

# Ceci n'est pas Heinz von Foerster

Diederik Aerts ◇ Vrije Universiteit Brussel, [diraerts@vub.ac.be](mailto:diraerts@vub.ac.be)

In 1995, the Leo Apostel Centre in Brussels, Belgium, organised an international conference called “Einstein meets Magritte”. Nobel prize winner Ilya Prigogine held the opening lecture at the conference, and Heinz von Foerster’s lecture was scheduled last. He was the oldest among the invited speakers, and Prigogine was the second-oldest. Heinz von Foerster, having noticed this arrangement, commented at the conference dinner, “I am the oldest, and Prigogine is the second-oldest. He opened the conference and I will close it, that is really perfect”.

Heinz von Foerster was enchanted by the conference theme “Einstein meets Magritte” and – in the spirit of surrealist Belgian painter René Magritte – had chosen an appropriate title for his talk: “Ceci n’est pas Albert Ein-

stein”. He asked to have a little picture of Einstein printed next to the announcement of his talk in the conference programme booklet, a wish we were glad to grant. As he explains in the interview below, over time he had become convinced that semantics-related problems are more important – even for the ontological nature of things – than he estimated himself in his earlier days. He saw a striking resemblance in the ways both Einstein and Magritte revolutionized their respective fields of inquiry and activity by making explicit the influence of the semantic level on the syntactic level. Like no one before, Magritte played with the insight that ‘the model is not the thing’, while Einstein shook the foundations of all of physics with his theory of relativity. Here, observation influences space as well as time – two physical concepts that until then were largely considered to be purely objective, or even a priori.

The way Heinz von Foerster arrived at the ‘Einstein meets Magritte’ conference is itself a surrealistic story of pure Magrittean quality. It is worth telling it in some detail. On Friday evening, the last evening of the conference, there was to be a performance by the dance and theatre group of Anne Teresa De Keersmaker. To allow the troupe to prepare for their performance, the large university hall, where the Einstein meets Magritte conferences were normally scheduled, therefore had to be made available to them on Friday afternoon. That is why the conference booklet announced that the last three lectures of the invited speakers, including von Foerster’s, would take place in an old cinema building on the premises of a military site close to the university campus. The organising committee of the conference had provided all invited speakers with vouchers for free taxi rides in Brussels on the days of the conference. The vouchers were also intended to be used on arrival at the airport to get to the location where the conference was held. However, for some mysterious reason, rather than taking him from the airport to the university, the taxi driver drove Heinz von Foerster to the university clinic, at the opposite end of town. This was to be only the

beginning of von Foerster’s Magrittean odyssey. It took some time before von Foerster was told that the university clinic was not the place where he was supposed to be. He then took another taxi, and showed the driver the conference booklet in which his talk was announced, thinking that this would get him to the right place. He was right, for this time the taxi did take him to the military site. But this was not to be the end of his predicament. The barracks site is not an area where civilians can easily enter, and it was only after von Foerster had marshalled his persuasive power, wielding the conference booklet as conclusive evidence, that the guards at the gate allowed him to enter the military zone. He was escorted to the cinema building, which had conference announcements posted on its walls. Indeed, some of the young conference assistants, during earlier visits undertaken to check that it could be used as an alternative to the university hall that Friday afternoon, had been eagerly putting up the posters at the cinema entrance. But neither the military, nor the guards at the gate, nor any of the cinema staff watching a movie (“Dracula”, von Foerster would comment later in a mysterious voice) now seemed to know anything about the conference.

All in all, it took von Foerster six long hours to get from the airport to the campus – longer than it took him to cross the Atlantic from the United States. I remember very vividly the state in which he arrived just after his unexpected adventure. He was all excited, a bit angry, but fascinated at the same time. He told about the amazing excitement he felt when being walked several times past and close by military horses standing in line.

“The horses snorted and stamped like hell each time I walked by, they knew that this was a person who did not belong there, but ... They definitely were the only ones to know this for like three full hours... so you see everything is relative, Einstein and Magritte would agree, in certain circumstances a horse can be more intelligent than a human being. These horses would have let me escape immediately.”

## ABOUT THE INTERVIEWER

Diederik Aerts is professor at the ‘Brussels Free University (Vrije Universiteit Brussel - VUB)’ and director of the ‘Leo Apostel Centre (CLEA)’, and interdisciplinary and inter-university (VUB and the universities of Gent and Leuven) research centre, where researchers of different disciplines work on interdisciplinary projects. He is also head of the research group ‘Foundations of the Exact Sciences (FUND)’ at the VUB. He is secretary of the ‘International Quantum Structures Association (IQSA)’ and editor of the international journal ‘Foundations of Science (FOS)’. He is a board member of the ‘Worldviews group’, founded by the philosopher Leo Apostel, which investigates the possibility of constructing integrated worldviews, taking into account the recent scientific findings. He was the scientific and artistic coordinator of the ‘Einstein meets Magritte’ conference, where the world’s leading scientists and artists gathered to reflect about science, nature, human action and society. The material of the conference has been published in an eight-volume series by Kluwer Academic and VUB-Press.

Despite his six-hour odyssey and three-hour captivity in Belgian barracks, he was delighted to grant the organisers the following interview, in which he tells us about an even longer journey – that of his remarkable life and scientific career. The transcription follows Heinz von Foerster's wording as closely as possible in order to capture his unique conversational charm. The endnotes were added later.

## “Heinz, what you said was very interesting but how you said it was abominable”

Heinz von Foerster: We are now supposed to have an interview!?

Diederik Aerts: Yes.

HvF: Who is interviewing whom?

I am interviewing you.

HVF: You are interviewing me, okay. I am ready for your interview.

Mr von Foerster, you are considered one of the founders of the very important discipline of “cybernetics”. It is true that this is also a discipline now, but it's kind of more interdisciplinary than other disciplines, I would say. Can you tell us a few words about when you began with these things?

HVF: A long time ago.

And what inspired you?

HVF: Oh well, I was very much inspired by other people. Now I tell you the story – it's a funny story. I left Vienna on an invitation of a friend of my wife to come to New York. This was in 1949. So I sailed with the Queen Mary over the ocean, and unfortunately there were tremendous storms and spring storms over the Atlantic. Everybody was seasick. But I grew up very close to one of the great amusement parks in Vienna so I don't get seasick at all. So I was the only one, one of 2000 inhabitants of Queen Mary, who was not seasick. I had about 20 waiters in the dining room waiting for me. I arrived in New York healthy and well fed. By a very peculiar accident, one very interesting gentleman, an American neuropsychiatrist by

the name of Warren McCulloch<sup>1</sup>, one of the leading scientists in neuropsychiatry, got hold of a book – a small booklet I should say – which I wrote in November of the previous year on the quantum theory of memory. He got hold of that thing. He read it and contacted me in New York the third or second day I arrived. “Mr Foerster this sounds very interesting what you wrote. I'm the chairman of a conference which will take place in New York in about five, six days on circular causal and feedback mechanism in biological and social systems.” And I said “What?” I don't understand a word of it.” He said, “Okay; why don't you get yourself a book which has just appeared in the bookstores. It's called ‘cybernetics’ by Norbert Wiener<sup>2</sup>, a mathematician; try to get that book and I'll invite you to a conference which takes place in 14 days from today in New York, you have only to go.” I said: “Wonderful, I shall do that”.

My vocabulary in English was then about 30 words – yeah, maybe 32; anyway I got that cybernetics book by Norbert Wiener. I mean when you read a scientific paper it's always the same; I mean there are the Latin words and formulae you understand. I got the point of what Norbert Wiener was talking about. And 14 days later I came to the conference which was at a beautiful old fashioned hotel which does not exist anymore, on 5<sup>th</sup> Avenue. I came to the conference. To my surprise there were only 20 people. It was not a circus for an audience. It was 20 people talking with each other. And these 20 people were the *crème de la crème* of American science. Warren McCulloch, one of his guests was John von Neumann<sup>3</sup>, the man who began the computer revolution, Norbert Wiener himself was there, Gregory Bateson<sup>4</sup>, the anthropologist, his wife at that time Margaret Mead<sup>5</sup>, and I can rattle of names and names. 20 absolutely outstanding people. So I came in as a greenhorn, had to give my story about ...

How old were you then?

HVF: This is of course '49. I must have been 38. So I give my story. And everybody was interested and I couldn't of course tell my story with 25 or 32 words in English.

And your story was about?

HVF: My story was about quantum theory of memory. So fortunately there were 2 or 3 gentlemen who spoke fluently German and

English and whenever I was lost they took over and translated what I said etc. etc. At the end of the whole thing I had to leave the room. I was called in after an hour and they said “Heinz, what you said was very interesting but how you said it was abominable. We have thought a way how to teach you English the fast way. We appoint you to become the editor of our transaction.” – Can you imagine? I mean, this only in America can happen. I said, “For heaven's sake, my English is not good!” – “No, no, no that's exactly why we appoint you.” – I said, “But then you have to change the title of that conference because I can't even pronounce the title of that conference!” And that is now an interesting point and this is why I tell the story. I said, “Why don't you call the conference ‘cybernetics’?” I just had read the Wiener book, I had the feeling that what these people were doing was talking cybernetics. Everybody thought that's a wonderful idea and applauded. And Norbert Wiener was sitting next to me. They applauded of course to Norbert. And he was so moved had tears in his eyes that his colleagues accepted this funny word of “cybernetics.” He had to get up and walked out of the room because he wanted to hide his emotions.

So then they adopted the word “cybernetics” for the conference, and with it my name was immediately linked to the cybernetic publication of the Josiah Macy foundation meeting.

Because you did the editing?

HVF: I edited the first published conference on cybernetics<sup>6</sup>.

And you learned a lot of English?

HVF: I learned English; I realised after about two months I got 10 cm of manuscript which was typed from a legal typist who was sitting in the court – a stenographer – overtyping all the conferences.

And you stayed in the States then?

HVF: Yeah, then I stayed with Warren McCulloch and met with people of the University of Illinois. Since at that time they were looking for a head of a particular section of research and I happened to be just the man to do that, I accepted that invitation and stayed with the university of Illinois for the next 30 years or something like that.

**That's a beautiful story.**

HVF: So I stayed there and my wife and children came, after a couple of months to get them a visa and permits etc. This was tremendous bureaucracy, I had to climb over the bureaucratic fences which took me about a half a year more to get the permits and then they could come.

**And then you started to work?**

HVF: Yeah, I was not permitted to do anything during the time when I was only a visitor in the United States. To wait until all these things were cleared and then I took my job at the University of Illinois as the director of the electron tube research lab. And from there on I continued my connection with the Macy people and with the cybernetics people and then after seven years ... you know, six years you have to be at a university then you can get these wonderful sabbatical leaves. In this year I thought I should learn more about biology, neurology, neurophilosophy, and neuroanatomy and went to McCulloch to MIT, to the Massachusetts Institute of Technology, for half a year. Then I was working in Mexico with a friend of Norbert Wiener's, Arthur Rosenblueth<sup>7</sup>, who wrote with me some early papers about cybernetics and I worked then in Rosenblueth's laboratory in Mexico City for half a year. And then I came back and said now I start a new lab and then I started the Biological Computer Lab<sup>7</sup> in 1958.

**What were the problems that fascinated you in this period?**

HVF: At that time? Probably still the same things. Today I feel more and more that semantic problems are involved in our understanding of things. These are notions of course which were already produced by Wittgenstein and other philosophers who happened to be reasonably well known by me because this is all coming out of the so called Vienna circle. The language problem, the lin-

guistic problem, the understanding, the hermeneutic problem – all these things are relatively familiar to me. So I think there is a point which I will also address perhaps tomorrow on my paper because I will celebrate Magritte and Einstein as essentially semanticists, not so much as physicist and painter, but as people who were interested in what is the meaning of a statement, what's going on when I make an explanation in which we connect some points with other points, what are the semantic links. So these I think are the links between Magritte and Einstein.

**I didn't think myself of this! You mean Einstein when he was carefully reflecting on the observers, how time and space got completely transformed by these indeed 'semantic' reflections?**

HVF: Exactly, precisely! I will bring about tomorrow. I will not give it away at the moment in our interview but I found a wonderful perception of Einstein in his early days when he was wrestling with a notion which is later found in the special theory of

relativity where he came up with a metaphorical statement of his. If you read that today and you think he had told his notion to a physician at an insane asylum he would probably be put inside that asylum. This man is crazy. He thinks

about things that don't exist, he is talking about them freely as if they were existing. I thought this is a wonderful example of ingenuity.

**You've made me curious. But I'll have to wait until tomorrow. Now, you are in a sense the example of an interdisciplinary interested person.**

HVF: No disciplines, no disciplines, no disciplines ... interdisciplinarity is already disciplinarity.

But I think your notion of transdisciplinarity is interesting, very interesting. Going beyond the disciplinary segmentation and fragmentation. Still interdisciplinarity says, "I'm a chemist who is interested in physics" – "Ah! That means you are a chemical physicist or a physical chemist."

**Still disciplines. And it is indeed dangerous that one should not make of the interdisciplinary a new discipline.**

HVF: Precisely! Exactly! These are the semantic traps. Language is taking over instead of you taking over the language.

**And the trap is very concrete the moment you want to find funding.**

HVF: Yeah! you must play the trap. Absolutely! You had to put the trap to others who are setting the trap. Otherwise they will be disappointed like a guy who's putting up a mousetrap and no mouse goes into it. The mouse has to get into the trap to satisfy the trapper.

**So you need to have a false mouse.**

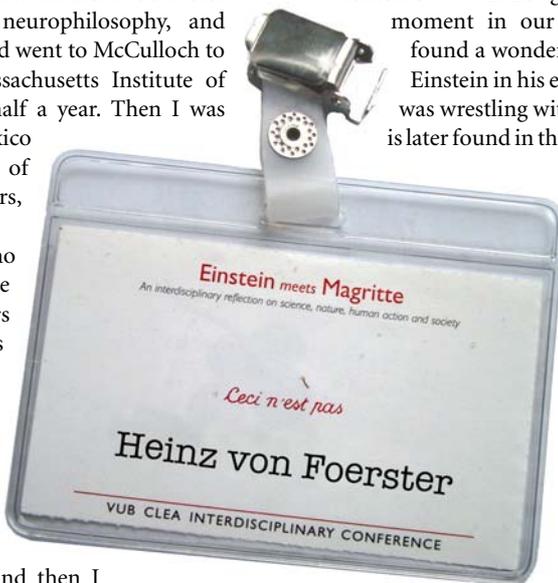
HVF: Yes, you have a very good point. You need a false mouse. So they snap over the false mouse and you can do your own thing.

**But when we want funding we must present it as a discipline of course, the discipline of interdisciplinarity, but we would like to keep it open and not fall into this trap.**

HVF: Yeah! For many cases you could find a good name which does not betray or belie the point you are trying to make, but at the same time would be understood by sponsors which would be governmental agencies or foundations – something like that. That would be very important. A name for this global problem from a linguistic point of view.

**Yes, it's true. So okay, we've now arrived at this period where you were in Illinois.**

HVF: Yeah! As I said, I took a sabbatical and started to make a foundation of the biological computer lab. This was of course strongly influenced from the perspective of this cybernetic group of McCulloch, Wiener, Von Neumann. I had a very good rapport with all these gentlemen. Von Neumann, for instance, who was at Princeton at that time, invited me again and again to come for several reasons. One is of course that he went to school in Budapest, which was part of the Austrian *Kaiserliche und*



*Königliche* Habsburg monarchy. So he wanted to know what is Vienna doing under Russian occupation and was of course very worried with members of his family in Budapest. So I could tell him a little about what the Russians were doing. They were occupying the region, Budapest and Vienna. And Norbert Wiener's wife is from Silesia, from *Schlesien*. I was in Silesia the last month of the existence of Germany. So she wanted to know, "Heinz can you tell me about this and that, how did the people flee, how did they get out of the Russian occupation?" etc. etc. So in both of these cases personal interests brought me closer and closer to these fabulous people.

With Margaret Mead I had a very good rapport. At once she was, I think, inventing the idea of teaching Heinz English by making him the editor of the transactions.

#### This was her idea?

HVF: Yeah, I think this was her idea, I have this suspicion. It's the woman who had this crazy idea but the men went along, and I admired her very much. I mean in this cybernetics meeting with all these brilliant men, there is, of course, a tendency that they show off their knowledge, show their peacock feathers, and so on. But at the moment when that happened Margaret put her fist on the table, "We know that you can speak Greek! Why don't you talk about what we are talking about!" It was fabulous how she was running the show, the only woman in that group. And with many others, Heinrich Klüver<sup>9</sup>, who came also from Germany, I had a rapport again and again. He was in Chicago. I was in Illinois. We met each other again and again and then I met some other friends of the early Vienna period, Karl Menger<sup>10</sup>, a famous mathematician, incredible mathematician, the son of a very famous economist, Carl Menger<sup>11</sup>, the papa with C, the son Karl is with K, so you have a distinction between papa and son. The son is dropping in the alphabet from C to K, but anyway. Karl Menger was one of my teachers at university – a very young teacher. He was not very much older than I was as a student. He must have been 30 when I was 22 or something like that. I was very fond of Menger's notion of mathematics. This was a confirmation of the constructivist notion of the 19<sup>th</sup> century.

The famous battle between two schools of mathematics. One says mathematics is dis-

covered. The rules of mathematics, numbers and everything is floating in the universe and from time to time God permits me, takes off the veil, and I see this incredible truth – this is one school of mathematics. The other school says it is our invention. We invented the numbers, we invented the calculus, it is our game of doing things. Of course these two camps cannot talk to each other. But I was immediately taken by the inventors and I followed the inventor school of mathematics – the constructivist school of mathematics; in the 19<sup>th</sup> century they were called the intuitionists. So there were two big camps, the Kronecker<sup>12</sup> camp and the Hilbert<sup>13</sup> camp. Hilbert was the formalist; he said, "I have nothing to do with these guys and I do my formulae and I'm working with them!" And Kronecker and his people said, "You invent all that stuff, I mean, it's quite clear."

#### In which camp was von Neumann?

HVF: Von Neumann was a constructivist, yeah, yeah. So we had a magnificent time with each other.

---

## He had this machine standing in his lab in London and you were allowed with a sledgehammer to destroy 500 tubes

---

*At the computer lab, you were working on many things – what would you yourself point out as the most important things that you were doing?*

HVF: I will tell you the names and you will get a little bit of the idea. One of the early participants was Ross Ashby<sup>14</sup>, a British psychiatrist who turned to cybernetics early in his life. He realised that the standard notion of dysfunction–function of the brain is not the way to do it. One must have a deeper knowledge about the whole thing. So he became interested in life systems which function even if you destroy large sections of that system. He built the first large machine out of, I think, 2000 vacuum tubes – at that time it was the only

way but today you would do it with transistors. He had this machine standing in his lab in London and you were allowed with a sledgehammer to destroy 500 tubes. It was doing some particular things – I don't know what but anyway – you went there with a sledgehammer... for a moment the pointers wiggled but then brrrr! moved into stability. So you could see if systems are constructed so that they can self repair – autodynamics etc etc. – it is the key for the brain. He had a wonderful example.

The example of a man who was working in a rolling mill, a big rotary mill where, for instance, steel rods are being built and what you do is you come with a thick piece of metal, which is red hot, go through the first wheels where it's squeezed to a smaller one and becomes longer and is shot into the next mill, shot and shot and shot, and becomes thinner and thinner, longer and longer. At one instant this rod – glowing – missed the next mill, shot into the eye of a worker, penetrated the brain, was sticking out at the other end. They stopped the mill, carried the man, cut the sticks, and brought him to Ross Ashby. The man was talking! The man could talk! They removed the rod because the man could die. Of course the man had difficulties talking but it was a functional creature. This is an example of self repair, of switching certain functions of the brain into the part which is still intact, taking over what was lost, and the man still functioned.

So Ashby became interested in these very general systemic structures which maintain themselves.

And then I had Humberto Maturana<sup>15</sup> as a guest for one or one and a half years who brought in the autopoietic notion generated in my lab. Things of that sort. And then at the last contract with the institute of health, the national institute of health, we worked on haematology and population dynamics etc. etc.

So we were playing in many different domains but with the same, should I say philosophical–epistemological attitude. It produces a lot of different things and this I think is what I enjoyed mostly.

#### Francisco Varela<sup>16</sup> came in too?

HVF: Varela never was in, I only knew Francisco as a young man he was first staying in Chile with...

He had to leave today, I think, but he wanted to meet you.

HVF: I met him this morning, we had breakfast together. I was very glad to meet him. And I invited him again to come see me in California, but he said he was so busy and he has difficulties to go there. Anyway Francisco is a dear, dear old friend of mine, only that he was never at the BCL. Maturana was at the BCL, some other people from Chile. Ashby I already mentioned. Then Gordon Pask<sup>17</sup>, perhaps. He is well-known. Gordon was spending good 2 years at BCL.

How did you manage to have this center? You were the director and managing it?

HVF: I was managing the whole thing, not only the intellectual and scientific part but also the financial part. I did it all and I must say I'm still very impressed how much money I brought in.

There was constantly a group of 30 people. May be 20 students, graduate students, some of them making their Ph.D. thesis, the fascinating thing was that they were paid for doing their doctoral dissertation because they were backed in the research projects.

I remember a young man, no, a professor of the department of mathematics said, "Heinz I know you have all these crazy people

around you. I have a young man who twice a week takes the train, goes to Chicago, sees his psychiatrist, comes back, and is incapable of doing anything. Would you like to see that man?" – "Of course, send him over!" So he sent him over here. Here came a very shy man to me in my lab. I said, "You are a mathematician, what is your interest? Integrals? Differential equations? Or what is it?" He said this and that. "Wonderful! You are just the right man!" I gave him the following problem so I go to the board and say I have no idea of how to go about that stuff. He said, "Let me think about that!" So three days later he came back. "I think I have a way of going about that." – "I thought you go to Chicago?" – "No, no, I have no time I was working on that problem."

He was cured.

HVF: He had no time to see the doctor. My friend the mathematician, "What did you do to that man?" I said, "Nothing! I told him a problem which I could not solve." So this immediately put him on the track. And I really don't know the mathematics; this guy knows much more than I. But I know the problem, I know who might be able to go about.

---

**"What did you do to that man?" I said, "Nothing! I told him a problem which I could not solve"**

---

That's very nice, so you really had a very good atmosphere there?

HVF: I had a wonderful atmosphere! The people they stayed friends for the rest of their lives, I'm sure.

But I know, because we have here also visiting a composer from Illinois University and he didn't know you because he's younger but he says that your name is still well-known.

HVF: Yes, I wrote a book about music by computers which was partly doing with people from the music lab at the university.

We have to go to Pirsig<sup>18</sup> now.

HVF: We have to go to Pirsig, let's go! Okay, let's take some motorcycle and go to Pirsig! Wonderful!

## Notes

1. Warren McCulloch (1899–1969) neurophysiologist and cybernetician working on mathematically neural network modeling. Together with Walter Pitts he showed in the 1943 paper "A logical calculus of the ideas immanent in nervous activity" how a neural network consisting of binary threshold neurons can carry out logical inferences at the level of first-order logic.
2. Norbert Wiener (1894–1964) became eventually known as the founder of cybernetics based on this book ("Cybernetics or Control and Communication in the Animal and the Machine") which he published in 1948.
3. John von Neumann (1903–1957) not only made contributions to various mathematical fields but also had a major impact on quantum physics, game theory, set theory, computer science, and economics.
4. Gregory Bateson (1904–1980) was a highly interdisciplinarily working anthropologist, linguist, social scientist, and psychiatrist.
5. Margaret Mead (1901–1978) was an anthropologist focusing on psychologically oriented field work as well as building interdisciplinary links between anthropology and other fields.
6. "Cybernetics. Circular causal, and feedback mechanisms in biological and social systems." Transactions of the Sixth Conference 1949, edited by Heinz von Foerster. Republished together with the following four transactions by Claus Pias (2003).
7. Mexican physiologist Arturo S. Rosenblueth (1900–1970) researched the chemical mechanism of nervous impulses transmission at the Departments of Physiology and Pharmacology at the Instituto Nacional de Cardiología in Mexico City.
8. The BCL was founded at the University of Illinois at Urbana-Champaign. See Müller (2000) for a detailed article on the history of the BCL.
9. Heinrich Klüver (1897–1979) made important contributions to visual psychology, psychopharmacology, and animal behavior research. Working as neurologist at the University of Chicago, he introduced Gestalt psychology to the US and helped to formulate the discipline that is today known as neuroscience.
10. Karl Menger (1902–1985), mathematician and member of the Vienna Circle, known for his work on various topics such as curve and dimension theory, algebras, probabilistic metric, and algebra of geometries. In the 1930s he worked with intuitionist mathematician L.E.J. Brouwer. In 1936 he emigrated to the US to work from 1946 on at the Illinois Institute of Technology in Chicago.

11. Economist Carl Menger von Wolfensgrün (1840–1921) was the founder of the Austrian school of economics.
12. Mathematician Leopold Kronecker (1823–1891) is known for his statement “God created the integers, all else is the work of man” expressing his idea on a finite mathematics which should forgo non-constructive existence proofs.
13. David Hilbert (1862–1943) favoured formalist mathematics according to which mathematics can be defined using a finite and consistent set of axioms. This was proved impossible by Kurt Gödel’s Incompleteness Theorem in 1931.
14. W. Ross Ashby (1903–1972), was one of the founders of cybernetics and general systems theory, focusing on self-organising systems, information theory, and machine learning. From 1959 to 1970 he was professor at the Biological Computer Laboratory.
15. Humberto Maturana (1928–) is neurobiologist at the University of Chile who developed the concept of autopoiesis.
16. Francisco Varela (1946–2002), a former student of Maturana. Later he pursued his own vision to develop a calculus of self-reference.
17. Gordon Pask (1928–1996) developed a Conversation Theory which he applied to education. It grew out of his cybernetic understanding of human-machine interaction as a form of conversation and dynamic process in which the participants learn about each other.
18. Referring to Pirsig’s talk at the conferences that started about when this interview ended. Robert Pirsig (1928–) became famous with his 1974 book called “Zen and the Art of Motorcycle Maintenance: An Inquiry into Value”, which introduced the “Metaphysics of Quality” to account for the link between quality, morality and reality.

## References

- Müller, A. (2000) Eine kurze Geschichte des BCL. *Österreichische Zeitschrift für Geschichtswissenschaften* 11: 9–30. Also: <http://www.univie.ac.at/constructivism/papers/mueller/mueller00-bcl.html>
- Pias, C. (ed.) (2003) *Cybernetics | Kybernetik. The Macy-Conferences 1946–1953. Volume 1 Transactions/Protokolle*. Diaphanes: Zürich, Berlin.

## Further links

The entire interview can be downloaded as audio file from <http://www.univie.ac.at/constructivism/journal/1.1/interview.mp3>

*Paper received: 20 September 2005*

*Paper accepted: 20 September 2005*