the other side in the form of digitals. You could then feed that into a computer and analyze it mathematically.

Herbert Brün

By way of our work with music we came upon Herbert Brün. I had met Herbert earlier on, since he had also emigrated from Europe, and was also at the University of Illinois in Urbana.

Herbert Brün was very interested in our musical studies. He was a professor of composition at the School of Music and worked in the Computer Music Lab and in the Experimental Music Studios at the University of Illinois. He did not only compose with notes for musical instruments, but composed directly into the computer; that is, he prescribed what tones and combination of tones were to be created by indicating the tonal frequencies. He wrote programs then that—very amusingly so—could be represented in two ways: In the form of graphics and in the form of music. That meant that you could hear as well as see what had been composed.

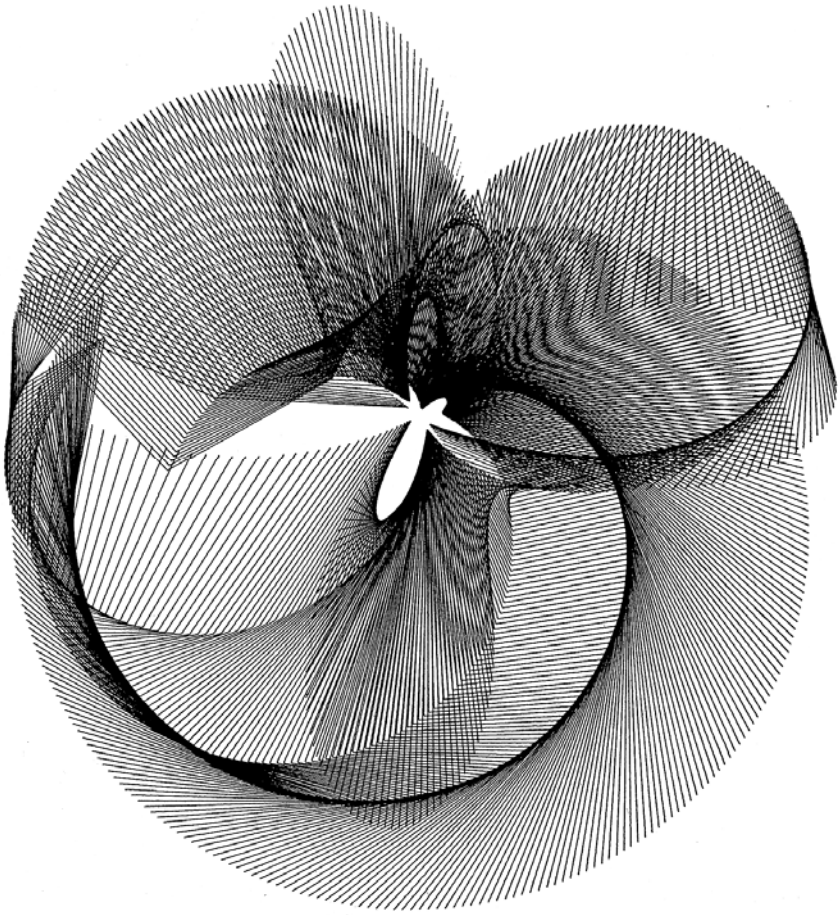
After some time David Freedman thought: "We have so many interesting insights regarding computation and music, let's organize a lecture series for the 1966 Fall Joint Computer Conference." That is a big circus. Computer experts come from all over the world.

So David Freedman and I incorporated a small session. Our session, entitled "Computers in Music," was a tremendous success. It resulted in a nice book: *Music by Computers.*

We worked very closely with Herbert because he was not only interested in computers, but also in perception and understanding in general. He was a close friend of our entire group.

Research projects: *Heuristics I and II*

Every year in the spring, the students of the University of Illinois arrange a big festival, where they convert the entire campus into a circus. They call it "Illioskee." I believe the Indians that lived in Illinois were called Illioskee. They set up small booths. There they prepare their sausages and play their music. Small orchestras play



Graphic by Herbert Brün

there. The combos. And they have singers. And they've got agitators, who yell like crazy: "Down!" and so on and so forth.

Well, Herbert Brün and I used to stroll together through the masses of people and look for any talent we could find. We were on a talent hunt, so to speak. As we were strolling along, suddenly a young man approaches me. A giant, a beautiful young man; he looked like a Siegfried: blond hair, a very beautiful face. He approaches me, looking very serious, grabs me by my lapel and says, "Do you want to teach a course on heuristics?" Whereupon I ask: "Heuristics—in what sense? In the sense of a specific strategy

to solve mathematical problems, or in the sense of an educational system, where the students find their own solutions?" I saw that he wasn't familiar with this difference. But smart, as he was, he says, "Both!" Whereupon I turn to Herbert, who is standing next to me: "Herbert, would you teach a course with me on heuristics?" Herbert says, "Every course suggested by students I will teach, for we are here for the students, not the students for us." Whereupon I say, "Yes, come to my office tomorrow; there we will work out something for this course." On the following day he comes to my office and says, "Dear Mr. von Foerster, I went from door to door throughout the entire university, in order to have them introduce a course on heuristics. All the people who decide what courses will be offered said, 'We don't do that.' I went to the Dean of Research and he said, 'I don't know anything about heuristics. We don't need that at this university.' I've undertaken all the steps to introduce this course, and you say, 'Yes, why not?'" I say, "All right; let's do the course. I'll be responsible for the course, you for the students."

So we announced the course for the fall semester of 1968. About fifty people enrolled. Since they came from so many different disciplines, such as sociology, biology, management, et cetera, et cetera, it was very difficult to find a common time to meet. I finally called the Center for Advanced Studies, whose director I knew very well. I told him about our situation. He said, "Heinz, I invite you to give your courses with us in the evening." Those were beautiful, huge rooms, with beautiful leather club chairs and an adjacent bar. Everything one needed was there: Devices for projecting, blackboards, everything.

And so we then met there in the evening. What was nice about it was that it didn't have a school atmosphere, but a club atmosphere; so that the speaker also became part of the class; not one man up front on the podium, telling the people what it is all about. One sat together, to get working on a problem.

Thankfully at the time I had some guests and members at the BCL, who played along enthusiastically. Humberto Maturana was already there at that time. John Lilly visited me from California at that time. John Lilly conducted interesting studies with dolphins:

Can one teach dolphins English, or can the dolphins teach us "Dolphinese"? So there were very interesting people there. I invited them all to tell us about their projects. And the students were very curious and asked: "Tell us, how is that? How do you do that? How did you get the idea?" Et cetera, et cetera. So the whole thing was actually a discussion club, where very interesting topics were being discussed. Students are actually very interested in certain problematic concepts that have never been explained or discussed anywhere. So they enthusiastically threw themselves into these topics.

Then we had an arrangement: The students themselves directed the course. At every meeting a different student was the chairman and leader of the course. The chairman decided who was to speak now and who wasn't. When a discussion started, we always listened to the discussion leader as to whether we should now say something or not. We subjected ourselves completely to the elements of the class, the students, because we told ourselves: "We are a university. We want to do something for the students. When they have questions, we will make an effort to answer them."

One of the students stuttered heavily. He could hardly talk. He always said, "I-I-I-I wou-wou-wou-would ..." et cetera, et cetera. Of course he was terribly afraid of having to become a class leader himself, and have to stand up front and say, "Ladies and gentlemen, the speaker today is Herbert Brün," or, "Today the speaker is Humberto Maturana," without being able to utter a single word. We completely ignored that. When it became his turn and he wanted to say something, we did not concern ourselves at all with whether he stuttered or not. When it became his turn to make his little speech, he managed to do it without any difficulty. We were, so to speak, a psychotherapeutic group as well. And the students knew that. "We know that we can support and change this situation or that, if we conduct ourselves thus and thus."

So the first semester worked out wonderfully. Everyone was thrilled. And we said, "We'll do a second semester." The second semester was even better.

There I had some other interesting visitors from out of town, all of whom presented with enthusiasm. In the second semester, in the spring of 1969, there were about seventy students.

Since these young people were so different, had come to this course for such differing reasons, one sometimes didn't see the nature of the questions: "What does this person want, when he asks this question? What does he want to talk about?" And there we introduced the following: I hung three cardboard disks around my neck that had different colors: a red one, a green one, and a black disk. And when a student asked any question: "Why are we now learning something about the retina?" I saw, "He doesn't want to know what can be said about the retina, but wants to know why we talk about the retina." And there I said, "Aha, that is a question regarding the course," and—let's say—put it on red. Then we said, "OK, let's talk about why we talk about this topic!" Or when someone didn't understand what a post-retinal network is, what a network is that is behind the retina—he simply wanted to understand the mechanics of the retina—I put it on green, and said, "So let's talk about the retina now!" The third was: "Why are we sitting here together in a course on heuristics?" Then I put it on black.

That was marvelous and contributed a lot to the discussion and also gave the students a clear picture: "What do we talk about now?" In private life that is a problem as well, that one doesn't know: "What *do* we talk about now? Do we talk about the fact that we don't like each other? Do we talk about the fact that we have difficulties living together? Or do we talk about your being of another political opinion that I am?"

We interpreted heuristics to be what heuristics meant originally, namely "to find something." The Greek word *heurískein* means "to find." *"Heureka!*—I found it" is what Archimedes called out when he sat down in his bathtub and noticed that he had become lighter. There he invented the famous Archimedean principle: that a body in the water becomes lighter relatively to the mass of water it displaces. He suddenly saw that. He had an insight. And there he called out, "Eureka! Eureka!—I found it." And since

then, *heureka* is the basis for the idea of heuristics. How does one go about finding something? The mathematicians took that on. And the pedagogues took that on; for a technique of giving a course, teaching a course, where the students themselves develop the finding of a solution, not where the professors tell them the solution.

At every meeting there was a scribe. It was a student, who recorded what was being discussed in class. Students took turns.

Research project: *Heuristics III—The Whole University Catalog*

When the second semester was over I said, "Those were two beautiful semesters on heuristics. Unfortunately I have to stop giving that class." Herbert Brün was going on sabbatical, Humberto Maturana had to go back to Chile, John Lilly went back to California; these very interesting colleagues were all gone. And I had one new big research commission that demanded a lot of work.

I said, "Unfortunately I cannot do that anymore." The students objected strongly: "That's not possible! You've got to do it! We will help you do this course. So please, announce it again." And since I am a sucker, I naturally gave in: "OK, if you help me, we can do it."

So I announce the course once more. The fall semester of 1969 rolls around. The first day is, of course, announced in the university bulletin: "First meeting in room such and such, in building such and such, at three in the afternoon." I go there. It was at the time of the student revolts. The students ran around the campus and said, "We are against the administration!" — "We don't have the right courses!" — "The teachers are too lazy!" — "The testing system is lousy!" — Everything is a scandal!" The students spent more time on the street than in the classroom. So I get to the building where the course is supposed to take place, and I don't get in. All the entrances are blocked by young people. I work my way through, want to get to the room; but nothing doing. The hallways are full of young people. I finally ask one of them: "Tell me, what is happening today? Why can't one get in?" — "Well, we would like to get into one course." — "And into what course do you want to get?" — "We

would like to enroll in the course on heuristics." — "All of you want to get into Heuristics?" — "Yes, today is the first day."

Well, I immediately saw: This Room 212, in which we were supposed to meet, that could fit perhaps thirty people, won't do anymore. I immediately went to the administration and asked whether we could have the big auditorium. We got the auditorium. Everybody marched into the auditorium. There were about one hundred and sixty students. While I go over there, I look around for the students who had wanted to help me give the course. None of them showed up. Oh well, they were graduate students, who did ask me to continue with the course, but naturally, didn't have the time to play along. They are writing their doctoral dissertation, they write this, they write that. They also have to go to their classes. They couldn't do it with me. So I walk over there: "Heinz, now you've got to think fast. I am now supposed to give a course to those one hundred and sixty people. What can I do?" And so I wander over there, as slowly as I can. I get there. And the following occurs to me: The students ran around in the corridors, because they are not happy with the university. And so I thought to myself: "Perhaps we could write a book as to what a university should be like, or how they would like a university to be."

At that time there happened to be a magazine that was fabulously laid out. It was entitled *Whole Earth Catalog.* It had been developed by Stewart Brand in California. The *Whole Earth Catalog* described everything you needed to know, if you wanted to be a revolutionary. There was a section on *nomadics*. One could buy tents there, made by reliable firms. One could buy megaphones. You could buy small ovens, that you could then use in the park in the tent to heat up or to fry your potatoes, et cetera, et cetera. A wonderful collection. And books that you ought to read so that you become a good revolutionary. Everything could be found in this *Whole Earth Catalog.* And so I thought to myself: "Since that is so popular"—each one of the students had a *Whole Earth Catalog*—"we'll simply make a *Whole University Catalog."*

And so I said: "I am very happy that we are all here. My plan is to write a new book together with you, in which you can say how

you would like a university to run; and we'll call it the *Whole University Catalog.* In order to do that, we have to cooperate; we all have to work together. So at first, lots of groups should be formed of those interested in similar topics. Some are interested in history. Some are interested in photography. Some are interested in politics. Some are interested in this or that. I'll now distribute some pieces of paper, and you'll write on them your name and what you are studying: journalism, biology, whatever. Then you'll write down what you are interested in: whether you would like to be revolutionaries, or whether you'd like to paint, whether you would like to do this or that! Write it all down! And your address and your telephone number."

They all did that. On the following day I produced a little booklet from it in the Biological Computer Lab, a "Directory of Heuristics." That in itself is, in my opinion, a very interesting document.

If you wanted to know who else was a photographer, you looked it up in the index. It said that Numbers 5, 11, and 17 were photographers. And so, actually, groups could be formed. This Directory is a very important cultural document for me, for it shows what kind of a position the students took vis-à-vis the university. For example, about thirty percent of the students did not take my suggestion of doing such a project seriously. Under "Interest," which was shortened to BAG for background, many of them wrote "sex," or "sleeping," or "doing nothing."

A girl, for example, wrote: "Trying to get laid all the time."

Of course I included that in the Directory. So when she then got it on the following day, she found herself. She came to my office, drenched in tears, and said, "How can you print such a thing? How can you do that to me?" I said, "But why? After all I said, 'Everyone writes down what he would like to do,' and if you had rather wanted to do something else, you would probably have written something else."

The first lesson that the students got from this course, in my opinion, was: One can be taken seriously. That was something that they were not used to anymore. That when you say something, the

other can listen and say, "I understand what it is that you want." That in itself was already an incredible insight. The groups formed the way I had hoped they would: The photographers met each other, the writers met, those interested in similar topics met each other. So many different little groups formed that studied this or that.

A girl in a wheelchair—she had polio—came rolling into my Lab and asked if I had a camera. I said, "Of course I've got a camera." — "Well, could I borrow the camera?" She wanted to photograph the graffiti in the ladies' toilets. Of course I gave her a camera. She then rolled around in her wheelchair and photographed the graffiti of the ladies in the toilets. Then she came back. I said, "I am very curious how the photographing went." She said, "I made a mistake opening the film cartridge. Everything is ruined." I asked, "But why didn't you go to one of the other photographers?" who for sure would have helped her develop these films right away. Well, she didn't dare trust him to have played along. Could she have another roll of film? I said, "OK, here's another roll of film." She gave up the toilet program and instead photographed trees: "I thought the trees of the campus were so beautiful."

At the end of the semester they put their results together. They always pasted and painted the projects on a big piece of paper. One of them had friends at a newspaper published in Champaign. I think it was the *Champaign-Urbana Courier*. And so he succeeded in having it printed on newsprint, a very cheap way of producing it. One thousand copies were printed. They were sold for one dollar, and the net profit went to one of the institutes of the university that helped the handicapped students—to have ramps everywhere, et cetera, et cetera. They accepted that very happily.

The last page states what the class decided to do with the money. The mere development of something like this is so very interesting: That they always debated, discussed, and then chose this form and printed it on the back of the *Catalog*.

What was interesting was that when the university found out about this production, it said, "This can't be. We have to squelch it."

THE PUBLICATION OF THIS CATALOGUE WAS MADE POSSIBLE BY THE FINANCIAL SUPPORT OF ALL STUDENTS WHO PARTICIPATED IN A COURSE ON HEURISTICS (EE 271; EE 497; ENGL. 199; FALL 1969), A GROUP OF GRADUATE STUDENTS WHO WISH TO REMAIN ANONYMOUS, AND THE SCHOOL OF LIBERAL ARTS AND SCIENCES THROUGH ITS PLANNING COMMITTEE FOR THE L.A.S. SYMPOSIUM ON APRIL 12-17, 1970; AND BY THE IMMEASURABLE ENTHUSIASM AND UNCOUNTABLE HOURS OF WORK CONTRIBUTED TO THE ORGANIZATION AND ASSEMBLY OF THIS PUBLICATION BY MRS. ALEXIS PETERSON AND MISS JANET FICKEN OF THE BIOLOGICAL COMPUTER LABORATORY. ONE THOUSAND (1000) COPIES OF THIS CATALOGUE WERE PRINTED BY THE RANTOUL PRESS, RANTOUL, ILLINOIS AND THEY ARE SOLD FOR THE PRICE OF $1.00 EACH. SHOULD THERE BE ANY PROFITS MADE THROUGH THIS SALE THEY WILL GO TO THE UNIVERSITY FOUNDATION WITH THE SPECIFICATION TO PROVIDE FINANCIAL AID TO THE SPECIAL EDUCATION OPPORTUNITIES PROGRAM (S.E.O.P.) OF THE UNIVERSITY OF ILLINOIS IN URBANA.

Front and back covers of The Whole University Catalog

The administration of the University of Illinois did not allow this production to be identified with the university. Originally, it said *University of Illinois* at the top, and at the bottom, I believe, *Biological Computer Lab* or *Department of Electrical Engineering*. They said, "It can't say that!" They did not want to be identified with something as disgusting as what we had produced. Therefore the students were asked to paste black strips over the identifying words.

One student, for instance, had taken a whole page to describe how to cultivate marijuana, how to cut it, how to make cigarettes out of it and how to smoke it. What was great about it was that since every student knew how to do that, he could afford to make a joke about it, and described everything the way it is *not* done. And of course we included it as a joke in the *Catalog*. The good professors fell for it and said, "Now Foerster publishes how to turn people into drug freaks. In the name of the university, in the name

of teaching, Foerster teaches these nice blue-blooded young citizens of the state of Illinois in the use of drugs."

The senator from Illinois then cited me to attend a hearing. That was incredibly funny, since they didn't know that the whole thing was a joke. Mai was also there. The senator was totally crazed. I sat there and laughed myself silly. I only gave funny answers. I asked: "Did you study the marijuana contribution?" — "Of course! Scandalous!" — "Well, did you try whether it works?" — "We wouldn't do something like that!" — "Well, why didn't you try it? Then you would have seen that it doesn't work, that the whole thing is a hoax."

In the end, of course, they had to release me, but the university really tried to get rid of me. The entire *Whole University Catalog* was a thorn in their eyes. But they couldn't kick me out, since I had this wonderful tenure.

But you can see how through these and other similar incidents tensions arose between the university and me. For example, the president was also cited to this hearing, and he too had to say how he could support such a thing. And the first thing they asked me was: "Did you show that to the superiors of your university?" I said, "Well, of course. That was the first thing I did; show the *Catalog* to the president." — "Well, and what did he say to that?" — "He was shocked. He said, 'For Heaven's sake, what have you done to me?'" Naturally, everybody laughed again.

Then there was a break from Heuristics.

Research project on ecology: *The Ecological Sourcebook*

I was elected by the students to teach the honors class of the College of Engineering in the spring semester of 1970. Under the umbrella of the College of Engineering are the physicists, the chemists, the electrical engineers, the mechanical engineers.

The best students of every class are in the honors class, the ones who have only gotten A's in their coursework. They have the right to decide on a course, with a teacher of their choosing. And so one year they picked me as the one to conduct this course.

Everybody, of course, got sick over it. For Foerster, after all, is a child seducer, who incites the students to deviate from the straight and narrow.

So they elected me to further lead them astray. And I went there and asked myself: "What am I going to do with them?" At that time the problem of ecology had surfaced. "What are we doing?" — "We are destroying the world." — "We are destroying the lakes." — "We are destroying the air." — "What are we doing?" And there I suggested to the students: "Why don't we write an 'Ecological Sourcebook,' where someone interested in ecological problems can look up: 'What are the problems?' ... 'What can I do to eliminate these problems?' … 'Where can I find sources, for reading up on what we can do with the woods and the lakes?' … 'How can one prevent the destruction?' … 'To which senators do I write about what?' Let's make such a book!" They adopted this proposition with great enthusiasm.

We did it, produced it and again printed it at the local newspaper, on newsprint as well. It turned out very nicely. It has around three hundred pages, so it is quite thick, with preformulated letters. When someone wants to write to a senator, "We've got to do this or that to stop the pollution of the air," the letter is already contained in the book. All you have to do is copy the letter. The senator's address is in the book as well. You take an envelope, stick the letter in it and send it to the senator. This *Ecological Sourcebook* contained many such points of reference, and the students who had made it were totally enchanted.

The assistant dean wrote a letter to the head of the Department of Electrical Engineering, telling him with how much enthusiasm the young people had participated in this course, and that he was very grateful to me for taking up ecology, the ecological problem.

Research project: *Heuristics IV—Cybernetics of Cybernetics*

I remembered that Margaret Mead had always told me: "Heinz, you have to write a book about cybernetics." I said, "Dear Margaret, I

don't write books. Perhaps I can write an article that stems from a lecture, but I cannot write books."

With the success of the *Ecological Sourcebook* and the *Whole University Catalog*, I said, "Perhaps with a class we could write a book about cybernetics." And so I announced a course for the fall of 1974 entitled "Cybernetics of Cybernetics" because, as I maintained: "We will hold the course on cybernetics cybernetically, so that the entire course will become a cybernetics of cybernetics." Many students came to register for it—forty-five, I believe. The course description already stated that we wanted to write a book that was to have at least five hundred pages, that was to be structured in such and such a way, that was to be richly illustrated, et cetera, et cetera. This course description is of course contained in the book, since it is a cybernetics of cybernetics; it has to be able to describe itself.

By the way, the expression "cybernetics of cybernetics" was also inspired by Margaret Mead. We had invited her to give a lecture at the first meeting of the American Society for Cybernetics in the year 1967. She came and held a wonderful lecture; she speaks totally impromptu; she doesn't need any notes.

We taped all the lectures at that conference, and together with some students, I edited these lectures in order to publish them as a book.

Margaret did not have a title for her lecture and was on the Trobriand Islands or in Samoa at the time, writing her twelfth book, watching how the girls there are thrown into the marriage market—as they call it in Vienna, "coming of age."

But we had to find a title for her lecture. So we always wrote her letters, in which we asked: "What shall we call your paper?" — "Would you like to correct your lecture?" But she never answered.

Finally I said, "I have to give this lecture a title." Now, she spoke cybernetically about cybernetics. She said, "A society has to conduct itself in accordance with its own maxims. If you are a cybernetic society, you need to notice when you are no longer functioning, and then perhaps decide to disband." And so I called

her article "Cybernetics of Cybernetics." That is where that combination appeared for the first time.

At a later opportunity—1974, Klaus Krippendorf had invited me to give a lecture at a conference of the American Society for Cybernetics in Philadelphia—I saw: "This idea of 'cybernetics of cybernetics' is a very good one." Only then did I think of how meaningful these self-referential concepts are, these concepts that apply themselves to themselves. That is when I invented the idea of "second order cybernetics."

Again, students came from all classes, freshmen just out of high school, students in their first year of college; then postdocs, people who had already completed their doctorate and held some kind of assistantship at the university. It was an incredible success. During the first half I always gave lectures and said what cybernetics is all about, what one concerns oneself with, what fields are touched upon, et cetera, et cetera. The students then investigated everything else from the literature.

They wanted to create a dictionary. So they selected some concepts like "consciousness," "future," or "truth," and wrote to different great research scientists: "We are writing a book on cybernetics. Could you define 'consciousness' for us?" — "Could you define 'intelligence' for us?" — "Could you define this and that for us?" And these great scientists wrote back; many, almost all of them, answered. What was great was that it turned out that everyone defines "consciousness" differently. That in itself is already an important insight for a young person, who says, "Now I would like to know something about consciousness. And what is it that I am being informed about? About the writer, and not so much about consciousness." That is how this book then came about. The students worked late into the night. Then they typed all the pages, pasted them up, provided them with illustrations, and laid them out in the corridors of my research lab. There the pages lay next to the pages, next to the pages, next to the pages; until they said, "Yes, these we'll put here. That we'll put there."

Then two supplementary books were invented. The "Metabook" informed about the authors who had written

contributions—what kind of people they were and what they were mainly interested in: cognition, the functioning of the nervous system, et cetera, et cetera. The Metabook was appended at the end. We used a Velcro fastening, so that you could take out the booklet and put it back in.

Then there was the so-called "Parabook." The Parabook is the book about the book, so to say; a meta table of contents, so to say. There you could find a list of the topics that were dealt with. There you could find the authors: Who the authors are and what they wrote about. The Parabook is exactly in the middle and has a gray edge, so that you can find it right away. "Where do I find the authors?" — "What topics are dealt with?"

I printed the first three hundred copies at my BCL printing shop. I had them bound by the University Press of the University of Illinois.

The students selected a very pretty cover: a painting by Pieter Brueghel, *Children's Games,* since, as they said: "Game playing is actually a cybernetic activity. One plays with the other; the other with the one. Circularity is already part of children's games."

In the course description I had already written: "We have to invent something so that the linearity of the book is cancelled out; so that one can easily get from one topic to another related topic in another part of the book; so that the topic is dealt with as a whole and not only one-sidedly." That was important, because the students at that time were totally against linearity; linearity was totally out.

One student had the great idea: "We'll simply make holes in the margin, so that when one sticks a pencil through these holes, one can get from one place where the topic is dealt with, to another place where this topic is dealt with again. So if, for example, you want to know something about cognition, you see neurology on page 110. Then you stick a pencil through the holes and get to page 450, where you can then find the philosophical or the logical treatment of cognition. Simply with a small hole puncher you punch holes and can then read this book cross-disciplinarily, so to say; not linearly, but spatially, so to say."

I believe every student got two or three copies. Then a few were left over, and that was actually the end of the story.

Several years later, when I already lived in California, someone accidentally found out about this book. It happened this way: I was at a conference here in California, in Asilomar, sitting at a table with several other people. Of course we talked: "What do you do? What are you doing here?" I asked my neighbor at the table: "What do you do?" He said, "I am a publisher of unpublishable books." I said, "Would you like to see the most unpublishable book?" — "Yes, of course, that would really interest me." — "You can see it at my house." Well, Asilomar is here on the coast, to the south of Santa Cruz. "When are you leaving?" I asked. "I am taking a plane this afternoon." — "From where?" — "From the San Francisco airport." — "Why, then you can come by my house; then I'll show you the most unpublishable book." So he really came by, in the afternoon for coffee. I show him a copy of *Cybernetics of Cybernetics.* We sat outside, on the deck. He looks at it. His mouth simply began to water. "It's not possible! Unbelievable! I've got to publish that." — "Well yes, but that is my last copy. Unfortunately I can't …" — "No, no, I've got to publish that. You have to let me have the book." — "No, no, I cannot give it to you. It is my last copy." — "No, no, you've got to let me have it." Well, he finally won. He took the book with him and produced a new edition, an improved edition, for he used much better paper. I had only been able to use paper that happened to have been gifted to me by someone. The paper was enough for exactly those three hundred copies. He printed it all on white paper. He computer-enhanced the photographs, so that all pictures turned out to be more beautiful than in the original edition. I believe he printed one thousand copies of the book.

Quantitative hematology and the *von Foerster equation*

An important financial contribution to the Biological Computer Lab came from the National Institutes of Health. Almost thirty percent of the costs were covered by this institute.