Nobel Voices Video History Project, 2000-2001

Interviewee: Richard Ernst
Interviewer: Neil Hollander
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HOLLANDER:

Doctor, if you would just introduce yourself to us, who you are, and what it is you do.

ERNST:

I'm Richard Ernst. I'm coming from Zurich, working at ETH, Federal Institute of Technology. I'm a physical chemist, retired since one and a half years. Before, I was doing nuclear magnetic resonance, and now I'm working a little bit in science policy, enjoying life. I'm much interested in Tibetan art, and that keeps me busy during these days, and traveling, giving lectures everywhere. That's about my life at the moment.

HOLLANDER:

Doctor, how did you first become interested in science, to go all the way back to the beginning?

ERNST:

That was curious. I mean, we had an old house with an attic built in the nineteenth century, and I found there in the attic a box these chemicals. These were actually the only remainders of one of my uncle's, dying in 1921. And so I took these chemicals down into the cellar, starting to do experiments. Fortunately, I survived, and I wanted to know why, and so I started to study chemistry.

HOLLANDER:

You wanted to know why you survived?

ERNST:

Yes. I mean, it was dangerous, I mean. It also made a lot of fun. Today children don't have all this fun anymore. It's difficult to buy chemicals and just to do experiments with them. But I mean, it's a very really fascinating world for a young person.

HOLLANDER:

What kind of experiments did you do?

ERNST:

Oh, it was mostly inorganic chemistry, mixing together different salts and acids and see what resulted out of it. Of course, I produced explosives, and they worked quite well, made a lot of noise, and sometimes I almost got poisoned. But I mean, it's adventurous, and that's what I liked.

HOLLANDER:

Your parents didn't object to your making explosions?

ERNST:

Oh, I tried to keep it away from them, and so they didn't notice too much of it. Yes, yes, I mean, they were not against my experiments. They wanted me to go into science or some technical profession. My father was an architect, and he was working at the technical high school in the same city. So he wanted me to go into a similar direction, but not exactly the same what he was doing.

HOLLANDER:

Then you went on to the gymnasium, the high school?

ERNST:

Yes, I went to high school, and then I saw essentially two options for me, either become a musician or become a composer, or going into science. And fortunately, I made the proper decision. I don't think that anybody would like to listen to my compositions, and I was much more successful this way.

HOLLANDER:

Do you still write music?

ERNST:

No, no. No, that's a long time gone. Only in high school when I really was a teenager, I tried to compose music.

HOLLANDER:

Do you play an instrument now?

ERNST:

I'm playing cello, but poorly. I mean, I'm on a downward hill, and I can't play so well anymore, but music is a lot of fun also.

HOLLANDER:

Had music helped you in your profession in any way? Has it been a kind of solace?

ERNST:

I think, in general, art's helped me a lot to survive. I mean, I needed something in addition to just science. I mean, it's too one-sided for me, and I was never completely convinced that science alone would provide a living for me. So I needed art in addition, and initially it was music. Later on it was then this graphical art, Tibetan art, which became very important for me. So I needed a second leg, so to say.

I mean, music has something to do with what I was actually doing. I was doing frequency analysis, Fourier spectroscopy, separating different frequencies or different sounds, so to say. I mean, there's a lot of analogy between my kind of spectroscopy and music. What I'm producing in science are normally images, beautiful images, three-dimensional images that has much to do also with graphical art. So I mean, the connection between science and art was always important for me as a stimulation, inspiration.

HOLLANDER:

What exactly did you win the Nobel for? What led you to the Nobel or led Nobel to you?

ERNST:

That was the conception of the Fourier spectroscopy and Fourier nuclear magnetic resonance. I mean, nuclear magnetic resonance has something to do with the nuclei, nuclei being used as spies in order to explore the inner workings of matter in general. Molecules, how do molecules behave? How do they interact? How are materials structured? Polymers, for example. And finally, how are the inner workings of the human body? For this, you need sensors. The atomic nuclei, they provide these kind of sensors and even applies a strong magnetic field. This nuclei, they start to precess, and one can measure these precession frequencies and learn something about the environment. So indeed, these nuclei are spies telling us almost everything about the environment, their nearest environment, and that's how we learn how molecules behave, how people work. I mean, that provides also insight necessary to do science with, and so that's nuclear magnetic resonance.

Now, nuclear magnetic resonance is a very insensitive technique. You need a lot of time to record the signals. Normally, one has a spectrum with many different lines, and what was just sweeping through this spectrum from one side to the other, very time-consuming, and Fourier spectroscopy and that way of measuring it excites all the resonances at once, simultaneously, done. And it's like having a piano keyboard, instead of going from the left to the right, key by key, you just press all the keys together, and then you analyze the sound. That's what we are doing with the nuclei. If we analyze the sound or the frequencies of the nuclei by a Fourier transformation, that's a mathematical transformation which is essentially the same as using a filter, a narrowband filter, to figure out the various frequencies, and this speeds up the process enormously. That's what provided then for possibilities to apply it also to very complicated biomolecules and, finally, medicine.

HOLLANDER:

So the connection between what you won the Nobel Prize for and the practicality for, is medicine?

ERNST:

It's medicine; it's chemistry, organic chemistry; it's biology; structures of proteins, for example. That's molecular biology. Or I mean chemical reactions in organic chemistry or materials in materials science, polymer structure. It's a very, very wide range, but I mean its most fascinating, perhaps its most obvious application is magnetic resonance imaging, MRI, where one puts the people into this tube and then makes "bang, bang, bang," and then afterwards you get a nice picture.

HOLLANDER:

So would you consider yourself an inventor, then?

ERNST:

I'm an engineer. I'm not a scientist. I wanted to achieve something, to build something, and not to learn about nature. I mean, curiosity in this sense wasn't really my driving force. It was much more the will to do something, to build something. I do also a lot of theory, which is necessary to understand what I have done, but my basic motivation is to do something which other people can use.

HOLLANDER:

You are an inventor.

ERNST:
So to say, yes, not a great one, but a small one.

HOLLANDER:

MRI is used around the world now.

ERNST:

I mean, I didn't invent, really, MRI. That was invented by another guy. I provided the technique how one should do MRI. The basic idea came from somebody else. I provided a technique to do it better.

HOLLANDER:

Doctor, some time ago, you mentioned Tibetan art. How did you come to be in Tibet?

ERNST:

Oh, that was a pure accident. I mean, we went once, after having spent five years in the United States, on our way home to Switzerland we went through Asia and spent a few days in Nepal, bought one of these tancup [phonetic] paintings, meditation painting, and we liked it so much that we spent all of our other money. Now we are poor people that have a nice collection at home. And it's a very fascinating world. I mean, it really gives you a clue to another culture. When you look at these pictures, it's all the life of these Tibetans is contained, and it's a completely different world than the ones to do—so to say, being able to really penetrate another culture. That's very important to understand where we are standing ourselves. And so sometimes I feel like a Tibetan being able to look at back on Europe and to see where I actually am, and I mean, this possibility to once leave your skin is important.

HOLLANDER:

Some of the Tibetan Buddhism has rubbed off on you, quite obviously.

ERNST:

In some way. I'm not a Buddhist. I'm perhaps not even a religious person in that particular way, but, I mean, it fascinates me. And I respect Buddhism as a very deep philosophy and deep religion. There's a lot of truth which one can gain from them, and I'd like to try to combine and to get, I mean, inspiration from all different sides and not just devote myself to one particular sect, for example.

HOLLANDER:

Is there some correlation between your flair for music and your [unclear] for Tibet? [Unclear]?

ERNST:

Not—I mean, it's just an artistic way of expression which I'm fascinated by. Whether somebody expresses himself in terms of music or in terms of paintings, it doesn't matter so much. But, I mean, just, so to say, to penetrate the soul and not only see the surface of the person. I mean, these are then aspects which are very difficult to formulate in words and which cannot be approached scientifically either. So it's really a compliment to our rational way of thinking, and that's what I feel so inspiring.

HOLLANDER:

[Unclear]rational, subjective or—

ERNST:

I think so, yes. I think that's important to make a full person. Otherwise one is just half.

HOLLANDER:

It seems to me, as an outsider, that very few people here at this conference share your view.

ERNST:

I think they share my view, but they don't express it. They are perhaps afraid of speaking about their most inner feelings, but they have them also and they have these aspects also buried in themselves, even if they might not express it so freely to just a stranger.

HOLLANDER:

A lot of people that we've interviewed have made a point of saying, "My life has been devoted to science. Science [unclear] to my family, to my life. There's no room there.

ERNST:

Yes, I know. I mean, time is really a great problem, and I didn't have much time to devote myself to these other aspects, but I felt in my life it was always important that I was missing something, and I knew I'm missing something to devoting myself to science. I was working perhaps 99 percent in science, but I was missing my other half, and I still felt it, and it hurt me. I think that was important, to feel this pain, still, in the neck, that you devote yourself only to half of your own being. Then I mean, whenever you have time, then you can take advantage of it. And I didn't try out in this way.

HOLLANDER:

But you're making up for it now.

ERNST:

Yes, I'm a little bit more. I still don't have enough time, but I spend a little bit more time on it, yes.

HOLLANDER:

Doctor, one last question. Where do you think science is going? Where do you think we're headed?

ERNST:

I mean, science will continue as it did so far, working on the details and exploring the universe better and better. I mean, I'm more worried about where society is going and what sort of a function science will fulfill in the broader sense for society. I mean, there I just think that we have to pick to come closer together again.

I think science carries dangers, but it also has to fulfill a function, a very important function, and we have to recognize this as scientists. Of course we need the freedom to do science. Curiosity-driven science is very important. But still, on the other side, we also should ask ourselves, "What does society expect from us, and what is our function?" that we also develop concepts for society itself. Where shall society go? I mean, what shall be the real goals? I mean, who else would be doing that? The politicians? No. Economy? They are just trying to make money. So somebody has to think, and I think as scientists, they have an obligation to think about the future of society.

HOLLANDER:

Can you answer your own questions?

ERNST:

No, of course, not. I mean, it's not a question which one can answer, but one has to think about it. It needs—everybody has to contribute and to provide pathways, and we are really walking in the dark. Hopefully, somebody finds a passage. But that's not something which one can simply answer. This is a goal of society and then we go straight. That's much more complicated, but you have to recognize our obligation and our responsibility and the need that we think in these terms.

HOLLANDER:

Thank you very much.

ERNST:

Okay.

[End of interview]