

Interview with Heinz von Foerster (Yveline Rey, in Ethics & Cybernetics 1991)

Yveline: The first time I heard your name mentioned, it was accompanied by the term “cybernetician.” How does one become a cybernetician? Why this choice at the beginning? What were the influential steps throughout the course of your life?

Heinz: Yes. How does one become a cybernetician? Or, perhaps you want me to tell you how I became a cybernetician. You may remember the point I made in my address; that we all are metaphysicians, whether we call ourselves such, whenever we decide upon in principle undecidable questions. To answer your question, I could also say we are all cyberneticians (whether or not we call ourselves such) whenever we justify our actions without using the words “because of . . .” or “A cause de . . .” but with the phrase in English “in order to . . .” which in French is much more Aristotelian, “A fin de . . .”

Yveline: Why Aristotelian?

Heinz: In his *Metaphysics*, Aristotle distinguished four different kinds of causes or, as I would say, four different excuses; two of which have temporal character, “causa efficientis” and “causa finalis.” Physicists love the former, where causes in the past determine the effects in the present: “Because she did turn the switch, the lights go on now.” Psychologists prefer the latter: “In order to have the lights on, she turns the switch now.” Causes in the future, “to have the room lit,” determine actions in the present, “turn the switch now.”

Yveline: Very interesting, but where does cybernetics come in?

Heinz: Physicists explore the connection between the positions of the switch, making or breaking contact, and the electrical processes that heat the wires in the lamp to temperatures that are high enough to radiate electromagnetic waves in the visible spectrum, etc., etc. Cyberneticians explore the connection between the little girl’s wish to enter a lit as opposed to a dark room, as well as the sensory-motor processes and the emerging eye-hand correlation that bring her hand along an unpredictable path, but with a predictable outcome, closer and closer to the switch which she then turns in the right direction, etc. If one were to watch this girl, one might be tempted to say as did Norbert Wiener, “. . . her behavior may be interpreted as directed to the attainment of a goal.” In the early cybernetic literature you will find again and again reference to the notion of “goal,” “purpose,” “end,” etc. Since the Greek word for “end” is “telos,” our pre-cyberneticians used “teleology” for identifying their activity.

Yveline: But, Heinz, you said before that we are all cyberneticians, whether or not we call ourselves such, but when I go to turn on a light switch I am not “exploring the sensory-motor connections,” et cetera. I just go and turn on the switch. Where is the cybernetician?

Heinz [Laughing]: This is one more reason why I love women! You look through all the scientific verbal haze and go straight to the essential points. Now . . . Hmm . . . What can I say? I think I can extricate myself from this dilemma by inventing a **new category of cybernetics: “Zero-order Cybernetics.”** I suggest we have a case of **zero-order cybernetics when activity becomes structured**; when “behavior” emerges, but one doesn’t reflect upon the “why” and the “how” of this behavior. One just acts. This is when cybernetics is implicit.

Yveline: I see. But what is now **“First-order cybernetics?”**

Heinz: This is when one reflects upon one’s behavior, upon the “how” and the “why.” Then cybernetics becomes explicit, and one develops notions like “feedback,” “amount of information,” “circularity,” “recursion,” “control” “homeostasis,” “dynamic stability,” “dynamic instability or chaos,” “fixed points,” “attractors,” “equi-finality,” “purpose,” “goal,” etc., etc. In other words, one arrives at the whole conceptual machinery of “early” cybernetics, first-order cybernetics; or as I would say, the cybernetics of observed systems.

Yveline: Let me come back to my first question. How did you come upon cybernetics?

Heinz: Very simple. Cybernetics came upon me, because my English vocabulary was at most 25 words.

Yveline: This makes no sense, dear Heinz. You’ll have to explain that a bit better.

Heinz: Okay. Then we have to go back to a time when you, dear Yveline, were not yet born. We have to go back to the year 1948, when parts of Austria were still occupied by Russian troops, and the world was slowly recovering from the wounds of the war. In November of that year, in Cambridge, Massachusetts, Norbert Wiener published a book entitled Cybernetics, with the subtitle Communication and Control in the Animal and the Machine. Also that November, Heinz von Foerster in Vienna, Austria, published a book entitled Das Gedächtnis [The memory] with the subtitle Eine quantenphysikalische Untersuchung, [An investigation in quantum physics]. I am originally a physicist, and what I tried to do in this investigation was to connect observations in experimental psychology and neurophysiology with the physics of the large (biological) molecules. I think that I didn’t do a bad job of it. Now I have to switch to another track. My wife’s dearest friend, Ilse, had escaped from Germany when Hitler came into power. By 1948 she was well established in New York and she invited me to come to the United States in the hope that I could establish a beachhead in order to make it easier for the rest of my family to follow. In February of 1949 I crossed a very stormy Atlantic on the Queen Mary. Since I don’t get seasick, (most of the other passengers were) I always had 6 waiters serving me in an empty dining room. A few days after my arrival in New York, one of America’s leading neuropsychiatrist, Warren McCulloch (who, by an amazing combination of

miraculous circumstances, had gotten hold of my book) invited me to present my theory of memory at a meeting in New York that was to take place a few days later. He also recommended that I find a book entitled Cybernetics in order to prepare myself a bit for this meeting. I did that, and with the little English at my disposal at that time, I tried hard to understand some of its basic points. Somewhat ill prepared in concepts and language, I came to this meeting whose title was more or less an enigma as well: "Circular Causal and Feedback Mechanisms in Biological and Social Systems." To my surprise, it was a small meeting of about 20 participants, but to my even greater surprise, this was an assembly of the cr'eme de la cr'eme of American scientists. There was, of course, Warren McCulloch who was chairman of the conference, and whose works in 4 volumes have recently been published. There was Norbert Wiener himself, of whom a lovely biography by P. Masani appeared last year. There was John von Neuman, the man who started the computer revolution. Then there were Gregory Bateson and his wife Margaret Mead, or should I say Margaret Mead and her husband Gregory Bateson, who brought to anthropology wisdom, profundity and humor; both in different ways. These are but a few, whose names I believe would be familiar to my European friends. I don't know who invented the notion of "interdisciplinarity," but this meeting was its manifestation. If you were to begin with Anthropology in an alphabetical list of academic professions, and end with Zoology, my guess would be that almost every one of these disciplines had a representative present.

I was called upon relatively early to present my story, and I wrestled valiantly with my 20 English words to make myself understood. The whole thing would have turned into a catastrophe if it weren't for the presence of Gerhard von Bonin, Heinrich Kl'uver and others who spoke fluently German and who rescued me by translating some of my arguments. That evening, the group had a business meeting. Before it was over, I was invited to come in. "Heinz," began the chairman, "we listened to your molecular theory of memory, and your theory agrees with many observations which other theories cannot account for. What you had to say was very interesting. However, how you said it was abominable! Because we want you to learn English fast, we have decided to appoint you to be the editor of the transactions of this conference." I was of course speechless. How could I edit articles by such superb writers as Wiener, Mead, Bateson, etc.? How could I organize material of which I, at best, understood only half? But, I thought,, "Why not try?". So I accepted the appointment. I immediately proposed that, "Since the title of this conference is so long, it is hard to remember, and for me, hard to pronounce; 'circular-causal-and-feedback-mechanisms...' I propose to call this conference 'Cybernetics.'"

Everybody looked at Norbert Wiener, who sat next to me, and applauded in his honor and in acceptance of my proposal. Deeply touched by the recognition of his peers, tears came to his eyes, and he left the room to hide his emotions. The sponsor of this, and four more conferences on this topic, was the Josiah Macy Jr. Foundation of New York, who asked me to edit each of the 5 volumes. Since all

of that took place in the remote past, aficionados of cybernetics refer to these books as the “legendary Macy meetings on cybernetics.” Here ends, dear Yveline, my story of how cybernetics came upon me.

Yveline: Throughout the course of this conference, in the conference rooms as well as the corridors of the Cit’e dela Villette, there was much discussion about first-order cybernetics and second-order cybernetics; mostly to put them opposite each other. For instance, “But you see my dear, in my view this is from first-order cybernetics. . . .” or, “I tell you, one really feels the difference; this time we are in the second-order cybernetics.” Would you attempt to clarify for the people here, what are the **fundamental distinctions for first-order and second-order cybernetics**? Which change of direction or observation signify second-order cybernetics? Or to paraphrase G. Spencer-Brown, whom you like to cite, “Design me a resemblance!” or, “Design me a distinction!”

Heinz: Let me draw the distinction for you. You followed me when I moved from zero-order to first-order cybernetics. What did I do? I let the underlying circularity of processes of emergence, of manifestation, of structurization, of organization, etc., become explicit. By that I mean that we now reflect about these circular processes which generate structure, order, behavior, etc., in those things we observe. Now Yveline, you can easily guess how to move from first-order to second-order cybernetics.

Yveline: I think so. Let me try. In **second-order you reflect upon your reflections.**

Heinz: Of course!

Yveline: And now, can I go on to **third-order cybernetics**?

Heinz: Yes, you could. But it would not create anything new, because by **ascending into “second-order,”** as Aristotle would say, **one has stepped into the circle that closes upon itself.** One has stepped into the domain of concepts that apply to themselves. [Autopoiesis, self-organization, self-reference. Why not a third-order when one acts in accordance with their reflections upon their reflections – hence praxis.]

Yveline: Do you mean to say that a second-order cybernetics is a cybernetics of cybernetics?

Heinz: Yes, precisely!

Yveline: Can you give me other examples?

Heinz: Yes of course. For instance, compare a typical first-order cybernetics concept such as “purpose,” (as being the equivalent of “why”) with a second-

order question, “What is the purpose of ‘purpose’?” (asking why the notion of “purpose” is used in the first place; i.e. how does it influence discourse, explanations, argumentations, etc.?) One nice feature of this notion is that it relieves one of the need to account for the way things are done which are intended. Every time I tie my shoelaces, or you slip into your pumps, we do it differently. We do it in thousands of unpredictable variations, but the outcome is predictable; my shoelaces are tied, your shoes are on your feet. On the other hand, it is quite impossible for a physicist to invent the “Laws of Nature” with which to compute our behavior from the initial conditions of my united shoelaces or your pumps in your wardrobe; that is to compute the paths, the “trajectories” and the movements that our bodies and our limbs are taking, which tie my laces or put shoes on your feet. The physicist’s “causa efficientis” is impotent. But the cyberneticist’s “causa finalis” does it all. If the intentions are clear, (independent of the initial conditions) the sensorimotor loops will adjust and readjust our movements until my laces are tied; your shoes are on your feet.

Yveline: Thank you. I feel much better with my shoes on. I see now the purpose of using the notion of purpose. One does not need to know how to get there, one needs only to know the there. This is a very nice feature indeed! Is there a bad feature too?

Heinz: Yes there is. The ugly feature of the notions of “purpose,” “goal,” “end,” is that they can be used to justify the specific ways of getting there; “The end justified the means.” And as we know now, the means can be very ugly indeed. The question should be, “Do the means justify the end?” [humane cybernetics]

Yveline: If we would remember to ask the question this way, the world could be a very different place. But now Heinz, to use your language, tell me how did second-order cybernetics “come upon” you?

Heinz: Through a woman, of course, it was Margaret Mead. You remember the quote I cited in my address? It came from a speech she gave, I think in 1968. Since she rarely uses titles for her talks and almost never reads from a script, I sent her the transcript from a recording asking for her corrections and a title. There was no reply. I urged by telegram; still no answer. Finally, I tried to reach her by telephone at the Museum of Natural History In New York where she was a curator. I was told she was with the Papuas, or the Trobrianders, or the Samoans, and could not be reached. So, I had to edit her speech and invent a title. What struck me was her speaking about cybernetics in a cybernetical way. Thus I chose for her the title, “Cybernetics of Cybernetics.” It appears to me today that the interest in the peculiar properties of concepts that apply to themselves (or even need themselves to come into being) must then have been floating in the air. Francisco Varela, the Chilean neuro-philosopher referred to them as “self-referential,” the Swedish logico-mathematician Lars Lofgren as “autological.”

Yveline: If I were to ask you to give me the shortest description of the distinction between first-order cybernetics and second-order cybernetics, what would you say?

Heinz: I would say, **first-order cybernetics is the cybernetics of observed systems**, while **second-order cybernetics is the cybernetics of observing systems**. [third-order cybernetics is in the doing of cybernetic concepts?]

Yveline: Very short indeed! Would you like to expand on this?

Heinz: Perhaps only briefly, because my “shortest description” is nothing else but a paraphrase of the description I made in my address, where I juxtaposed the **two fundamentally different epistemological, even ethical, positions** where one considers oneself: on the one hand, as an **independent observer** who watches the world go by; or on the other hand, as a **participant actor** in the **circularity of human relations**. When taking the latter position, (the position I believe taken by systemic family therapists) one develops notions like “closure,” “self-organization,” “self-reference,” “self,” “autopoiesis,” “autonomy,” “responsibility,” [insistence], etc., etc.

In other words, one arrives at the whole conceptual machinery of contemporary cybernetics, the cybernetics of observing systems, and thus one comes very close to the theme of your Congress: “Ethics, Ideologies, New Methods.”

Yveline: At the conclusion of your paper, “On Constructing a Reality,” which was published in Paul Watzlawick’s book The Invented Reality, you ask, “What are the consequences of all this in ethics and aesthetics?” You also wrote,

The ethical imperative: “Act always so as to increase the number of choices.”

The aesthetical imperative: “If you desire to see, learn how to act.”

Can you add something to the connections between ethics, aesthetics and change; which from my point of view are the three basic coordinates in family therapy?

Heinz: I like your three coordinates, because all three have a second-order flavor. And, of course, I am delighted that two of my imperatives correspond to two of your coordinates. However, I feel some uneasiness that your third coordinate “change” is not yet accompanied by an appropriate imperative. Let me remedy this situation at once by inventing an imperative for you;

The therapeutic imperative: “If you want to be yourself, change!”

Is this paradoxical? Of course! What else would you expect from change?

Yveline: You say with so much self assurance, “Paradoxical, of course!” How can you connect change with paradox?

Heinz: Easily! You remember **paradox**? It **yields one meaning when apprehended one way, and one meaning when apprehended the other.** What do you do when I say “I am a liar,” do you believe me? If you do, then I must have spoken the truth; but if I had spoken the truth, I must have lied, etc., etc. What is the problem here? Lying? No, **the problem is “I,”** the shortest self-referential loop. When speaking about oneself, using “I,” magic is performed. One creates oneself by creating oneself. “I” is the operator who is the result of the operation.

Yveline: This is all magic to me. Where does “change” come in?

Heinz: The **paradoxical nature of change** is much richer than the orthodox “paradox of the liar” which switches from “true” to “false,” and from “false” to “true,” and so on and so forth in **dynamic stability.** The unorthodox nature of change arises when you apprehend “change” any way you wish to apprehend it, and it will yield something else, otherwise it wouldn’t be “change.” This is, its therapeutic force. [The power of a respondent]

Yveline: But you said, “If you want to be yourself; change!” How can you be yourself and change?

Heinz: I wanted to appeal to ancient wisdom. It is 2600 years old and comes from the I Ching. Under the 58th symbol “Fu,” or “The Turning Point,” it says, “**The ultimate frame for change is the unchanging.**”

Yveline [Smiling]: This conversation with you, Heinz, has been a joyful and exciting day of learning. It seems to have mirrored the theme of our conference; ethics and family therapy. It feels as though I’ve discovered a new freedom within a precise and rigorous framework. This framework, clearly defined by the fundamental guidelines of therapeutic practice, encourages communication with another, thereby creating a new space. Does this not broaden our possibilities by redrawing the line of the horizon? If rigor were combined with creativity, the ethics of choice could also be the ethics of change! At least that is the very personal understanding, which I have gained from our encounter. I now have an exquisite diffused feeling of a door, which opens onto another door, which opens to another door, and another door... thank-you.