



Nobel Voices Video History Project, 2000-2001

Interviewee: Martinus Veltman
Interviewer: Neil Hollander
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HOLLANDER:

Doctor, if you could please just introduce yourself to us.

VELTMAN:

Well, I'm Martinus Veltman, born in the Netherlands in 1931. I've seen a part of the war, but only as a kid of fourteen years old and so on. I was fourteen at the end of the war. We had a hard time in the Netherlands after '45. For about ten years, the country was building up and was essentially rather poor. So that part of my life I remember mainly as not having luxuries, certainly often not even having food.

Then I went to study, and it still took a while, because not only had the war destroyed many things, but it also destroyed science. So the science at our university was not very good in Utrecht. So it took a while before I got teachers that started telling me the exciting things, to be precise, somewhere around 1955. But then when I got to know about modern physics, I got very fascinated by it. Once you get fascinated, you start working day and night, and it becomes more fascinating.

Well, basically, that's the way it went. In 1953, I think, I got in my hands a book by Einstein, *The Meaning Of Relativity*. He had written it himself. I had to wrestle for a year or so to get through it, but that's what really got me.

HOLLANDER:

To go all the way back to when you were a child, what put you on the road to science? Why science and not a poet or something else?

VELTMAN:

Well, because I'm not good at poetry. [Laughs] It's as simple as that. From a young child on, which I was interested in technical and scientific things, so these are things that you are or you are not. It's not something that you can direct yourself. At the age of five or six or something like it, they gave me a set of lamps and wires and batteries with which you could make lamps go and so on. This excited me greatly, and by the age of twelve or, no, a bit later, about twelve, thirteen, I put my hands on to transformers and

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things like that, and started getting interested in radios. But that's, you see, a very personal interest. If you are interested in that, well, that's why you're interested. So from the beginning on, I was led in that direction.

HOLLANDER:

So, really, you started on electrical things first.

VELTMAN:

Well, because electricity is always fascinating. There's secret things going on in wires. [Laughs] You pull a switch, and, boing, there something goes over there. It's magic become real. And getting voices out of the air, radio, that's also very interesting. In those days, you are dreaming about television, which we didn't know was possible and so on. But sometimes in some books they would write about it, and I was greatly mystified.

In fact, to be precise that's real, let me recall this incident. When I was, I think, eleven or so, I remember, I discovered that electricity has something reciprocal. You could hook up two telephone or an earphone, you know, and then I discovered you could also do the opposite. You could speak in it and the guy on the other side would hear it. So I remember that I thought, well, you can do television the same way. So I got myself a glass plate, two of them, and I attached wires on one of the plates, and attached it to the other plate. I put one outside and I looked at the other in the hope to see something. Well, it didn't work, of course, but it gives you an idea that that was the kind of things I was thinking. It was, of course, real stupid, but just to give you the idea.

HOLLANDER:

That's exactly the kind of thing we're talking about.

VELTMAN:

Yes.

HOLLANDER:

Is there anything else? What got you to the University of Utrecht?

VELTMAN:

Well, that was a very important thing that happened to me, which was beyond my power. It is the function of a high school teacher. You see, at high school, I was to most teachers a bad and a difficult student, not so much because I was difficult. I was not difficult, but I was not listening to them. I was sitting in the back of the room doing my own thing. I was not interested in the languages. I was not interested in biology or something. My

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interests were very polarized towards physics and mathematics, geometry, I remember.

These teachers would see me sitting in the back, clearly working on something else than they were talking about, and it would make them nuts. So they didn't like me very much from this point on. But of course, one teacher would like me a lot more, and that was the physics teacher. So I had a very good relationship with the physics teacher and with the English teacher, I should say. So that physics teacher, really, he thought a lot of me. He thought I could do something and so on.

By the time that I finished high school at the age of seventeen, barely seventeen, no, I was still sixteen then, and I tried to get in schools, I had difficulty getting in schools because I didn't have good marks, you know, because all the other things were bad. For languages, I had five, you know, less than half the grade and so on. It was pretty tough, so it was hard for me to go to a good school.

So then this teacher came to my home, and that's the great thing, see. He went out of his way. He did something. He came to our home on his bicycle from across town, and he say to my parents, "You have to make him go to the university." This man, I'm eternally grateful. While he's dead now, I've done my best during my lifetime to let him know how much I appreciated it. He was there when I became professor in Utrecht, and he was very happy about that. But this is an extremely important thing.

In my business, high school teachers are extremely important. For example, there was a high school in the Bronx in New York. I can point to at least two people, but there are many more, who are sitting here as Nobel Prize winners, who come from that high school, Mr. Cooper, Mel Swetts [phonetic]. There are others, and I don't know them. But I know many of them. That high school has produced lots of Nobel Prize winners, because their teachers there, these teachers there and these people, they created excitement in everything. It is that that's important at that stage of life. So teachers, I think, have a gigantic influence on the career of anybody. And almost every physics scientist somewhere in his career has a good teacher at that level, as a high school teacher. I cannot emphasize that enough. Certainly to me.

HOLLANDER:

How did you get into the university if you had bad grades?

VELTMAN:

Well, at that time, going to the university was open. You didn't have to compete. All you had to do is say you wanted to come and then pay an amount of money, which at that time was gigantic. University was still in Holland, at the time, an elitarian institution.

So I felt sort of bad in the beginning. There were all these other guys, and they all had grades, you know, sky-high. Here I was, maybe good in physics and mathematics, but

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the rest I was truly an idiot. But I went on, went on anyway. But in the beginning it was a bit difficult. For about a year it was difficult, then gradually started to become easier.

HOLLANDER:

[inaudible]

VELTMAN:

No, not really very much. The University of Utrecht was in really bad shape. In the beginning, even physics was not very interesting at all to me. It was dull. They were doing physics that was from the previous century. There was nothing about relativity, nothing about elementary particles, nothing even about quantum mechanics. All the exciting things were not taught because the teachers had gone. The war had really put the university to ruins, and the good guys, whom I got to know later, had gone away. They were in America or what have you. So, physics in Utrecht where I started at the university, it was really bad, I would say. It was really bad, without insulting anybody, yes. They were doing dull things, not the exciting things. So at some point I run into them, and then I got very excited, but it happened only in '53, five years after I was at the university.

HOLLANDER:

Then you found Einstein's book?

VELTMAN:

Then I met Einstein's book. Well, what happened, I first got a popular book on Einstein's work, and that awakened my interest. Then I went to see the real thing, because that's what you always want to do. You have to see the real thing. That was after. I went to the university in '48, and I remember this happened along '53, '52, '53. So I was sort of almost five years hanging around at the university, drinking, playing, or whatever have you, before I got really interested in science. I lost time, you might say. I lost more time later on, so I'm relatively old for [unclear] in this company here.

HOLLANDER:

You really feel you lost time at the university those five years?

VELTMAN:

Absolutely. They didn't awaken my interests. I did my candidate's exam, as it's called. That's an intermediate exam. You are supposed to do it at a time at the university in somewhere between two and three years. I did it after five years. I know very well what I did in those five years, and not all of it was studying. [Laughs]

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HOLLANDER:

[inaudible]

VELTMAN:

Oh, absolutely, yes, for sure.

HOLLANDER:

After the University of Utrecht, then where?

VELTMAN:

Well, I had the very good luck, first after being at the university and doing the final exam, which I do not know exactly what the German equivalent is, it was not my doctorate thesis, but just an exam, the master's degree in America. I first still had to go in military service, so I went two years in military service. I lost another three years—two years military service and one year to recover.

But then I found a place with a new professor in Utrecht, who was in the first ranks of science, Mr. Van Hove. He became later the director of CERN. He was asked to become director of the theory division at CERN, and I was starting my work for a thesis with him, and he took me with him to CERN in Geneva. There, they were just starting up, an experiment started going with elementary particles and neutrinos and the like. And this really fascinated me, so I went into that. So I went along to the experiments and talked to people and, you know, was there every day, every hour of the day. But then it got really exciting, and from there on, it has always been like that. There is still a lot of evolution that went on after that.

HOLLANDER:

I know this is a stupid question, but what exactly was it that got you excited, do you remember?

VELTMAN:

Yes, well, I do remember that, because where I really got the big excitement of was some experiment at CERN, the neutrino experiment, whose ideas has been brought forward by Professor S_____, who happens to be one of my best friends and is around here. These neutrino experiments were very much to me like you being an explorer and you see a mountain range and you go across. Now, you look into a new world. That's what you have. That's the effect. You are doing things, looking at happenings in a domain where no human being ever had been. It's like switching on the radio and going to a waveband

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that nobody has been. Well, you will probably hear nothing, but you hope you hear the stars or something.

So you go in a new domain and new things happen, and nothing can compare to the excitement to exploring and going where no one else has been before. That's the wonderful aspect of that period. In some sense, it has been like that. You try to understand what you see and you take it from there.

HOLLANDER:

[inaudible]

VELTMAN:

Well, it took on a somewhat different character later on, because this is experiment, you know. Experiment, basically a good experiment moves to a domain that's new and that you don't know about. But for theory, there is a development which I had to go through, and I guess everybody has to go through. There is a rather long time that in your theory you are more or less following the thoughts of other people and not developing that much yourself. So there is some moment where you start thinking yourself where you go into your own room, forget about the rest of the world, and try to think about things.

Now, this happened to me only quite late. I think I even can pinpoint the time when I really started thinking my own way. It was, I believe, around 1966 or so. Yes, something like that. And so at that time, I was already thirty-five. I have to say that up to that time I was a theorist and even a reasonably known one. But looking back, I was still mainly running in the group, not really following my own way. That's in theory where I started really only in that period, and that's a step you have to take. You cannot do it consciously, but you grow. You grow to that.

But all of it has been part of that time in Europe, this big backlog we had, the backlog with respect to America, the backlog in experiments. We were so behind in Europe, and we didn't even notice. If I had at an earlier stage of my career been able to work with some of these people that were around in the world, like Feynman or so on, maybe they would have gotten me to this point earlier.

But when you sit by yourself, it's difficult. Of course, you are not really sitting by yourself. By the time I had been to America, I—in any case, it's a development. It's something that you have to do it by yourself. It's almost impossible, so it's only after you get to know all these people and the way they think and so on, that you grow to that same point, that you get your independence.

HOLLANDER:

This independence and being on your own, does that make you in one way a very lonely

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person?

VELTMAN:

Well, of course it does. In my case, it took even some extreme form, because a development which started in '68 drove me in '68 to start studying a type of theory called Young-Mills Theory, Gates [?] Theories, that people had in the previous time been trying to investigate, not gotten very far, and [unclear] that's probably irrelevant. So starting on that subject, first of all, probably one of the very few still doing it, and most of them thought I was wasting my time anyway and said so explicitly to me. So that put me in a very lonely condition. Now, this I don't mind very much, really, I don't. I don't need—in a sense, it's okay. I'm happy to be alone.

But it raises another question as to what you do with your students. At that time I was a professor and ad students. Must I take my students with me in my lonely enterprise? I had big hesitations. They have to write a thesis and get a job. They have to take part in the scientific community. If I educate them into something that perhaps is total irrelevant for the rest of science, that might be a bad thing. So I was fighting with that dilemma. Initially, I would not let students in the subject I was myself busy with, but slowly I would do some of it at least.

One of my students, Mr. 't Hooft, joined me at that point and got into it. He is now my co-laureate, yes, and he made great contributions to the business. But at that point, you are alone. And that doesn't bother me, not at all. I like it. I mean, would you like to make a movie only of those movies of like everybody makes movies of? [Laughs] No way, yes?

HOLLANDER:

Do you find, in general, that physics is a lonely profession?

VELTMAN:

Well, see, there is still different kinds of physics. It's probably true for almost every specialized thing.

[Taping interruption]

VELTMAN:

It has to do with the fact that today most of us go in very specialized subjects, and what I was doing, which was quantum mechanics, elementary particle physics, Gates Theories, is so specialized and uses so much mathematics that there is very few people you can talk about it, certainly not your social environment, your wife. I actually have a daughter who studies the same subject, so with her I could discuss it, but at the time she was still very

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young. But you cannot discuss it with your neighbor in the bar while you are drinking a beer, and so in that sense it's lonely. But those guys that you can discuss it with are, of course, your immediate competitors. So in practice, the only guys you can talk about it with, you probably better not talk about it. [Laughs]

This takes some time. I never really worried about it very much, but I know people. I've known particularly one guy, when he started talking to me, he was very careful. He would never say me anything that I didn't know already. [Laughs] So that kind of things happen, but in general then in your discussions you talk with your competitor and so on, and it's not just friendly talking about what you have achieved. Now you think you've achieved something. They try to tell you you have achieved nothing, you know. So that's an aspect of it, and so theoretical physics tends to be a lonely profession where you have very little, what shall I say, gratitude.

HOLLANDER:

Is then the Nobel Prize one form of gratitude?

VELTMAN:

Well, for sure it is, yes, and it is, of course. That's why we all want it so much. It shows beyond a shadow doubt we are somebody.

HOLLANDER:

While we're on that subject, what do you think is the significance of the Nobel?

VELTMAN:

Well, I can't really say, because the prime quality of the Nobel Prize is the unbelievable publicity value of the thing, yes. Sometimes that's nice, and sometimes it's bad. Even you, you are only interviewing me because I have the Nobel Prize, but it may well be that there are people that it would be better if you interviewed them who don't have the Prize. For your purposes, you don't know. But it is the publicity and all the stuff around it that promotes the thing. If that's good or if that's bad, I don't know. If it makes making a good interviewing here, and it would make people stop and listen, that may be a good thing.

But there are also bad respects to it, and I think one of the bad respects goes all the people who don't get it. I remember being interviewed about fifteen years ago or even more, twenty years ago, and a journalist asked me—he had the idea that I was in the running for the Nobel Prize. He wanted to know what I thought of the Nobel Prize, and at the time I was rather bitter. I say to him, “Well, you see, the Nobel Prize is very nice thing to have if you get it.” [Laughs] If you don't get it, it's usually not that nice a thing. It also gives a lot of competition, not all of it nice.

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HOLLANDER:

[inaudible] a lot of jealousy?

VELTMAN:

Of course, everything you wish is going with it. Whether it is good or bad in the end, well, I don't know. But since no one asked me whether they should continue anyway, it doesn't matter.

HOLLANDER:

Doesn't it, to a certain extent, popularize science, bring science before the public?

VELTMAN:

Well, yes, but probably I didn't tell you, but I looked—I have lot of videos of Dutch television and Swedish television, and I'm gluing them together in order to have some stuff left of the Nobel ceremony. I remember the Dutch television spent about seven minutes on what happened in Stockholm. So here's this interview, seven minutes, it's about the Nobel Prize, 't Hooft and Veltman. You wouldn't believe it. Of those seven minutes, he has spent six minutes on the question on whether 't Hooft and I like each other. Nothing on physics, nothing, absolutely nothing. Now, you tell me what's the use of that? It's nothing. It's just, you know, like these tabloids. It doesn't serve any purpose, to my knowledge.

HOLLANDER:

Where do you think we're going to be [inaudible]?

VELTMAN:

Well, I really couldn't tell you. I can make some extrapolations of my own profession, particle physics. We depend on the construction of big machines. If they don't make those big machines, we will very likely not make progress. So there I can see what machines are more or less possible with present-day technology. Or the state of art of elementary particle physics has always been determined by what technology could do. We are really very much technology-driven. Of course, we also drive technology, so it is a mutual thing. But we very much depend on that.

I can extrapolate with our present knowledge and technology where we will go, and for this I think I can say, more or less, in particle physics where we will go up to 2010 or '15 or something. But then they may always make a discovery that I didn't know about or something, so really, apart from that, I can't say much. I just can say what machines will

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be coming along, and I can try to identify those parts of physics that they might investigate.

HOLLANDER:

Doctor, if someone were to come to you and as, “What book should I read?” could you single out a single book?

VELTMAN:

Well, to me, it was Einstein’s book, but it was only—the fire was lighted, so to say, by a popular book.

HOLLANDER:

Do you remember that book?

VELTMAN:

Well, it was a series of little books that were titled *On The Thinking Of*, so you had a booklet on the thinking of Kant, of the thinking of [unclear], on the thinking of this and that, and there was one book on the thinking of Einstein, written by a mathematics professor, of all people. But it was reasonably clear to me at that time, because what’s a good book is also depending on the time of when you get it.

The first book I started reading and it helped me a lot was learning about radios by a French author called Eiseberg [phonetic]. He wrote a book about explaining radio to kids. So I found that fascinating. I read it from cover to cover very slowly because it was difficult in the beginning. But I liked that.

So all depends. There must be popular books, that is, books that can explain things to people who don’t know any details of your business. But they might be different in different stages of life, so it’s hard to say. Some get this. Some get that. There are so many books today.

I myself am trying to write some book that will help in getting into it, but it will be for some level of people. I’m writing basically for someone who has had high school. You have to make some goal.

HOLLANDER:

Thank you very much.

VELTMAN:

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Good.

[End of interview]