparable atrocities committed by the victors in the war is more easily forgotten. This is why I mentioned it.

HOLLANDER:

Things like the bombing of Dresden.

STEINBERGER:

Things like the bombing of Dresden or Hamburg or anything, or of Hiroshima.

HOLLANDER:

At the moment, what are you doing?

STEINBERGER:

At the moment? It is a moment. My teacher whose name I mentioned, Fermi, was a very, very special physicist, and very well remembered and he's done many, many things, but he put me on some kind of road which I followed all my life without really looking right or left. It was going so well that I just was happy all the time. But lately the things are becoming much more difficult in my field of elementary particles, and I've left it a few years ago, maybe not completely. I've not changed. I'm no longer doing any research myself. I'm trying to understand a little bit what people are learning in a much more dynamic field now, which is astrophysics.

So I'm trying to learn astrophysics, and there are some very interesting theoretical challenges also in astrophysics which people are working on. I'm not trying to unravel them, but I'm trying to read what these people have learned and are learning the new discoveries. In the beginning of this year, there was an enormous step forward in astrophysics, which I can't explain to your young audience, but I'm trying to understand it in a substantial way. It's a pleasure for me, and not easy.

HOLLANDER:

Nobel Voices Video History Project, 2000-2001

Jack Steinberger, June 28, 2000, Archives Center, National Museum of American History

Fermi was, you said, one of your teachers. How did you come to meet him?

STEINBERGER:

Also by luck and completely undeliberate. While I was working during the war in this radar project, I was a very young man who knew physics. I was taking a physics course on the side now and then. There was one physicist who said, "When you go to graduate school after the war, go to Oppenheimer. He's in Pasadena." So I wrote when I got out of the army to Pasadena asking if I can have a fellowship.

They said no, I can't have a fellowship. I had no money, so I couldn't go. By that time, I had a wife and I had a child. I couldn't go to work with Oppenheimer. I couldn't go to Pasadena, so I went to Chicago where my family lived, my parents lived, where I had been before, and applied to Chicago. They accepted me, and in Chicago there was Fermi. So it was just because I was unlucky in what I wanted to do that I came to this man.

By the way, Oppenheimer, in the end, if I had gone to Pasadena, he wouldn't have been there, because after the war he took a job in the Institute for Advanced Study in Princeton. When I got my doctor's degree, I could study with him for a year later.

Does that answer your question?

HOLLANDER:

No, not completely. I wondered, too, do you remember the first time you encountered Fermi?

STEINBERGER:

Yes. When I became a graduate student in Chicago.

HOLLANDER:

You said he set you on the right path. How did he do that?

STEINBERGER:

By being himself. He was just a great man, and watching him a little bit was part of this. Another was I wish I had watched him better. Another was that his focus in physics, the physics that interested him was a path which I followed. That's what I meant, he set me on the right—he didn't tell me what to do, but I did my thesis with him. It was in a field—he was doing more than—he was interested in more than that field, but the real thing that was going on with this particular particle physics, and I did my thesis in it under his direction. Might say, but this I won't say, because it won't be so useful for

Nobel Voices Video History Project, 2000-2001

Jack Steinberger, June 28, 2000, Archives Center, National Museum of American History

your younger audience.

HOLLANDER:

Many of the people who see this don't really know who Fermi is. I wonder if you could give us a little sketch.

STEINBERGER:

Who Fermi was? Fermi was an Italian physicist who very early on made extremely important contributions in the advance of our understanding of how particles interact with each other. He was the co-discoverer of Fermi d_____, which is a very important property of spin one-half particles. He wrote down for the first time the theory of interactions between—which is now called the w___ interaction. At the time it was called the Fermi interaction. But he was intelligent. He also discovered on the side, while we were students—it was hardly discussed—what is now known to be the basic mechanism for the acceleration of cosmic rays. Cosmic rays is an important thing in astrophysics.

But he was a man who was really distinguished by his concentration on what he did, insisting on understanding very precisely what he did. Not being quite modest, he didn't need anybody to tell him he was any good. Everybody in my field is very aware that he was one of the great contributors.

HOLLANDER:

Doctor, can we jump to another subject for just a second? One of the topics that's come up many times is the relationship between science and society. What are your views on that?

STEINBERGER:

Oh, my views are that I wish I could do more. Of course, there are not many things which I understand any better than anybody else, and there I can't contribute. But there are some things where I think we are doing wrong things in our society where I wish I could help to make things better. One of the things is atomic weapons. I wish we could get rid of them, and to get rid of them, people should be aware that they would be better off without atomic weapons. For that, you have to get to the people. So I wish I could do something to get to the people.

Well, I don't think it will be of some use, but I've tried in the papers now and then to write an op-ed piece to try to focus on this problem, but my contributions have almost invariably been rejected. It's not easy to help society, but I think as a scientist I have an obligation. I wish I could do something, something which helps, maybe mention it in that connection. Yes, in that connection, maybe there is sometimes the pretension that the

Nobel Voices Video History Project, 2000-2001

Jack Steinberger, June 28, 2000, Archives Center, National Museum of American History

scientist in his research should be clear to do things which will benefit society and not do things which will not. That's not so easy to do in your research, unless your research is applied, trying to make an atom bomb. Maybe there you should think a little bit.

But mostly research is at a more basic level, and you should be aware you cannot anticipate how the thing might or might not be used. In fact, all of the research which I've done has been of a sort which I cannot imagine it ever being used. That doesn't mean that somebody won't someday be used in some indirect way which I can't anticipate. So I don't feel responsible for the eventual use of whatever I might have learned in my research, but I feel responsible to the extent to which I might understand something, to try to help make use of that information.

HOLLANDER:

In other words, there is no real direct line from what your research to something very practical [inaudible]?

STEINBERGER:

It's certainly totally impossible for me to imagine anything. It's the energies at which we work, so much temperatures which were so much higher than anything which goes on on our Earth, that it's hard to imagine how they can have some practical application later. But people always, when this question comes up, refer to the fact that, okay, Mrs. Curie didn't know what radioactivity might be used for, and these are also relatively high-energy temperature. But the fact that in that case something did happen, it doesn't mean that in all cases something will happen. It's hard for me to imagine that something will ever come out of a practical sort, of this particular kind of research.

HOLLANDER:

You mentioned that some of your efforts toward bring about peace have been rejected. What specific ones?

STEINBERGER:

So if I would write an article which I would hope to be published in *New York Times*, it would not...it would rarely...I've never had anything published in *New York Times*. I've also rarely sent anything in, but probably two or three times was rejected.

But recently I sent something in to the Frankfurt A____. I don't do it very often. It just happened in connection with the American proposal for a national missile defense. Your foreign minister was in Washington and tried to present his views that maybe this would not be the best thing for nuclear disarmament, to invent a national missile defense for America. And I appreciated what he tried to do. It was reported in the press. I think it had a very good effect in that it focused on the issue and did result in a fair amount of

Nobel Voices Video History Project, 2000-2001

Jack Steinberger, June 28, 2000, Archives Center, National Museum of American History

discussion since.

I sent a letter to *Frankfurter Allgemeine* to suggest that maybe Germany could do one little thing, it could tell NATO that it would no longer like to have nuclear weapons on its soil. This, I think, would have some impact. It's a purely—I can't find words these days anymore. It's just a gesture. It's not an act, because there are only a handful, maybe 50 weapons. America has 10,000 which are in Germany. But it's a symbol for German acceptance of the notion of a nuclear umbrella by America. This notion, I think, is not a very good notion, and would be very good if Germany said, "Look. We don't think that the nuclear umbrella is a good idea. Please take away your bombs." But this was not printed by the *Frankfurt Allgemeine*. My writing is not very good. Well, you probably guessed from the way in which I talk.

HOLLANDER:

There's somebody here from *Frankfurt Allgemeine*.

STEINBERGER:

Oh, really? [Laughs]

HOLLANDER:

Yes. Actually, the reporter who's from the *Frankfurt Allgemeine* wanted to come to this interview, and I said no. I'm sorry.

STEINBERGER: I see, really? Oh, no, no, no, no, no, no. Well, but also your life is also bit of chance. You can't always plan things.

HOLLANDER:

I've have to put you in touch with [inaudible] in touch with the reporter.

STEINBERGER:

Okay. If you say, but she's probably interested in different issues than this one here.

[End of interview]