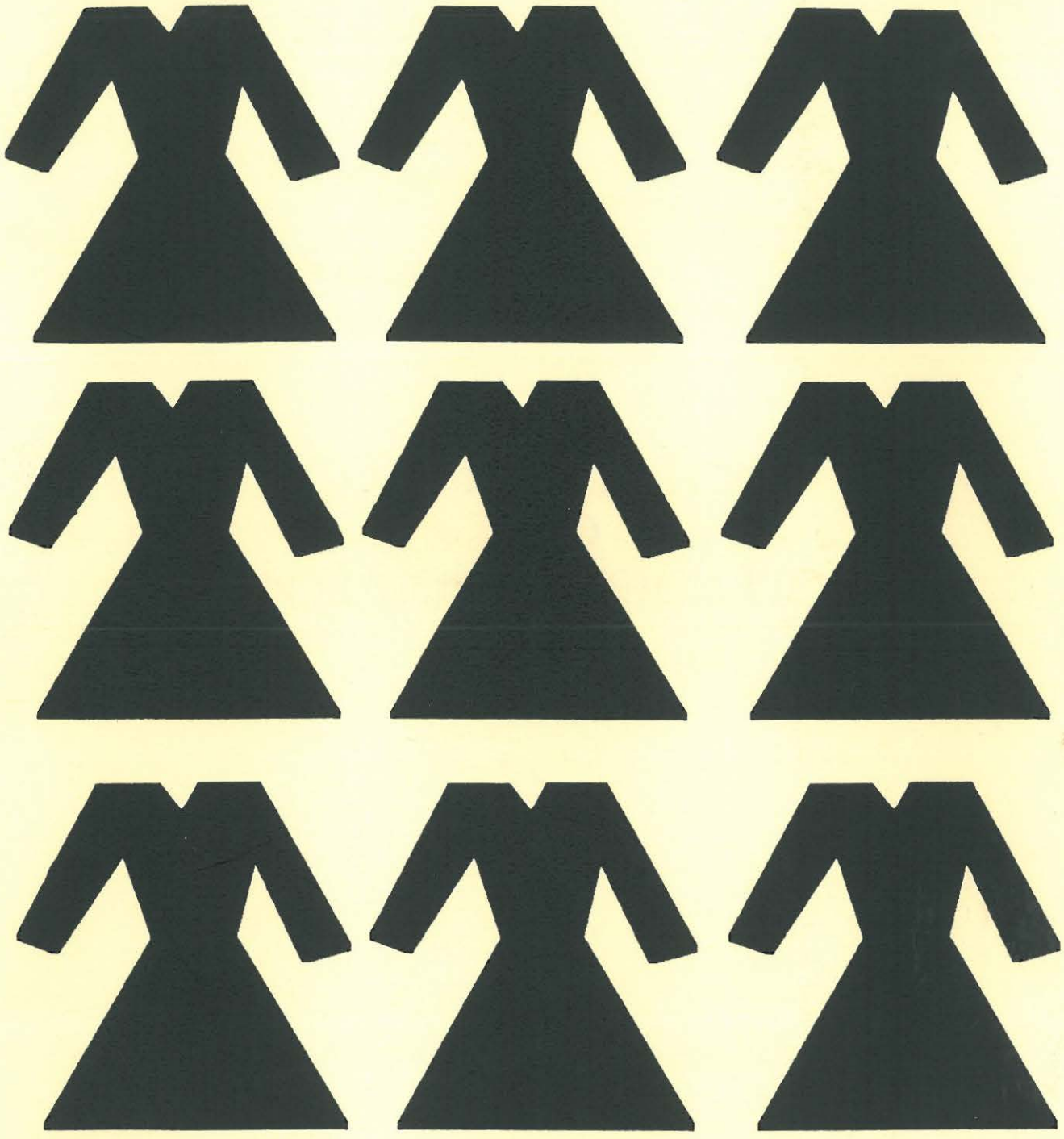

Marcy couldn't decide which dress to wear.

cover by Ellen Bloomenstein

COMMUNICATION AND ANTI-COMMUNICATION

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I like cybernetics: Its intrinsic circularity helps me to see myself through the eyes of the other.

Heinz von Foerster

The following was written by Larry Richards in response to a request for text for an updated ASC brochure.

CYBERNETICS

The field of cybernetics is distinguished by the questions it asks and how they are asked. These questions tend to be those that are in principle undecidable, and "only questions which are in principle undecidable, we can decide." *(Heinz von Foerster)* This form of questioning distinguishes cybernetics from virtually all of the sciences; it in fact seeks "to cure all temporary truth of eternal triteness." *(Herbert Brun)*

Cybernetics is "a way of thinking, not a collection of facts." *(Ernst von Glasersfeld)* It is a way of thinking about questions, about questioning, and about ways of thinking (of which it is one). This recursive aspect of cybernetics (a way of thinking about ways of thinking) requires a conceptual focus different from that of other fields of endeavor. That focus is dynamics and process, rather than substance and objects. Change (or difference) is the fundamental entity in cybernetics. Rather than dealing with matter and energy, cybernetics deals with form and pattern, information and organization. Of particular interest are systems in which "complexity [in the dynamic patterns of behavior] is outstanding and too important to ignore." *(W. Ross Ashby)* Such systems include non-linear dynamic systems, intelligent systems, living systems, observing systems, and social systems.

Cybernetics initiates a vocabulary for talking, and hence thinking, about the dynamics of relations and behavior. Language, as we know it, is linear. Yet, the systems of interest are not. Of particular interest are systems that exhibit circularity (or recursiveness) in their dynamics of operations--autonomous systems. The process of understanding such systems raises questions concerning the prevailing logic carried in virtually all known human languages. These questions imply a need for new, dynamic logics and new approaches to language. The dependence of modern science on the prevailing, time-less logic indicates a necessary role for art in this process. In this respect, cybernetics can be seen as a process of building a vocabulary through the "art and science of manipulating defensible metaphors." *(Gordon Pask)*

Cybernetics is itself neither a science nor an art; yet, the work of cybernetics is in "the science and art of understanding." *(Humberto Maturana)* In this work, science and art form a partnership, both getting transformed in the process. The American Society for Cybernetics is a collection of people interested in generating undecidable questions, exploring alternative logics, learning to be rigorous and creative with language, and doing so in a participative, dialogic process. There is a recognition that this form of activity does and must lead to a political agenda. Yet, the focus of the activity is not on any particular agenda; it is on the process. An awareness that there are political consequences of this activity suggests that cybernetics be promoted as offering, among other things, a framework for exploring strategies for social transformation. The individuals who choose to engage in this activity enjoy the opportunity to become craftspeople in time; this craftsmanship offers new ways of participating in the transformation of the world in which we now find ourselves, and can be employed irrespective of the particular discipline, training, or career of the individual.

CyberMath and {K}nots

by Louis H. Kauffman

0. Introduction and Apologia

This exposition consists in two linked essays. The first is about mathematics related to cybernetics from the point of view of the author of this essay. In this sense the essay is a current self-description of the author.

The author will often be designated by the word "I". I realize that nearly all that can be said of "I" is contained in the sentence: "I am the one who says I." The upshot is that every "you", including the reader of these words can also be construed as "I". I invite you to take this definition of "I" as an invitation to assume the identity indicated by that pronoun. That is, let the reference of "I" be to yourself and see if the statements are resonant for you.

First apologia: I have not taken the historical path and I have not made an exposition of the many strands of mathematics that underlie the detailed analysis of feedback and control in man and machine. In fact, what I try to do here is to start again, with the notion of systems that contain observers and systems that *are* observers, and let the mathematics unfold from that place.

Second apologia: In the next version there will be more graphics!

I. Mathematics and Cybernetics

Historically, cybernetics arose in relation to the mathematics of feedback processes (Wiener), information theory (Shannon) and the study of circularly interconnected logic nets (called neural nets in modern times) (McCulloch and Pitts). These notes will outline a new approach to math and cybernetics that can encompass the older approaches, but starts with the recognition of the observer.

A cybernetic observer is wider than a physics observer. In physics an observing system can be as simple as a record on photographic film or the reading of a needle in a gauge. A physical observing system makes a record, but is not required to reflect on that record. I, on the other hand, reflect and it is through that reflection that I can avail myself of the information in a physical record, or in a physical observing system. Of course a physical observing system may also reflect.

In doing mathematics it appears to be necessary to have a physical record for drawing images, symbols and calculations. A stick and a tide-flattened stretch of sand will suffice. A word-processor and allied graphics facilities will do as well. Mathematics commonly begins with formalisms. Here I start before the advent of formalism and discuss the prerequisites. Those prerequisites are the prerequisites for communication. They are, for example, the very same prerequisites as the prerequisites for notating music or writing the script of a play.

Mathematics proceeds by series of injunctions, as in a recipe. Mathematics transcends the simple domain of recipes by allowing reflection on the structure of the recipe to become part of the mathematics.

For example, suppose that
Sum = 1 + X + X*X + X*X*X + ... (Here the star denotes multiplication.)
Then

$$\textbf{Sum} = 1 + X*(1 + X + X*X + ...).$$

Whence

$$\textbf{Sum} = 1 + X*\textbf{Sum}.$$

By reflecting on the algorithm (recipe) of summing the powers of a number X, we see that the algorithm reflects into *itself* yielding a self referent equation for the **Sum**. This can be solved as

$$\textbf{Sum} = 1/(1 - X).$$

The interpretation of this result depends upon the numerical domain in which you work. Many people would accept that

$$2 = 1 + (1/2) + (1/2)*(1/2) + \ldots .$$

and deny that

$$1/2 = 1\text{-}1+1\text{-}1+1\text{-}1+1\text{-}\ldots .$$

The interpretation of the solution of a self-referent equation is a matter of context. The mathematician can remain separated from the mathematics only at the cost of incoherence in the face of self-reference.

Algebra is a domain in which I can reflect on the structure of arithmetic. Is there a mathematical domain in which I can reflect on reflection? If so, then such a domain could be the basis for a cybernetics of observing systems. Let us look for such a domain.

Mathematics is based on the notion of distinction. Mathematics is the study of what there would be if there could be anything at all.

In set theory the most elementary explicit distinction is the empty set, symbolized by the empty container { }. (The empty set is a logical precursor to the making of zero in arithmetic.) The operation of forming a set is an operation that makes the distinction that is the contents of the set. This gives rise at once to a vast hierarchy of sets obtained from nothing. First there is the empty set { }, then the set whose member is the empty set { {} }, then the set whose members are the empty set and the set consisting of the empty set { {}, { {} } } , and so on. This particular form of creating distinctions is not the only way to proceed, but must be mentioned particularly for the fundamental recursion (due to John von Neumann).

S(0) ={}
S(n+1) = { all previously created sets}.

Thus
S(1) = { {} }
S(2) = { {} , { {} } }
S(3) = { {} , { {} }, { {} , { {} } } }
and so on.

Any two empty sets have the same members (none!). With the definition that two sets are equal only if they have the same members, I get at once that the empty set is unique and that **S(n)** has n distinct members.

By already knowing the domain of numbers and by going to the realm of sets and their creation we see that multiplicity arises of its own accord under the conditions of set-formation. The conditions of set-formation are in fact a reflection of my ability to reflect. That is, the act of forming a set is a formal image of the act of "thinking about" a given domain. The von Neumann recursion is an image of thinking about thinking.

Why then has there been a prohibition against sets that are members of themselves, or against sets that are members of each other? (This is explicitly disallowed by the foundation axiom in classical set theory. Recent theories such as those of Aczel do allow self-membership.) The common answer is that such sets (that are members of themselves) lead to the Russell paradox of the set R of all sets that are not members of themselves. (Is R a member of itself? If Yes then No. If No then Yes.) In the next section we shall see that knots give a very clean way to think about sets that are members of themselves.

As far as the Russell paradox is concerned, its resolution depends upon your point of view. I like to think of my sets as evolutionary. The Russell set changes as soon as you insert it into itself. The new Russell set still does not contain it-self. The dog chases its tail. The paradox creates time and then there is no paradox.

Unless you prohibit it, self-reference occurs naturally in mathematics. Infinity and self-reference are synonymous in the following sense. Suppose we write a self-referential equation such as

$$A = *A.$$

Then this equation becomes a rule for substitution:

$$A=*A=**A=***A=****A=*****A= \ \ldots \ .$$

Thus the self-reference leads to an infinite process. The results of this process tend to have a pattern of invariance that approximates the self-reference itself. A row of 100 stars looks approximately like a row of 101 stars. This leads to possibly nonsensical notions such as an infinite row of stars

$$\textbf{Infinistar} = **********\ldots$$

I would like **Infinistar** to have an "existence" so that, literally

$$*\textbf{Infinistar}=\textbf{Infinistar}.$$

The existence of **Infinistar** is certainly not a physical existence in any sense that we can construct. I mean, nobody and no computer can lay down an infinite row of stars. **Infinistar** is a *concept*. It is the concept that you can always add one more star. And it is a true concept, as you can verify for yourself. If you are present before a row of stars, then you can add one more star. If you are present and distinguishing, then you can make one more distinction. Being present and distinguishing is a process. I am not stopped. If I am stopped, then I am not and there is no one and there is nothing to discuss.

There *is* a problem with the usual formulation of set theory. That problem is that all the created sets are assumed to be present in eternity. They are regarded as existences rather than as processes. That problem is also the virtue of the classical theory because many sets (processes though they really are) have the capacity to keep recreating themselves in the eye of the observer as apparently unchanged. Von Neumann's numbers **S(0), S(1), ...** have this capacity, and so form the backbone of number theory and give it that quality of eternal existence that motivated the mathematician G.H. Hardy to exclaim that mathematical existence was firmer than physical existence.

All around the relatively static mathematical entities are self-referential entities that propel themselves forward into time and cross the boundaries between the observer of the mathematics and the mathematics itself. By starting with a distinction rather than a set, we recognize the circular and self-referential nature of the mathematics from the outset and align it directly with cybernetic thinking.

Self-reference does not require physical infinity to bring it into existence. Self-reference has conceptual life. Nothing brings this more clearly to the fore than just understanding that you yourself make the distinctions that allow your own cognition. It is amusing and useful to see this process reflected in formalism. Allow me to introduce you to the *duplicating gremlin*, **G**. When **G** meets any entity **Q**, he/she duplicates **Q**, tucks the copies inside a pair of brackets and disappears!

$$GQ = [QQ].$$

Now suppose we go to the Gremlin Factory, purchase two duplicating gremlins and introduce them to each other. Then

$$GG = [GG]$$

and we see that the "entity" **GG** is self-referential, and does not disappear. Of course "equals" here means "can be substituted for" and the equation **GG = [GG]** initiates the process

$$GG = [GG] = [[GG]] = [[[GG]]] = ...$$

This form of self-reference is the basis of recursive programming and was first articulated by Church and Curry in the form of the lambda calculus for mathematical logic. The same pattern of self-reference underlies the structure of Godel's incompleteness theorem and many other constructions in logic and mathematics.

In fact, we can generalize the gremlin in the following way. Let **Gx = F(xx)** for any **F**. Then **GG=F(GG)**. We see that "any" **F** has a fixed point **GG**. I have been utterly cavalier about specifying the domain of applicability of **F**. It is at this level that we arrive at a parallel with the notion of the self. For I am indeed utterly cavalier in specifying the domain of application of the self, and in that way I become the fixed point of that self that is myself.

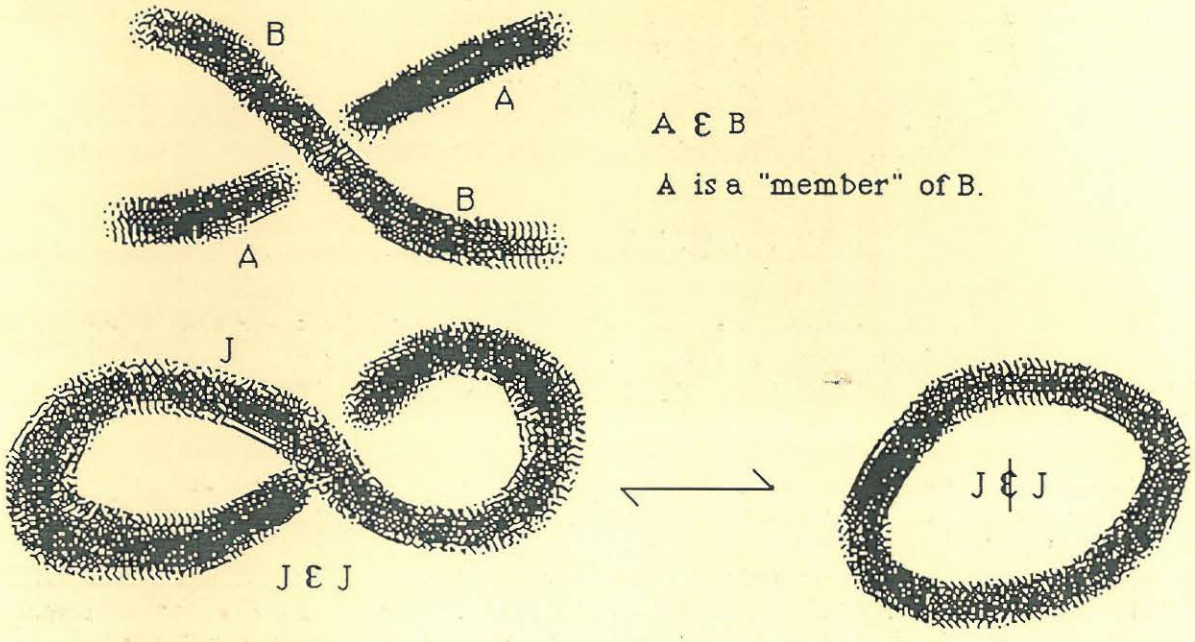
II. Cybernetics and Knots

A knot is a natural example of a system that needs self-reference in order to achieve stability. Tie a knot on a length of rope. If I do not make the rope itself into a closed circular loop, then the knot can fall off the end of the rope. Thus the basic self-reference of a simple closed loop in three dimensional space supports the vast chaos of all possible knots.

The knot itself is a pattern that intermediates between the rope (substrate) and the ambient space (context). The knot cannot exist without the rope and the space. Once knotted, the pattern, which might be thought of as imposed on the rope, is an integral part of the physicality of the "rope-in-space". The boundary between the object and its description has disappeared. This is the real disappearing rope trick.

Now imagine a simple loop of rope. Allow that when a bit of line passes underneath another bit of line, we shall say that the underpassing bit "belongs" to the overpassing bit. Membership by underpassage.

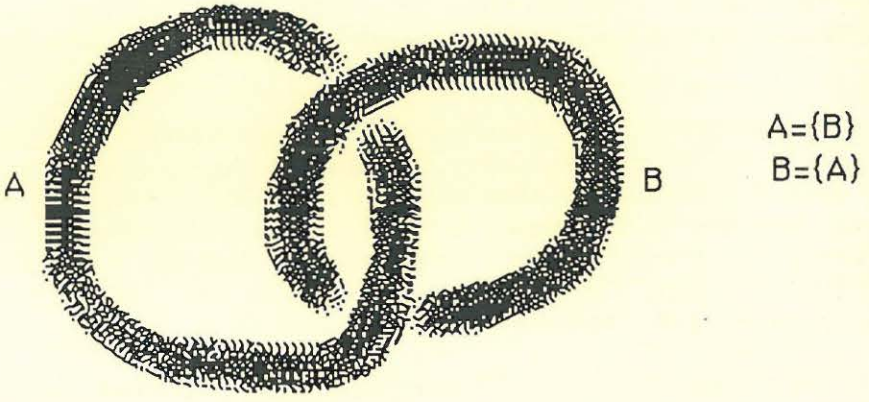
The simple loop is then an empty "knot set".
Put a twist in the loop and it underpasses itself.
The singly twisted loop is a member of itself.
Loop and twisted loop are topologically equivalent.
Hence, speaking {topo}logically, the simple loop is both a member of itself and not a member of itself. By this simple twist of logic, the paradox becomes a phenomenon of three dimensional space.



THE RUSSELL PARADOX UNTWISTED

In knot sets the Russell paradox is erased via a spatial rather than a temporal phenomenon. Space and Time are imaginary domains that serve to resolve the paradox. In space, the knots and links are whole forms without any parts. In the projections of the knots and links to a plane I see them cut up into parts that are arranged self-referentially. A system that has a self-referential description can be construed as a projection of a system that is whole in a higher dimensional space. The self-reference is seen as an illusion of the projection. Any particular decomposition of the system into parts is a case of this illusion. It is an illusion exactly analogous to the forming of coordinates for the "locations" of the "points" of an "object" in ordinary space.

Consider two linked loops, each linking the other once.
Call the loops A and B.
Then in a pictorial representation,
A passes once under B and
B passes once under A.
Thus B={A} and A={B}.
The linkage corresponds to a mutuality in knot sets.



MUTUALITY

There is more to say about knot sets and much more to say about the relationship of knot theory to cybernetics. Knots and knot theory occur integrally in dynamical systems, chemistry, the molecular biology of DNA and the mathematics of quantum field theory.

One point that is worth mentioning before we close is that knots lead naturally to "quantum networks". In a quantum network signals are not passed as in an electrical network. Rather, the network has states with values in a numerical domain such as the complex numbers. An "amplitude" is associated with the net as the sum over all the values of the states. This amplitude corresponds to the probability for occurrence of the process that is the net. The quantum nets are \ interconnected but the quantum amplitudes measure this interconnectedness without the paradoxes of recursion. This point of view is relevant to the cybernetic analysis of systems, languages and conversations.

Languaging Language

Cristina Magro

With the development of Second Order Cybernetics and its epistemology, the understanding of what happens between the participants in the communicative domain in terms of languaging (and not of language) is compelling.

The western philosophical and scientific traditions have created and worked with the idea of language as an autonomous combinatorial system of symbols and rules, which constrain the combinations producing grammatical sentences. This abstract construct is seen, in a great extent, as previously given to individuals as a species specific property. It depends on two basic notions:

a) the one of representation, in a twofold way: signs and symbols are said to represent things in the world, mediating symbolically between these and concepts and feelings represented themselves in our minds. According to this way of looking, this double conformity is what responds for adequate behavior, linguistic or other, and for communication between individuals that "possess" the same language. This leads us to talk about the imperfections of language to represent non-linguistic worlds.

b) the one of correspondence, which responds for the distinction between pairs like literal / metaphorical sentences or expressions, true / false statements, mind dependent / mind independent reality, and a whole architecture of dichotomies within which we have got used to live and reason, to the point of finding it our natural way.

As the Second Order Cybernetics claims the observer to be part of the systems and thus of processes we call "cognitive", and as the observer is described in terms of autopoiesis, our dependence on this early notion of language is a Gordian knot to be cut here. From Maturana (1978, 1988 and 1989) as well as from Maturana and Varela (1987), we understand that what happens between human beings in a linguistic domain is a recursive history of consensual coordinations of consensual coordinations of actions, along which emerge the world of objects and symbols we live in, together with what we call meaning, consciousness, reasoning. These, the western tradition treat as abstract entities and not as processes, as it is of our interest here. This way of looking allows us to understand:

a) our experience of living in language, as legitimately including both the interpretive variability between individuals and also within the same subject,

as well as the experience of interpretive congruence;

b) the networks of conversations we participate in along life as prior texts (see A. L. Becker, 1988 and 1991) we reweave contingently, bringing history and circumstances into our understanding of language;

c) our communicative difficulties as overcome only through conversational effort -- as opposed to the belief that an observer independent reality is a resource that validates our beliefs, and that sentences or texts constructed according to the rules of a language per se carry meanings which should be instantaneously apprehended by efficient hearers.

The idea of languaging is thus a challenge and at the same time a hope for those who have lived in language aware of language.

The above was written by Cristina Magro in response to a "lesson on Cybernetics and language" for the ASC website.

ENGINEERING

Larry Richards

Cybernetics in engineering has to date been primarily of the first-order variety, dealing with "control and communication in the animal and the machine." Whether it be in applications to computer design, adaptive control mechanisms, automation and robotics, coding, communication systems, human factors engineering, bionics, biomedical devices, or software engineering, principle concepts of interest have been information theory, methods for dynamic simulation, linear and non-linear systems theory, optimal control theory, statistical communication theory, and various approaches to artificial intelligence. This emphasis on first-order concepts is perhaps appropriate, given that when we design devices, we want them to exhibit high degrees of stability and reliability. They are to be systems that, when we observe them, behave in precise and predictable ways, unlike what we might want when we "design" human or social systems. With the advent of human engineering, social engineering, and engineering management, some second-order concepts are beginning to creep into engineering discourse--e.g., organizational closure, autonomy, structural drift, plasticity, phenomenal domains, awareness, self-consciousness, and dialogic process. These concepts provide a way of conceptualizing creativity and surprise as desirable attributes of systems involving humans. In the United States, the main literary source on cybernetics in engineering is the IEEE Transactions on Systems, Man, and Cybernetics (IEEE is the Institute of Electrical and Electronic Engineers). Prominent among recent topics in this journal are genetic algorithms, fuzzy sets, Petri nets, neural networks, artificial life, and chaos theory, with applications to discrete event simulation, flexible manufacturing, knowledge representation, data fusion, fault detection/tolerance, digital imaging, learning automata, remote sensing, and robotic manipulators. The term "cybernetics" is much more prominent in European (both East and West) and East Asian engineering journals, where it is also more broadly interpreted than it is in American journals. However, it is the rare article indeed that employs any second-order concepts.

The above was written by Larry Richards in response to a "lesson on Cybernetics and engineering" for the ASC website.

CYBERNETICS AND CREATIVITY: THERE IS HERE

Donna Reese

creativity can't not
do it can't do it
on purpose

follow the present
mix intention present tense
only the present
where power is

deeper into what
is to see what
arises

like steering a boat to the other shore over there out there how do we get there
elements surrounding senses filling one moment between moments
combine these back to whole that they are
by being here a nervous system
making preferences
finding ourselves
being and doing
or not doing
this or
that

it is this
simple
too

The above was written by Donna Reese in response to a "lesson on Cybernetics and creativity" for the ASC website.

Cybernetics And Conversation

Paul Pangaro

A: *'Without conversation, there is nothing (no thing). '*
B: *'Doesn't that imply, "In the beginning, was the conversation" ?'*

As observing beings, we learn what we learn by interacting with our environment: the spaces, objects, processes and others-who-are-also-observing all around us. Construing these interactions as "conversations", whether with our friends or our pet fish, is highly useful in both metaphorical and formal ways.

Metaphorically speaking, we "converse" with everything in our environment. We "offer our views" as we act, re-act and think. The environment "speaks to us" in the sense that we interpret it. We respond to what we hear and see and feel, in an exchange that has the structure of a dialogue in language.

More formally, the term "conversation" was used by Gordon Pask and others in the body of work called Conversation Theory, which formalizes concepts such as agreement, understanding, and consciousness. Each of these concepts (as well as the concept "concept") exists in relation to conversation.

For us to understand each other, there are minimum requirements. We may both utter the word "cup" or "happiness" or "cybernetics", but, what is required for each of us to know we agree on the meaning? A conversation, surely. You explicate how a cup is used, and what it is for. I hear your views, re-compute your perspectives, and come as close as I can get to your meaning of "cup." But is your meaning (or, to say it more carefully, my view of your meaning) consistent with my own, pre-existing view? Are there conflicts? And that is only the half of it. After I exteriorize _my_ view of why a cup is what it is and how it is used, does your view of my view of a cup resonate (and not conflict) with your original view? In summary, if we resonate together in our views of "cup", then (as named by Conversation Theory) we have "agreement over an understanding" - in both metaphorical and formal terms.

This perspective is consonant with Maturana's concept of language as "consensual coordination of consensual coordination of actions." It is in language, and via conversation, that we live together. In that living, and through agreement, we share perspectives and merge into fractal communities of relations, friends, clubs, schools of thought and entire cultures. Insofar as we share our similarities and (for a moment) ignore our differences, we merge with other participants in conversation and lose our individuality in exchange for "becoming one with others", at least in the

cognitive domain.

This shared awareness, or consciousness, is an outcome of conversation. It is a state that persists beyond the individual. According to Pask, consciousness is conserved in the same strict scientific sense that matter and energy are conserved in the transformations of physics. And, much as Heisenberg uncertainty informs us about the physical realm, Conversation Theory speaks of how certain we can be of what we know about each other.

And what of the taciturn world of trees and sky, stones and water (particles and electrons)? How do we know anything about these things? How are they distinguished and their properties observed? Though "on our own" we evoke a conversation between these elements, just to be able to see them: figure and ground, boundary and body, identity and exchange. Perhaps the elements of our perceptual field do not, by one meaning of the term, converse; but as observers we trace a dialogue from one side to the other, looping around and across the boundaries we create. Carrying utterances about "harder on this side, swifter on that side" in an interaction that we give breath to, we compare and contrast the two (or more) sides. We invoke a point-of-view for each side, inventing participants in conversation. By this process we construct our understanding of all the elements, based in their relationship to each other.

By this explanation it appears that we learn what we learn through the interactions we construct. Conversation is the basis of all that we know. Hence cybernetics, which is itself a formal inquiry into what we can know and how we know it, is always concerned with conversations.

One further thought about what arises through conversation, in this looping-around across perspectives that constructs what we know. If instead of observing a relationship of objects in our environment, we take a position of observing ourselves in conversation with others, a similar phenomenon occurs: the participants in the conversation are defined by the looping-around. Our features, feelings, opinions, boundaries, differences are computed by the interaction. Thus we find ourselves being constructed (defined, identified, distinguished) _by_ that conversation. From this point-of-view, our selves emerge as a consequence of conversation. Expressed more fully, conversation and identity arise together.

A: 'So without conversation, there is no self-and-other.'

B: 'But can you also say that the conversation creates the observer and the observer creates the conversation?'

These sentences are, themselves, observer statements. Cybernetics, the science of describing, offers to place such circular and self-reflexive utterances in their scientific context: the inevitable consequence of the actions of observing systems.

The above was written by Paul Pangaro in response to a "lesson on Cybernetics and conversation" for the ASC website.

Embodiment

Bunny Kaufman

Embodiment is a manner of living, not a "talking about." For me, one way embodiment is lived is through behaviors I call Mothering. As I grow older, I discover more and more that it is the ordinary, the common, that truly endures and influences our lives. It is in that realization that the ordinary becomes extraordinary. Frequently we experience something so often that we take it for granted. Only later do we realize that it has always been an important and sometimes foundational part of our lives. Mothering is in that category. I use the term Mothering as a metaphor for Living in Love - or living in a domain of unconditional acceptance. Humberto Maturana defines love as: "the domain of those behaviors through which the other arises as a legitimate other in coexistence with oneself." Much of my understanding of what I call Mothering was stimulated by my study of Maturana's exploration of the evolution, development and perpetuation of the human species.

My selection of the term Mothering may be viewed as controversial by some. However, it is deliberate and intended to counter the negative connotation the expression "mothering" now has. The expression "Mothering" has frequently been used in very pejorative ways. Mothering has been portrayed as the unwanted, smothering, controlling and manipulating behavior of one's mother. It has been viewed and verbalized as intrusive acts in an adult child's life. I do not share that opinion. Further, I do not consider Mothering to be gender specific or necessarily associated with motherhood.

All mothers are women. However, Mothering can be done, and is done, by both men and women. In the American culture, and in most cultures around the world, the functions of attending to and raising a child are performed by women. Not all men want to raise children. Men, however, are biologically and emotionally able to be as loving and nurturing as Mothering women. Culture and society in many cases have taken that privilege from men through negative reinforcement.

I use the word Mothering in the widest possible context. The term could apply to any interaction between people. It also includes other living organisms. However, it has become clear to me that it is the Mothering that takes place in the home between the Mothering parent and child that sets a child on the path s/he will follow for the rest of his or her life. Whoever does the Mothering of a child becomes that child's mirror - the way the child views his or her worth in the world.

The first relationship we have in life is with our mother. We know her and she knows us even before we make an appearance on this earth. Regardless of how our lives proceed, the mother-child relationship is the closest relationship we will ever have with another human being. And too, once born, the relationship we have with the person who Mothers us, be that person male or female, is foundational in our experience of loving ourselves and loving others. Mothering is so quiet as to go unnoticed - so loud as to be heard forever. Mothering is the essence of our humanity. It is at the same time the most simple and most complex of human emotioning. It is profound.

Mothering is a manner of living. It is not about giving to or doing for another. It is an emotional framework that includes both the self and other. It is living in a place of openness, and, by virtue of your manner of living, issuing an invitation to others to meet you there. It is a place of non-judgment. It is a place of absolute safety. It is a willingness, a desire, to accept others at face value. It does not urge you to agree or disagree with someone else's way of life or to "fix" what is wrong. To think Mothering is about doing is to engage in *simulated mothering*. Like all simulations, it may look like the real thing, but it is a staged production for public consumption. It is self-serving.

I have learned that to meet others without judgment, one must be without self-judgment. Judgment of others is self-judgment and in many cases a projection. Mothering does not mean that we must like all the behaviors we encounter. Mothering is in the recognition of a particular behavior as being what it is and acknowledging that there are particular consequences attendant to those behaviors. Mothering does not mean that we must live in a false state of perpetual happiness. It does not mean that we can never feel angry, or sad. It is only in openly being able to bring every emotion to another that it is possible to live in love. If we come to another without feeling the safety to be open in our emotioning, then what do we have? A game? A dance? How can we be in a loving relationship if we feel it necessary to hide part of ourselves? I would say we cannot.

The above was written by Bunny Kaufman in response to a "lesson on Cybernetics and embodiment" for the ASC website.

Panic and Unclosed Loops: Mutual Orientation in Public Spaces

Paul Schroeder

During the past several years a theme has been resounding for me. When the theme comes to mind it is marked by the phrase "unclosed loops."

An approach to thinking cybernetically about unclosed loops is what I am attempting here. To not make this attempt would itself mark a refusal to close a loop launched by the invitation to provide a lesson in cybernetics from "art, library science or daily life." An invitation to which I had agreed to respond.

Loops and their closing are central to cybernetics, the art of "communication and control in machines and living organisms." Without some contact with cybernetic thought it is likely I would not be able to see this phenomenon at all.

Unclosed loops are a source of pain. Refusal to respond when in a communicative context is often, but not always, based on a decision to cause pain. It may be claimed that the decision is out of one's control; deciding to cause this pain may simply be habitual.

Counterpart to such refusals are what are termed "breakdowns of communication." The breakdown may be a purely accidental and unforseen failure of a physical channel. Imagine that you and I agreed to meet in a public place at a given time, for whatever purpose. And you or I have had a flat tire; and we have not established a backup communications plan. The result: confusion, panic, anger, resignation, concern. These are names for emotions which build within to complete a loop that suddenly stands unclosed.

Not all of what passes for communication requires direct response. Our environment is filled with broadcast signalling. Here is an example: a dapper gentleman in gray moustache and dark suit walks a city sidewalk with his cane carried lightly against his shoulder; the cane is tipped with a three-inch steel spike. This is a broadcast signal.

Broadcast signals exclude direct loops. The gentleman knows his signal is received whenever he is not attacked. The advertisers know their signals are received when the dollars pour in.

The absence of adequate public feedback mechanisms and the willful design of signal systems which allow only implicit closure is central to violence in our time. This situation also points to a working definition of the "information poor," a new underclass of which we are all members.

What does cybernetics recommend? Grounded both in the realms of engineering and in cognition, a cybernetician may attempt to build a "dialogical machine" which allows contextual and indirect loops, and further encourages the construction of directly closed loops. A second-order cybernetician might see this as a "participant observatory." Construction of participant observatories is the project of the second cybernetics.

The above was written by Paul Schroeder in response to a "lesson on Cybernetics and library science" for the ASC website.

Links via Paul Schroeder's home page to:
1. Emanuel Schmitt and Kurt Brassels, "From GIS (Geographic Information Systems) for Control to GIS for Creative Exploration."
2. Paul Schroeder: "Cybernetics: Word and Images"
3. Public Participation Geographic Information Systems Home Page

Presentation of the Norbert Wiener Memorial Gold Medal of the World Organisation of Systems and Cybernetics (WOSC) to Professor Heinz Von Foerster

The World Organisation of Systems and Cybernetics intended to present the Norbert Wiener Memorial Gold Medal[1] to Professor Heinz Von Foerster during the 9th International Congress of Cybernetics and Systems of WOSC held in New Delhi in January 1993. Due to some difficulties, however, this was impossible and the medal has been presented at the 1995 meeting of the American Society for Cybernetics which took place 17-21 May in Chicago (University of Illinois). The meeting was devoted to "Cybernetics and circularity" and centred on the work of Heinz Von Foerster.

The medal was presented on Friday evening, 19 May, at the end of a circular process (described in the Appendix) starting and ending with Professor Heinz Von Foerster and involving Professor Humberto Maturana, Klaus Krippendorff, Louis H. Kaufman, Frank Galuszka (president of the American Society for Cybernetics), who introduced Professor Stafford Beer (president of WOSC), who told the story of Heinz Von Foerster's medal and introduced Robert Vallée, director-general of WOSC, who read the following citation:

> *By order of the Council of the World Organisation of Systems and Cybernetics, the Norbert Wiener Memorial Gold Medal is awarded to Professor Heinz Von Foerster in recognition of his exceptional achievements in cybernetics and systems science.*
>
> *The scientific activity of Heinz Von Foerster started with his contacts with the Vienna Circle, developed later as secretary of the Macy's Conferences on cybernetics, continued with the foundation and direction of the Biological Computer Laboratory of the University of Illinois at Urbana and resulted in outstanding contributions to self-organization and noise, neurocybernetics, time and memory and cognition. In this last domain Heinz Von Foerster introduced "second order cybernetics" where emphasis is put on the role of the observer and recursive processes, giving rise to a constructivism which is still a source of inspiration and makes him one of the great founders and contributors in the fields of both cybernetics and systems.*

Professors Stafford Beer and Robert Vallée then presented, respectively, the medal and the diploma to Professor Heinz Von Foerster who responded. Professor Frank Galuszka, the president of the American Society for Cybernetics, also addressed the gathering.

Note

1. The last four recipients were Professors T. Helvey, S. Beer, J. Rose and R. Vallée.

Introducing Heinz

Frank Galuszka

I was not prepared for introducing Heinz. Two or three days ago, Steve called me and asked that I perform this magisterial duty. Such is my luck.

A little less than a year ago, Steve Sloan said that he and Lou Kauffman were considering being hosts to an ASC conference at the University of Illinois in Chicago. With Steve Sloan, myself, and a couple of others participating in the Summer School for Designing Societies, the plan for this conference was hatched in a luncheonette in Sioux Falls, South Dakota. It was embraced with love from the start.

Heinz, as most of you know, lives with his dear wife, Mai, on Rattlesnake Hill, in Pescadero, in California, where things, to my way of seeing, occur in magic mirrors; where either the ocean is on the wrong side or the sun doesn't know where it is going in the sky, where trees are more permanent than the land on which they stand; where a seismic goose hangs from a door jamb and the sway of its head decides whether or not a tremor felt is a perception or an illusion.

As an introducer, I get to propose a Heinz to you. Usually the job of an introducer would be to propose the most familiar Heinz possible, an easily recognizable one, a shared one, such as the geographically locatable one I have just begun to describe.

But I don't want to squander this opportunity by trading in the familiar. After all, this is my opportunity. I get to construct a Heinz, and, as I believe him, I know that the Heinz I create will be mysteriously telling him something about me, that it will say more about me than about him, and that I am welcome to look at it this way myself, and I am welcome to welcome the specter of selfconsciousness into my presence as I consider this.

Knowing this, how can I propose to you some kind of standard, biographically controlled Heinz?

Paul Schroeder sent me a note in the mail which contained a recollection of Heinz von Foerster presenting himself not as just one man, but as a whole collection of people.

That comment helped me to clarify my position on the role of style in the visual arts. I am not going to discuss that, except to say that the statement resonated and still resonates through me as describing a middle path between two failures to comprehend complexity: the false rigidity of self-conscious consistency and the wicked pathology of double-lives and multiple personality disorders.

Heinz, being not one man, but a whole collection of people, can support many Heinz's being built around him, and relieves the pressure this might exert on more ordinary beings, such as Madonna or Michael Jackson, by creating endless Heinzes himself. It is because of the endless Heinzes being generated by Heinz himself that the Heinzes that are built by others do no damage. The opposite of doing damage; all the Heinzes dance.

It is because of endless Heinzes that we can live for the moment with a ubiquity of Heinz. Like a Hindu god, he can have as many arms and many legs as we like. Like a Hindu god, Heinz can have many aspects: He is wholly present in each of them, vigorously present with acts and legends, and connections that meet across the ordinary constraints of space, time, and expectation. These aspects are all busy becoming, busy fulfilling themselves by means of further propositions, wonderings, and other cognitive *prana*. They fulfill themselves by becoming further becomings.

Heinz has been called a guru. It is wise to face this accusation directly. I have to conclude for myself and state that - in my own personal opinion - among the many Heinzes that walk around in my house, there are some models that are specialists in traditional careers: Heinz the scientist, Heinz the magician, Heinz the husband. But there is also one that fits the description of a bodhisattva, plain and simple. This Heinz is not bigger than the others. He does not require an aura around his head of any particular color. He may even refuse to take to the lotus position. He is more inclined to be assistant to Mai as she works in the kitchen. But he releases a *shakti-pat*, which, in the world of academic science, is probably considered a criminal act.

After first meeting Heinz, I became a sudden insomniac. I had no sleep, no sleep at all, for eight days. I had no idea what was going on. I still don't know. But in the well-appointed and cozy archive of my mythic autobiography, Heinz is depicted more and more as the author of my heroic sleeplessness. Unknowingly, in this myth, unintentionally, he sets in motion some unnamable rumbling. It rumbles through my brain and prevents it from sleeping the usual sleep, and puts me under a waking spell.

Of the many manifestations of Heinz, I expect several to get considerable attention at this conference. So I will say nothing about those.

I want to mention a handful of Heinzes that are not as likely to get so much attention: several manifestations of the most solid of Heinzes, the physical Heinz, the one who only appears at a single place at any time. This is the man who chops wood, clears poison oak, who picks up handkerchiefs dropped by ladies, and runs off to get a wheelchair when one is required. This Heinz has a striking, even a profound, masculinity. This is also Heinz the artist, maker of furniture and sculpture, of a remarkable place to live in, son of a Lilith who was Kokoshka's Eve. He does not know, after all, only calculations, histories, and philosophies: there are savvy surrealist periodicals, as well as tremendously hip books on Tchewlitchew and Tantric Art on his shelves. And he does not know, after all, only such thoughts as arise in books, only aesthetics and criticism: Through an ax he is a man who joins with trees on a regular basis. His thumb knows the heat that builds up in the spoon as the ink on a woodcut block is painstakingly transferred to paper. His fingers delight in writing, and in carving, out of an eraser, the Von Foerster crest - both in original and erotic design - for a bookplate device. When it comes to

designing, he predicts not only how an angled mirror will reflect adequately the face of a man who shaves, but how this will reflect he who shaves against a landscape of surprising enchantment that reveals a communication so unusual in the context of the construction of a home that it can best be described as an architectural wink.

He is a Midas of meaning: What he touches, becomes vivid with sensibility as intentionality; and general function, always adequate, is furthermore transparent to a becoming that requires you, the observer, the companion in meaning. This, I think, in its fundamental form, is the mission of the artist. To make, of matter, companionship.

This Heinz, not an anti-Midas but actually a second-order Midas, of course, knows it is not goldmaking that matters, but the goldmaking of goldmaking. For unlike Midas, whose gift ultimately destroys all companionship, Heinz generates companionship by what he touches. Unlike Midas who reduces diversity to uniformity as the world collapses into metal, Heinz coordinates diversity, so that even a piece of metal, under his touch, comes to life.

So I have, in my life, around me, not just Heinz von Foerster, one man, but Heinz von Foerster, as I said earlier, a whole collection of people. This might turn out to be troubling, claustrophobic in the very least, if the rest of the world survived this proliferation of Heinzes and stayed as it was. All these Heinz's would squeeze everything else out, and I would feel oppressed, as by an overbearing guru.

But it is not only Heinz, it is everyone who, in the light of this magic, becomes a whole collection of people: A whole collection of Bobs, a whole collection of Harveys, a whole collection of Kathleens, of Judys, of Klauses, of Steves, of Jeremys, of Rodneys, Freds, and Larrys, of a whole collection of Chichos, and so on, as well as collections upon collections of coordinated newborn spaces for them to live, breathe, and generate further becomings in.

So now, with that, I am deeply delighted to introduce the one, but not the only, Heinz Von Foerster.

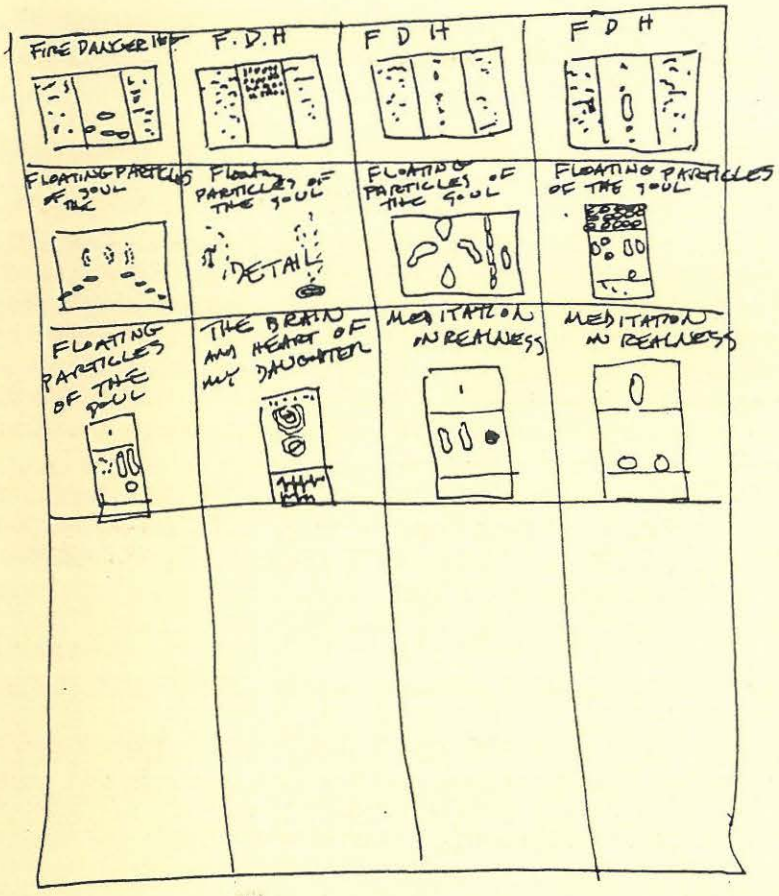
May 17, 1995
On the occasion of

CYBERNETICS AND CIRCULARITY:
A Conference Focused on the Work of
Heinz Von Foerster

at the University of Illinois, Chicago

8.26.96

slides & resumé - just an update



Diane Pieri

About the American Society for Cybernetics

Every cybernetician has his or her own definition of cybernetics, because each one of them came out of the cracks between different disciplines in order to understand purposive thinking and the goal-directed actions of people and machines.

When these individualists discovered that in spite of all their differences there were ideas on which they could agree, they founded a Society.

It is a society without an established philosophical dogma and without the need to protect the holy cows of other sciences.

It fosters discussion and all attempts to make sense of the world.

It's an organization for those who mistrust organization.

Its meetings and publications are therefore uncommonly stimulating for anyone who wants to think for her or himself.

Ernst von Glasersfeld

CYBERNETICS & HUMAN KNOWING: A Journal of Second Order Cybernetics & Cyber-Semiotics

Cybernetics and Human Knowing is a quarterly international multi- and interdisciplinary journal on **second order cybernetics** and its relation and relevance to other interdisciplinary approaches such as semiotics.

The journal is devoted to the new understandings of the self-organizing processes of information in human knowing that have arisen through the cybernetics of cybernetics, or second order cybernetics. This new development within cybernetics is a nondisciplinary approach. Through the concept of self-reference it tries to explore: the meaning of cognition and communication; our understanding of organization and information in human, artificial and natural systems; and our understanding of understanding within the natural and social sciences, humanities, information and library science, and in social practices as design, education, organisation, teaching, therapy, art, management and politics.

Because of the interdisciplinary character articles are written in such a way that people from other domains can understand them. Articles from practitioners will be accepted in a special section.

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REMINDER

DON'T FORGET THE ASC/CYBERFEST97 CONFERENCE

The conference will begin at 3 p.m. on Saturday, March 8.
Registration will be followed by a reception, opening remarks, and an evening performance at the University Faculty Center.

The conference will run for three full days Sunday, Monday, and Tuesday ending at noon on Wednesday, March 12.
Hotel accomodations will be at the University Inn in Champaign/Urbana, IL.

The estimated cost for the conference registration is $200.00.

A discount of the conference registration fees is possible for those in need who are willing to help with conference planning.

Skills needed include a graphic artist, video operators, and secretarial help.

If you are interested, please call, write, fax, or e-mail:

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at

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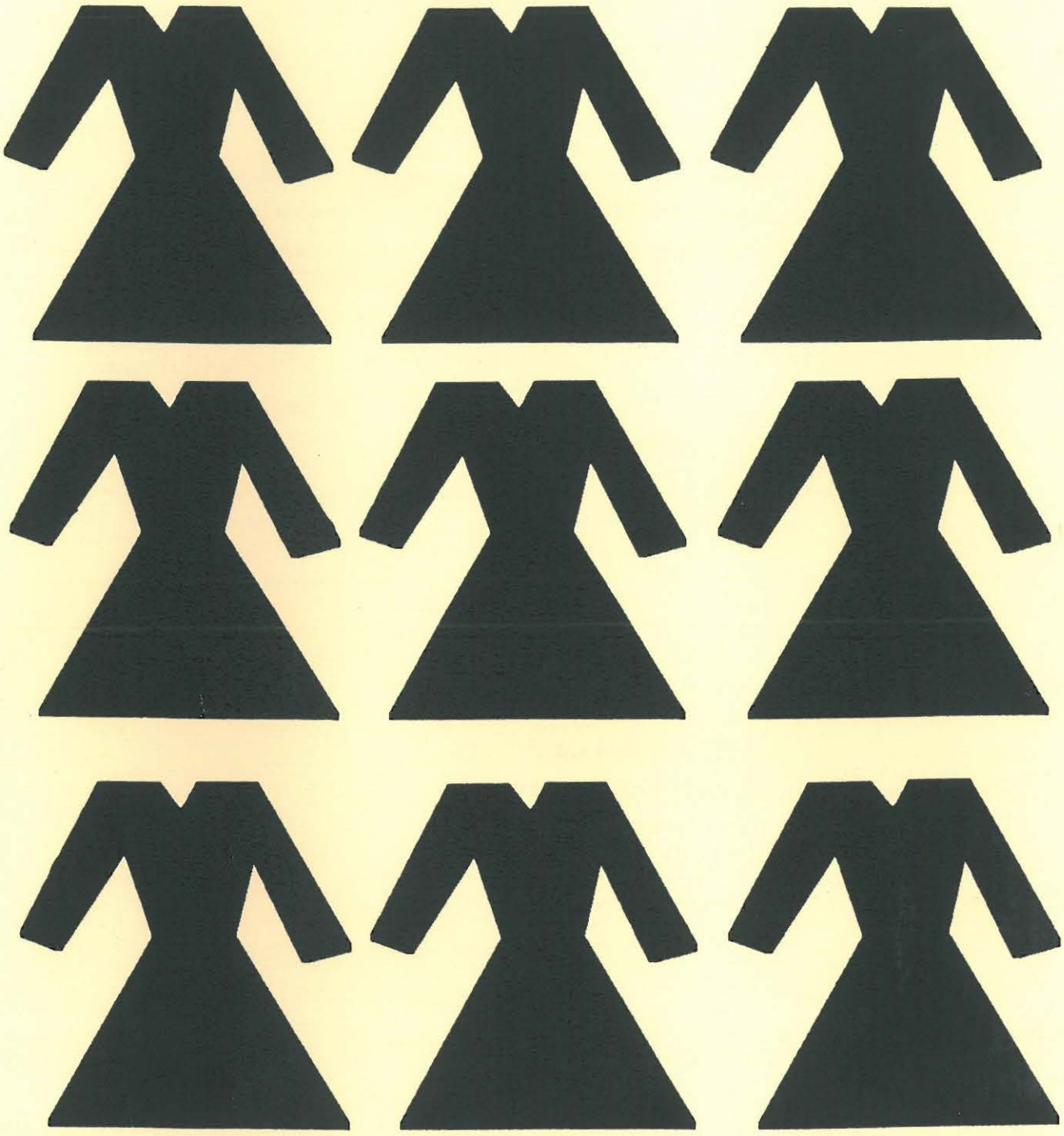
COMMUNICATION AND ANTI-COMMUNICATION is dedicated to the memory of Gordon Pask

COMMUNICATION AND ANTI-COMMUNICATION was edited by Frank Galuszka



Marcy couldn't decide which dress to wear.