

Biosphere, Homosphere, and Robosphere: what has that to do with Business?

Humberto Maturana Romesin and Pille Bunnell

This paper is based on a presentation made by Humberto Maturana at the Society for Organizational Learning Member's Meeting, Amherst MA in June, 1998. It is not a transcript, rather it is a re-creation by Pille Bunnell, reorganized with changes, deletions, and additions intended to make it more coherent as a written document. The first person voice of Dr. Maturana is retained, but any mis-representation of what he intended is the responsibility of Dr. Bunnell.

Introduction

I think that most of the fundamentals about how we can work together in business setting are already understood by many business people. For example the transformation of Shell Oil over the last five years is grounded in an understanding of the social ground of working together, even where this is not made explicit. I am not a business person, so I shall not tell you about business. What I shall do is to reflect on the biological background on which the concern for what we do in business rests.

This meeting began with a presentation of beautiful slides, and we enjoyed them. Isn't this remarkable! We enjoy beauty. How come we humans enjoy beauty? What is beauty that we enjoy it? Why, or what, or how is it that we have a sense of wellbeing when looking at beautiful images? And what were these images that we found beautiful? Trees, leaves, waterfalls, sunsets -- nature, beautiful nature.

We find beauty in nature everywhere; in the desert, the forest, or the mountains -- any natural place. However, if we go to an eroded area we do not find beauty. What is the difference? In some sense a desert and an eroded area are similar as neither of them contains many living beings. I think the difference between these two situations has to do with us. It is us humans who see beauty in one case but not in the other. How is this so; what in us makes this so?

This is not a trivial question, and it has to do with our concern about what we do, about how we conduct our affairs. To address this question I shall speak about human history and the history of the earth, about living systems and humans. And I shall make a few reflections about emotions, freedom, ethics and beauty. You will see

that all of this does indeed have to do with business.

History

We belong to a history that runs in the present. This is a fantastic thing! We belong to a history that runs in a continuous changing present. Yesterday is not now, tomorrow is not now, but we exist in a continuous NOW... we human beings, all living beings, the whole biosphere. Everything that we do, occurs now. Although human beings can speak about the past and the future, and live in the ideas of past and future, humans exist in the present. We live in the past and the future, but we exist in the present.

We can claim that everything began with the Big Bang. But notice that this Big Bang is an invention of a history to explain the present. We use the coherences of the present to invent a Big Bang such that if it had taken place, then the present that we live now would be the case.

I would like to suggest an image to convey this notion of inventing a history to explain the present. Consider what happens when we drop a pebble in a still pool and a wave begins to expand. Where does the wavefront occur? On the wavefront! The expanding wavefront is a continuous "now". If we select a couple of points on the wavefront, we can invent an origin, but the wavefront itself exists now. Similarly we can invent an origin for the universe from observations we make now. The same with the biosphere. When we propose an origin for the living systems on earth, what we are proposing is the origin of the historical wavefront of living beings that is the biosphere now.

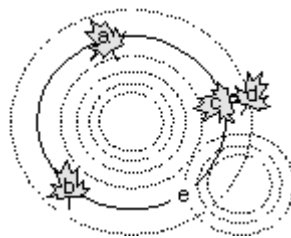


Figure 1 The expanding wavefront made by a pebble dropped into a pool represents the present moment. If we see a picture of such a wave, we can invent an origin. Further, all the floating leaves encountered by the wave move coherently; either because they are all connected to the same history - in this case of a pebble dropping (a, b and c), or because they are touching each other (c and d). This image can become rich as one expands it with the notion of intersecting wavefronts (e).

What is interesting in such a situation is that we do find coherences which are adequate for inventing an origin in a way that remains consistent with other observations we make now. The image of the little pool helps explain this too. Consider various bits - leaves, little sticks, seeds - floating here and there on the surface of the water, some of them touching each other. If we look at the movements of these floating bits we shall find that they have two kinds of coherences, some of which are historical, others which have to do with nearness, and still others that have to do with other influences. When the pebble makes a wave, all the little bits that the wave encounters move simultaneously. They are coherent because the movements on the wavefront have to do with the history of the wavefront -- in the sense that the wavefront has a coherence that has to do with its history. Other coherences have to do with nearness, for example when one leaf touches another. Still other coherences have to do with other wavefronts that intercross the main one. Imagine, for example, what would happen if the wavefront from the pebble triggered a floating seed to pop so it started a new wavefront.

What we have in this image of a pool is not only a metaphor of our existence in the present, but also an image of the coherences among ourselves, and in the world in which we exist. Some coherences are of a historical nature - that is they are there because we belong to the same history. Others are there because we are making this history of a changing present through the interactions we have with what we encounter, that is, through nearness.

Now that I have specified what a history is, I will propose a history of living things and humans. What I will say is an explanation from the coherences of the present to invent an origin and a progression of happenings from that origin. I will propose a history of what must have happened for us to be as we now are.

My explanation began with a question that a student asked me in 1960 when I was lecturing in a biology course. I was speaking about the origin of living systems, and a student said to me "Sir, you say that living systems began some 3,800 million years ago. What began 3,800 million years ago such that you can say now that living systems began then?" And there I was, a young man who believed I could answer all questions, and I did not know what to say! (All of us like to believe that we can answer any question, and indeed we can make up an answer for anything, but sometimes we suddenly find ourselves having to re-think our answers.) I blushed and said that I didn't know, and

then I said that if he came again next year I would propose an answer.

This is a general question: how can we ever say now, that things began then. Of course we make a computation according to the coherences of the present. We propose what happened such that this is so. We propose a history. And what is history? **History is a process of transformation through conservation.** History is a process of transformation that is continually arising on what is being conserved. This is interesting to notice because we usually do not pay attention to what is conserved, but only to what changes. For example if we look at modern biology, we will find a lot of work concerned with evolution, and indeed this is a very fundamental aspect of biology. Most of the emphasis in evolution is on what has changed, but what is central in evolution or any history is not what has changed, rather what has been conserved.

We can speak about anything being a history precisely because it is a story of conservation. If conservation stops, history ends. If we want to make a historical connection through a change, we have to show that something has been conserved through the hiatus in which something ended. We may wish to say that a process, an idea, or a relation was conserved, such that although something ended, something fundamental was conserved. There has to be a continuity in the story. This is exactly what we find in the history of living systems: some life forms disappear but living systems go on. And what is conserved? Living.

So the history of living things is a history of the conservation of living, with many changes in form, each of which conserves living. We are one of these millions of forms that comprise the biosphere; a biosphere which is the present of a history of the conservation of living. We are part of the biosphere, the natural landscape has to do with us. We look at the biosphere and find it beautiful because we are coherent with it. We are coherent with it because we belong to the same history - as well as to the local coherences we may have generated.

Conservation and change

This phenomenon of conservation and change rests on three systemic conditions. These are systemic conditions because they constitute systemic dynamics, and are thus valid in any part of the cosmos. These dynamics are the fundament of all cosmic historical dynamics,

including this earth and humans.

1. When in a collection of elements some configuration of relations begins to be conserved, a space is opened for everything to change around what is conserved.

This is the origin of living systems - but all systems arise in this way. In chaos theory people talk about attractors and so forth - and again this is what is involved. Something begins in the moment a configuration of relations begins to be conserved, and ends in the moment that the configuration which defines it stops being conserved.

We know this, and yet it is interesting to state it explicitly. We know this through how we live. For example, if we embark on a course of studies, we remain as students as long as we continue on this course. We may change what we eat, where we sleep, what we read, who we talk to, and so forth, but we conserve our condition of being students. Another example, when we say that a particular company has existed since 1893, we mean that something has been conserved - it could be the name, or it could be a particular configuration of relationships of how people interact with each other, or it might be what the company produces - whatever we claim constitutes the identity of the company. There are examples that show any of these are acceptable for the claim that the company has a history.

So what is conserved defines the identity, and whatever is conserved specifies what can change. This is interesting; we are so preoccupied with change that we do not notice that what is important is what is conserved.

Once, in a meeting in Santiago a friend of mine announced that "I have founded a club of innovators!" and everyone congratulated him saying how fantastic this was. But I remained silent. My friend asked me why, and I told him that the only club I would like to found is a "conservator's club". I'm a conservator, not a political conservative - conservation is not a political notion. Yet politics results, because politics is a system that conserves particular identities. Even revolutionaries conserve; all cultures are conservative. This is so because it is a systemic phenomenon: all systems exist only as long as there is conservation of that which defines them.

The story of changes in Shell Oil is also a lesson about conservation. As the qualities to be conserved were identified, a space for change was opened, and as that change took place, what was to be conserved

altered too - so another space for change occurred.

The second systemic condition pertains to all living systems, but I will word it so it pertains to humans in particular:

2. Human history does not follow the path of resources or opportunities, rather it follows the path of desires or, in more general terms, a path of emotions.

Something is a resource if one wants it, if one desires it. Similarly, something is only an opportunity if you desire it. For example when you say that you did not realize that something was an opportunity you are saying that you did not see it as an opportunity because you did not desire what appeared at that moment. Later you comment on the missed opportunity when you explain the history of how something you now desired happened in a way in which you imagine yourself connected to that story.

We move around seeing different things, wanting different things, and according to our desires we consider these things resources, or opportunities, or something else that has to do with what we want. If we do not want to have them or use them, then things are just there, being whatever they are for themselves.

I invite you to the following exercise. Think about your personal history, and you will discover that everything in your life has happened such that you are here, right where you are in this moment, reading this paper. Everything; where you were born, who your parents and friends are, where you went to school, what language you speak - everything leads to this moment. You can make a trace, from now into the past in way that shows that every turn you took, every choice you made, brought you here. So you were destined to read this paper today.

The beauty of this silly little exercise is that it shows us that if one looks at a history this way, it looks as if everything is predetermined or fated; but it isn't. Your whole life was not directed at arriving here, you resulted here. And that is the nature of biological history, the way any living being lives. What happens is constructed moment by moment by the character of one's living, always going in the path of well being, a choice of comfort, desire or preference. An animal may prefer to go one way, and in doing so, it happens to get eaten by a predator. If it had chosen another way, it might not have been eaten. Did it choose based on the consequences? No, it chose according to its

desires in the present, because living is in the present. For animals there are no opportunities or resources. We humans may use these words as we comment on their behaviour according to how we explain what we see as happening to them. If we want to invent a human history, we will have to show a path of conservation that we follow. And what path do we follow? We follow the path of our desires, because desires define what we conserve. This is not a trivial point, and fundamentally we all know this. When we are concerned about what we are doing we are concerned with conserving that which we desire.

The concern for organizations, production, efficiency, and success rests on a background which we usually do not look at, but we all know is there, and sooner or later it appears in front of our nose. What I am alluding to is the background in which what we do is possible.

3. When a configuration of relations among elements is conserved, that configuration may enter into a relationship with other elements, or configurations of elements, and this new configuration of relationships may begin to be conserved.

This eventually results in a complex interconnected and intersected systemic dynamics in which systems appear embedded in other systems. Whenever we identify a system of some kind, it is embedded in another system. If we think of ourselves as a system, then we see that we are embedded in a community, or a family, or an organization in which we work. This system is then embedded in another system. I do not mean to say that each system acts as a container for those inside it, rather that the smaller system is embedded in a flow of interactions and modulations between itself and the larger systems.



Figure 2 Systems are embedded in systems which are embedded in yet larger systems. This does not constitute a hierarchy of containment or control, as there is a continuous flow of interactions and modulations among the systems; represented by the arrows in this figure.

In his book called "The Future Eaters" T. Flannery shows us that we

are consuming our future. He shows this through a study of the ecological transformations made by people in Australia, New Zealand, New Caledonia, and Easter Island. In many cases the transformations were catastrophic. For example, when the first few families arrived on Easter Island it was a lush tropical island, but there is nothing of that now. Everything was consumed by the expanding human population. Humans not only consumed the biota that was there, but in the process they transformed the conditions so that the ecosystems could not regenerate. Flannery shows that what is involved in such situations is a particular attitude about the future: namely that whatever we want is an infinite resource - there for our taking. Daniel Quinn in his book "Ishmael" names whole cultures based on this attitude as the "Takers". Takers come to a wonderful place, and say "How fantastic, how marvelous for us!", and keep taking from it as if it were infinite. But it is not.

I have seen this myself, for example about 10 years ago I was visiting a landowner in Brazil and I asked him "Do you care about conservation?" He answered me "Why should I care? There is so much here, it is infinite!" The same attitude has grounded many losses, which we call "resource depletion" because we wanted what was lost, from passenger pigeons to Pacific salmon. We humans produce machines that transform infinity into nothingness.

What happens is that the systems we are embedded in are involved with what happens. And yes, you know this. Who supports Shell Oil? The consumers, of course. (Excuse me if I say these things, but I am speaking as a biologist, so I have some permissions.) This is why their CEO, Mr. Carroll was so concerned with a match between production and consumption. As long as consumers remain infinite, Shell Oil can grow and grow and grow ... and of course Shell Oil is not the only company who prospers through growing on a growing base of consumers. But what happens if consumers are not infinite? What happens if the system that the consumers are embedded in is not infinite?

What will happen depends on what has transpired by the time we become aware that the system that contains us is not infinite. What will happen depends on whether reach a systemic condition of stability, or not. Now stability is not the same as equilibrium, stability does not mean that the system remains unchanging. Rather, stability means that the dynamics involved conserve certain relations of coherence such that the system can continue existing in a finite

background.

I think that the main problem that we face as business persons, if we wish to face it, is that of creating activities for finite backgrounds. Of course, occasionally a background may grow, and occasionally it may shrink. But the situation on earth is necessarily finite.

We humans have a history of expansions in which resources seemed to become infinite. For example when the new world was opened, that is when Europeans found that they could come here, a limited space became infinite. Europe had been limited, and suddenly the world appeared infinite! It did not matter that the new world was already inhabited by other people, Europeans saw it as open to their desires. So we may wish to imagine another expansion to conserve this notion of infinite resources. We can think of colonizing the moon, or Mars, or even some other solar system by sending properly hibernated people. But the solar system is finite and interstellar distances begin to be such that when the colonizers arrive there the connections with the origin may have been completely severed. We may wish to think about such expansion, but the earth is finite. We can transform it, yes, but the earth is finite, and this is where we are.

Living systems

A living system is "closed" and operates according to its own dynamics, that is, it is a structure determined system. This means it operates according to its own structure in any instant. This is the same as any system, what happens with planetary systems, weather, tape recorders -- any system -- depends on its structure. The peculiarity of living systems is that their operational dynamics conserve living. Living systems are discrete entities that are constituted as such through molecular dynamics; they are molecular systems that continually produce themselves.

A living systems is a network of molecules that interact with each other in such a way that through their interactions they produce the same kinds of molecules as the network that produced them -- and in doing so constitute the whole network as a singular unity.

The process of molecular productions that constitutes a living system cannot exist in isolation, it is only possible with a flow of matter and energy. Thus living systems can only exist by interacting with a medium that provides matter and energy. What living systems conserve is living, so the form, or structure, of the living system is

open to change, and this is what we find: a history of changes in structure.

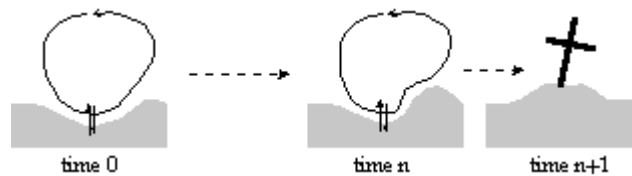


Figure 3 The circular arrow represents a living system as a structurally determined system that conserves living. The living system lives as long as its structure changes coherently with the circumstances (time 0 to time n), if coherence (adaptation) is lost, the living system dies (time n+1).

Changes in structure are happening all the time. We ourselves are living systems, and we have had different structures in different moments of our history. This is so obvious we take it for granted, but if you look at photos of yourself at various ages, you will be able to connect yourself with a history in which living has been conserved while everything else may have changed.

As its structure changes, what the system can do also changes. This too we know from daily living. For example if you have a car and you want to use it for a race, you would go to a mechanic and ask him to make the appropriate modifications. As the structure of the car is changed, what you can do with it changes. In the case of living systems these changes follow a particular path that has to do with the conservation of living and the conservation of congruence with the circumstances, that is, adaptation. The whole history of living systems is a history of the conservation of living and the conservation of adaptation. As the circumstances change the structure of the system changes coherently with those changes - if there is no coherence with the circumstances the living system disintegrates and dies.

In general terms living systems are autonomous entities that exist in the present. They are autonomous in their actual operation as living systems but this does not mean that they can exist by themselves separated from everything else. It means that whatever happens to them, has to do with them. Their wellbeing consists of being autonomous in that sense, wherever they are.

The wellbeing of a lion has to do with itself, yet the lion depends on other living beings for its food -- as all living beings except plants do. We eat each other. Have you ever thought how many living beings you eat when you eat lettuce? Have you ever thought how marvelous a

thing it is that lettuce is food for you? Some time ago I was struck by this realization "Oh my goodness, lettuce is food for me!" How come? Because we resemble each other. The lettuce has proteins as we do, it has carbohydrates and nucleic acids as we do, and so forth - everything - its cells are made of the same sorts of things as ours. We eat living beings whether or not we are vegetarians.

So the lion is autonomous, as long as it is not in the zoo, because in the zoo somebody controls its eating. While the lion is in the Savannah, he may die of hunger, but nobody controls his eating. There he has the opportunity of living or not living. This is the condition of autonomy. I think that if the very crazy idea of being a revolutionary were to happen to you, you could only achieve that if you had your own potatoes, your own beans and corn, so you could live on your own produce. Then you could be revolutionary, because you would be autonomous. Nobody would control your eating. But in the sense that whatever happens with us in our living has to do with us, autonomy is a condition of being a living system. We are well when this is so. Like all living beings we humans are autonomous entities.

Let me propose three historical periods on earth:

I Biosphere

II Homosphere

III Robosphere

The biosphere has given rise to the homosphere, which is the period where we now are -- and we are leading in to what I shall call the "Robosphere". I have distinguished these three periods according to what is conserved.

The biosphere is a history of autonomous living systems. It is a history of transformations in the conservation of living. In the biosphere what is conserved is living, with changes in the forms of living, that is various living systems. In conserving living, many different forms of the realization of living have been conserved, and we are one of them. And with us, the homosphere has appeared. Not just like that, but as we became humans a couple of peculiar things arose with us that made a homosphere possible. Human beings exist in language, and human beings are loving animals.

Language

Humans began when language began. Let me explain by first telling you what I understand by language. We usually speak about language as a system of communication, saying that we communicate to each other with language. We say language is a system of symbolic communication. I think communication is not a fundamental phenomenon, rather I claim it is a commentary that one makes about the course of interactions. Imagine the following scenarios of making a telephone call:

- a) "Hello John! Hello! John! John? John?" click
- b) "Hello John! No, no... I did not mean that. No, John, not that way. No!" slam
- c) "Hello John! Yes, this is Humberto! Yes, let us have lunch today. No, let's go to the usual place, same as last week. Good, see you at one o'clock! Bye!"

If someone were listening to you they would comment on the first two scenarios saying that you could not communicate -- but the third one is different. What happened in the third conversation? You engaged in a coordination of your behaviour. We speak of communication when the result of a particular interaction is the coordination of behaviour, that is a coordination of doings, a coordination of operations. Language is not a system of communication, yet communication occurs through language.

Let me give you another example from daily life. Imagine you are in a big city, say London. You're on the street and want to take a taxi. Taxis are going by, but all the ones going in your direction are taken. So you flag one going the other way, and then, when the driver notices you, you gesture him to turn around. (In London they manage to turn around no matter how narrow the street - I suppose that is why they have very short cars.)

What has happened in this scenario? Something very interesting has happened, and you would see what that is if the taxi came and stopped, but you stepped into another taxi. What would the first taxi driver say? If he transformed his utterance into polite words, what kind of complaint would he make? He would say something like "You had already hired me!" or "You promised me!" What happened that he could say that, and you would know his complaint was appropriate?

Something very simple and very basic took place. When you made the first gesture, your gazes met, and from that moment onward you and taxi driver were not independent. You were coordinated for a while. That this is so is revealed through the complaint referring to breaking something that should have lasted a while. The second gesture coordinates your coordinations. It took place on top of the first gesture. It happened based on the relational displacement that had already taken place with the first interaction.

That the taxi driver has a valid complaint if the sequence is broken shows that this situation is a coordination of coordinations of behavior. Not a coordination AND a coordination, but a coordination OF a coordination. Put in other words, what you have is a recursion in the coordinations of behaviour.

Whenever there is a recursion, something new appears. For example compound interest is recursive, and what appears is the explosive increase of something, in this case, money. Walking is recursive. If I move my legs as if I were walking, but do not progress, that is not walking. Maybe I am suspended in the air, maybe I am good at mimicking walking, but the movement of my legs is not enough. When the circular movement of my legs is coupled with a linear displacement of the floor, walking arises. Whenever a cyclical dynamic is coupled with a linear one, you have a recursion, and something new arises. When a cycle of coordinations is coupled with the consensual flow of living the new thing that arises is language. Thus the example of flagging the taxi is a minimal operation in language.

Language, as a phenomenon, is thus a manner of flowing in living together in a path of coordination of the coordinations of coordinations of behavior. Language happens as a consensual behaviour, it arises in the living as a feature of living together in the particular life that one is living. I'm not denying that you need a brain to participate in language. What I am saying is that the phenomenon of language does not occur in brain, rather it occurs in the recursive coordination of interactions in the flow of living together. One cannot claim that such languaging behaviors are inherited, they have to grow. There are coordinated behaviours such as courtship dances among animals that one can claim are inherited, but they are not coordinations of coordinations. These behaviors are sequences, coordinations AND coordinations.

Language is not abstract. Language has the concreteness of doings, it is the coordination of doings. Symbols are commentaries about what is

happening in language; they are not primary. This is why words are never trivial. The same word used under different flows has a different meaning, and different words used in the same way have the same meaning. Just the same, different words belong to different histories of coordinations, they are not innocent. This is a very fundamental thing: language is not abstract, that is, it does not pertain to an abstract domain, it pertains to the concrete domain of doings.

This is what was involved in the transformation of Shell Oil. Phil Carroll opened spaces of conversation, and as conversations are about doings, he opened a space for changing the doings, and as we change our doings, we change - and new doings become possible. This is something we all know but we do not necessarily act according to what it implies. I shall make it explicit. We do not have a fixed structure. We have a plastic structure, we are continually changing, and we never come back to the same structure, ever. It is a continuous flow of transformations in which we sometimes conserve certain relationships, and then we change around what we conserve. Because of the continuity of some relation or other being conserved, we have a sense of sameness, we do not become suddenly alien to ourselves. For example when SOL has the second general member's meeting, it will still be a SOL member's meeting like the first one, but it will be a different meeting, with a different history. It will be the same, but not the same.

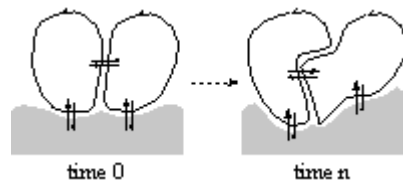


Figure 4 Two living systems in recurrent interactions change together coherently with each other and their medium. If they lose congruence with each other, they each follow a new path of changes, or they disintegrate.

Since language is a manner of flowing together in recurrent recursive interactions, we change in our languaging. Because of this what we say, or what we hear, is not trivial. We hear something and we are not the same afterwards. We say something and we are not the same afterwards. We come to this meeting and we change according to the flow of languaging. We change, and as we change according to our languaging, the homopshere transforms along one path, or another. And we are changing anyhow. If we hadn't come, we would have changed according to whatever else we were living. But if we

participate in a particular languaging situation, we change according to it. We open a space of conversation as interactions in language, or we restrict it, and what happens is entirely different. To open a space for conversations means that one is in fact open, one is not attempting to control what happens. When the space is open, autonomy in human beings appears.

Though we change according to our structure and according to our interactions, this does not mean that what happens to us has nothing to do with choice or freedom. As we exist in language, we can reflect. As we reflect we can look at our circumstance and move this way or that, and we can be responsible for our behaviour.

Now reflection is a very interesting operation. We frequently are inclined to think in terms of properties. But we know that nothing happens unless there is some operational dynamics that makes it possible. For example we know that if I want to be on the third floor, I need a procedure to put me there. This procedure could be going up the stairs, or taking an elevator, or jumping out of the window and climbing up the vines. In any case I need a procedure. This is so for reflection, I need a procedure. Reflection is not a property, it is an operation.

Reflection is an operation that consists of treating the circumstances in which one is as an object and looking at it.

And language constitutes the procedure for doing that. As languaging beings we create objects, and in doing so we can treat our present as an object and look at it. I can look at my circumstance here and say "Oh my goodness here I am giving this talk, and I am so daring inventing this story of a robosphere". This is reflection. Then I think about what I am going to do, and this I say like an aside in the theater: "How am I going to get out of this mess in which I have put myself?"

So, with human beings as languaging beings, reflection appears, and with reflection responsibility arises.

Love

Besides language, there is another peculiarity about human beings, namely that we are loving animals. Now I know that we kill each other and do all those horrible things, but if you look at the story of the transformation of Shell Oil, or other similar transformations, you will

see that it is a story of love. The problems of Shell Oil were solved through love, not through competition, not through fighting, not through authority. They were solved through something very, very different. They were solved through the only emotion that expands intelligent behavior. They were solved through the only emotion that expands creativity as in this emotion there is freedom for creativity. The emotion is love. Love expands intelligence, and enables creativity. Love returns autonomy, and as it returns autonomy, it returns responsibility and freedom in us.

Once in a lecture I said that we are loving animals, and a question arose... "Are we animals?" I answered, "Yes we are animals, but we are *loving* animals." Most animals are loving animals to some extent, what is peculiar about us is that we have expanded this emotion in our manner of living. What happens if you take a dog to live with you in your home? I'm sure you have some experiences like this, with dogs or cats, or parrots, or lizards. What happens with this dog? It becomes childish and playful - you come home and it jumps on you, licks your face, and you say "Ah, ah! you love me too much!" The dog becomes playful like a child, it becomes as we are when we are not under the stress of duty, or the demand of authority, or the negation of ambition and competition.

Humans are those animals that have expanded living in love. We have become dependent on love in the sense that we become ill of body and soul if love is interfered with. Sometimes conditions arise in our culture so that some bad ideas persist in spite of their badness. I think competition is one of those bad ideas that is destructive, and yet it persists.

If you think about what happens in your daily life (remember, this is biology, not philosophy) you will notice that we normally use the word emotion to connote domains of relational behaviours. Emotions specify kinds of relational behaviours. If you say somebody is angry, you know immediately what kinds of relational behaviours this person can participate in, and what kinds he or she is incapable of while angry. If you say someone is ambitious, you know immediately what kinds of relational behaviours he or she can and cannot participate in. We know this; it is very simple.

We can characterize emotions by the particular body dynamics that specify what you can do and what you cannot do. That does not mean that the emotions are body dynamics, or that they take place in the body. Emotions take place in the domain in which they occur, and

where they occur is in the relation.

Emotions take place in a relationship as kinds of relational behaviours, and this is what you distinguish when you distinguish an emotion.

When you distinguish a particular behaviour, you distinguish the emotion. If you want to know the emotion, you look at the behaviour. If you want to know what kind of behaviour it is, you look at the emotion. Behaviour and emotion are both ways at pointing at relational dynamics; they entail different looks, different ways of grasping these dynamics. As we speak of this dynamic we do what language enables us to do, that is we make an object of either the emotion or the behaviour, and having done so we can look at it. But you do not have to think about this, you already practice it in daily life - you know when your friends are angry, when they are joyful, sad, or indifferent. And you know immediately either by looking at the behaviour, or looking at the person. We are expert at seeing emotions. It is because it comes so easily to us that we do not see that this is the case - there is usually nothing that triggers us to reflect on the relational dynamics of emotioning.

Now I am going to tell you what love is, not as a definition, but as an abstraction of the coherences of our living - and I pretend that this is all that one needs to know.

Love is the domain of those relational behaviours through which another (a person, being, or thing) arises as a legitimate other in coexistence with oneself.

You could use the word respect instead of love, they are two forms that refer to this dynamic in different circumstances. But remember, as I said about living in language: words are never trivial. When you use 'respect' you are creating a distance, an aloofness, and that leads to a different path .. so I prefer 'love'.

The dynamics I have abstracted is how we act, whether or not we reflect on it. Suppose that you are walking in the countryside, and you encounter a spider. What if you exclaim "A spider!" and immediately stomp on it, making sure it is thoroughly squashed. What would your companion comment? Something like "You don't love spiders" or "You don't love animals" or "You hate spiders, don't you!" And all those expressions belong to the negation of love, the spider does not arise as a legitimate other in coexistence with you.

Aggression is that domain of relational behaviours in which another is negated as a legitimate other in coexistence with oneself.

But if you say in wonder "A spider! look at it! Let's be careful not to step on this beautiful spider" your companion might comment "You sure love animals! even spiders!" You don't have to take it into bed with you, to transform it into a princess or something, to love it. The fact that you let the spider be a spider where spiders live shows that you love it. You let the other arise as a legitimate other through your behaviour. It is your behaviour that makes it so you move around the spider so it can co-exist with you.

We talk about love as if it were special because it is rare - but it is a really ordinary thing. But it is special in a different way. When the emotion of love is there, then vision expands. Many, many, many years ago I was walking with one of my sons, Alehandro, who was about seven then. We were going through a field of thistles and I was opening a space with my stick by batting the thistles aside. Suddenly my son asked "Father, why don't you love thistles?" and there I was, stopped, suddenly seeing what I was doing. And when I stopped being aggressive towards the thistles, I saw them, beautiful violet flowers! I could see a path between them without destroying them. But the point is, that at seven, Alehandro knew exactly the nature of love as a relational behavior. So we learn this as children - we don't need philosophy or science, or anything.

Conversation

Language consists of coordinations, of flowing in the coordination of coordinations of behaviour. Language takes place in this flowing - which is why I have transformed it into a verb: languaging. You know from daily life that when you hear a word you do not know what the conversation is about, you have to hear a sentence so you hear a whole process. The word conversation comes from the Latin *con*, which means "with", and *versare*, which means "turning around". So conversation is turning around with somebody else. I use the word conversation to refer to the interlacing of languaging and emotioning.

Conversation takes place in the interlacing of languaging and emotioning.

All that we humans do we do in conversation; in the coordination of coordinations of behaviour and emotions. When we learn a particular profession we learn a particular network of conversations - this is so

because we learn the doings and the emotioning that has to do with those doings. In this process the history of human beings has been a history of progressive generations of different worlds through different networks of conversations. And this has taken place since language began to be conserved in the living of our children, which I maintain is 3 million years ago. Everything about us, including our bodyhood and particularly our brain, has changed in accord with the conservation of living in language.

Language, as I said earlier, provides us with the operation for creating objects, indeed the minimal operation in language constitutes an object. Once my wife, Beatriz, was carrying a lot of packages on a rainy winter day and wanted to take a taxi. She saw a car with a driver by the curb, opened the door, got inside, and said "Please take me to...." thus giving the driver her address. She closed the door and when she had been taken home she asked "How much do I owe you?" The driver answered, "Nothing madam, I am not a taxi driver". This is very fantastic because the object 'taxi' appeared in the coordination of coordination of transportation. So objects arise in languaging. We say objects pre-exist language, yet in the living objects arise in language.

The result of hundreds of thousands of years of languaging has been the appearance of many different kinds of objects, many of which are conserved. As we live in conversation new kinds of objects continue to appear, and as we take these objects, and live with them, new domains of existence appear! So here we now are, living in these very funny kinds of objects called firms, companies, profit, incomes, etc. And we are very attached to them - my goodness! we kill each other according to what has arisen in our conversations of commerce. Just the same, we are not necessarily stuck in any of the objects we create, we can always reflect and say "Oh, I'm not interested in this any more", abandon an object, change our orientation and begin a new history.

This is why the world we live, we do it, we make it, even if it seems that it is carrying us. It IS carrying us, but we are carrying it too, because we conserve it in a systemic dynamics. So yes, our life is changing, but we maintain the ability to reflect on our liking or not liking of our circumstances. We can reflect as we have language. Other animals cannot reflect, as they do not live in language. I am not asserting that we are the only animal which languages, but we are the only ones who LIVE in language, we are the ones who make languaging and conversation our manner of living. This is a peculiar condition. Look, here we are today, in conversation. We enjoy it, we

caress each other with language. We can also hurt each other with language, we can open spaces or restrict them in conversations. We live in this, this is central in us. And even in this we are a living system, we shape our own path of living according to our manner of living, as do all living systems.

Emotions and intelligence

Different emotions take us along different paths, we live different histories according to our emotions. There is a book called "Emotional Intelligence" that speaks of emotions as a particular kind of intelligence, and in a way emotions are related to intelligence. I think intelligence is something very basic, a particular kind of phenomenon that has to do with the plasticity for participation in changing behaviour and changing relations. This is what we refer to when we speak about an intelligent being. For example when we say that an animal is intelligent we are saying that it has entered into a flow of consensuality, a flow of plastic behaviour, with us. When we say a person is intelligent, we refer to the plastic flow of whatever relationship the person is participating in, including relationships in various conceptual domains.

Intelligence is a basic phenomenon that has to do with the plasticity for participation in changing relations.

How emotions relate to intelligence is that emotions change the possible expanse of intelligent behavior. Fear restricts intelligence to a very narrow view, it concentrates attention in a particular way, and constrains the relationship to a particular orientation. Similarly, ambition and competition restrict attention, vision, and intelligence. Forgive me for saying so, but if you think about it bit, you will see that this is indeed so.

The only emotion that expands intelligent behavior is love.

I claim that from a biological point of view we humans are all equally intelligent, and this is the case because we live in language. The fundamental neuronal plasticity needed for living in language is so gigantic that we are fundamentally equally intelligent. This plasticity is not at all the same sort of thing that computers have - the computers we use are computing machines, not intelligent machines. They do not have the plasticity for participation in changing behaviour and changing relations that comprises intelligence. Our languaging brain is enormously plastic, able to generate endless recursions in language,

creating endlessly new domains of living. Sure, there are individual variations in realizing this fundamental plasticity according to whether we have had some malnutrition in our development, or brain damage or disease, or whether we have lived a life that has put us in situations of constraint, despair, or rejection.

Our cultural belief that intelligence is something that some people have, and others lack, limits what we can do together. Philip Carroll, in his tenure as CEO of Shell Oil, realized this fallacy, he stated that "people are competent" as one of his primary premises as he initiated a change. If we want to do something different, we have to accept that we are all equally intelligent, or we will not trust that the others will act competently. If you want autonomous and coherent behaviour, you need only open a space of love, and intelligence appears there. You don't have to do anything but accepting that the other is equally intelligent as you, even as he or she has a different experience, lives in a different way, or has different preferences.

How is it that love expands intelligence? It has to do with vision - not eyesight, but that which we mean when we exclaim "I see!". Let me give you another example from daily life, you may have heard something like this enacted in a play, or you may have lived it yourself. A man comes home from work, and after a little while his wife complains "You don't love me anymore! You didn't notice that I've done my hair!" What is her complaint? Her complaint concerns not being seen, not arising in the legitimacy of her existence with the other. By the way this business of the legitimacy of the existence of the other does not mean you have to accept, or want to be near the person, being, or circumstance -- it means you have to let it be to see it.

There is an interesting television series called "McGyver", you may have seen it. McGyver is the hero in this series, he knows many things, like all of us do. He knows some physics, chemistry, anthropology, architecture... all sorts of things. And in several episodes he finds himself trapped somewhere with a companion. They may be in a cave, or in a barn that is about to be burned down, something like that, the point is they are trapped. His companion may have the same kind of knowledge about physics, chemistry, etc., but is frightened and despairs "My goodness, we are trapped, we're going to run out of air!" or "The bandits are going to come and kill us!". But McGyver, no, McGyver is not frightened, he fully accepts his situation as legitimate in coexistence with him. He loves his situation and thus he can see, and as he can see he can see this little wire here, and this

little thing there, and all his knowledge is at hand to make something that opens an escape. If you are fearful, you cannot see, your knowledge is not available, and your intelligent behavior is diminished. I could have said "McGyver respects his situation", and you could think of it that way. But you might see that with respect McGyver might remain a little more aloof, and would not as easily engage with all the little details that become the tools for his escape.

And this what I say, you can check in your own daily life. We continuously live change in the availability of our knowledge, change in our possibilities of plasticity in our relations as modulated through our emotions. I do not think there are different kinds of intelligence, I think emotions modulate the domain of intelligent behavior in which we can operate, and hence our intelligence is expanded or diminished according to our emotions.

McGyver could see his situation as he let it be whatever it was. To see, one must let it be. But this is not always easy as we live in a homosphere. The homosphere is both a rich domain of human living in the present, and a historic domain of human living in which some things have been hidden as others have arisen. The problem with the homosphere is inherent in this peculiar human thing: language. As language began to be lived, we began to live in language by constituting objects, and categories of objects (a new object), and relationships (another kind of object) between objects. With all this we could begin to reflect (as we made of our circumstances an object) and we could invent purposes and intentions (yet another kind of object). This all takes place not as a mental exercise, but as a lived world; we live this world of objects and relationships among objects as our human world, our homosphere. As long as we live the purposes and intentions we have created as a plastic participation in various relationships in a way that does not distort what we do, it does not matter. If we make these rigid and demand that everything we do fit the rigid structure we have devised, or if we focus our attention on the purpose too closely, we distort our ability to live that which we desired when we distinguished what we wanted as a purpose.

This is again a biological discussion, not a philosophical one. This matter of attention resulting in distortion is based in the operation of the nervous system. The nervous system is a network of neuronal elements which operates on excitations and inhibitions. Every movement we make entails excitations and inhibitions. In the most simple way, if I contract a muscle other muscles (the antagonists) are inhibited. Further, there is inhibition within the process of contraction

of any given muscle. In us this coordination of excitations and inhibitions occurs directly in the nervous system, in some animals it happens at the level of the muscle. The point is that this play between excitation and inhibition happens in every movement. **Every movement is being inhibited as it occurs.** This is why, if you are learning karate and you want to break a brick, you have to aim below the brick. If you aim at the brick the force of the blow will be diminished because inhibition takes place before the intended movement is completed.

The coordination of excitation and inhibition is involved in all neuronal activities, including what we call thinking. It is in our neurobiology that attention on what we do inhibits what we do. This is why learning a task involves relaxation - not in terms of becoming limp or falling asleep, but in terms of relaxing your attention, your intent of controlling what you are doing. As you relax your attention on the doing, but proceed in an understanding of what you do, you allow the actual doing to take place in a manner that uses the circumstances as a reference that guides what you are doing. As you become more relaxed, your doing becomes more fluid, and as it becomes more fluid it becomes more pristine, and as it becomes more pristine it becomes more beautiful, more comfortable and more perfect.

As notions such as purpose, intention, or aim arise, they become part of what we do, and as they become part of what we do and we attend to them, this dynamics of interfering with our doing through our attention to what we do takes place -- to a greater or smaller degree.

Homosphere and Biosphere

In the history of living every moment, every change, whether it resulted in survival or extinction, has arisen along a path of preferences. This is how the course of evolution has taken place. We usually speak of evolution as a process of natural selection and in so doing confuse the outcome with the process. The outcome of following different paths of preferences is differential survival, and we call it selection. The word selection brings forth the notion of a force or an agent which is doing the selecting, but it is much simpler than that. It just happens, and selection is an explanation in the form of a history of what happened. A process is not what is going to happen as a result, it is what is happening now - and in living systems what is always happening is conservation of organization and adaptation.

Nevertheless, all living is only possible when there is flow of energy.

Living systems are molecular systems that can exist only in a background which provides them with a flow of matter and energy. As we are living systems, we can only remain existing as long as matter and energy remain flowing. Part of our problem is that we have transformed energy into a commodity so we accumulate it and thus distort the flow of energy. Money is a way of commodifying energy.

We human beings have purposes and intentions. These are not fundamental biological forces, they are comments that we make concerning our doings. Our cells have no purpose, living has no purpose or intention. I remember a very distinguished cybernetician, Gordon Pask, used to say "If you see a purpose in a system, the system has a purpose." I do not agree with this. If you see a purpose in a system, you see a purpose in a system -- but the system doesn't have a purpose. Even if you create a system with a purpose, you design the operation of the system according to the criteria that define the purpose, but the system itself only operates according to its internal coherences. This is so with living systems.

When we human beings arose, and the homosphere began to expand, we created purpose and intention in our coordination of coordinations, and so purpose and intention began to be part of our living. As we create a domain of intentions and purposes, we do so with different degrees of vision concerning the ground on which we exist, that is concerning the systems we are embedded in.

That which we do not see does not participate in our operation as human beings. If we exist in the assumption of infinity, then what happens to the system in which we are embedded in does not enter our concerns, or our vision. But since we do remain embedded in a larger system, the larger system does participate in our operation as living systems. Though we live as humans in the homosphere, we are also living beings which live in the biosphere. Our existence as living beings is what makes our existence as humans possible. This is obvious, we all know it; we all know we exist as humans only as long as we are alive.

Thus, in the domain of the homosphere, we may intend to create human well being through reducing hunger. So we plant new hybrid food plants, we fertilize to make them grow, and we apply insecticides to protect the crop. As we do this we are unaware that we are incrementally damaging the whole living community under the ground - which makes the growth of what we planted possible. The changes in the soil are not part of our living, they happen in the biosphere. And

they would remain invisible to us if they did not eventually enter the homosphere through crop failures as the ground became sterile. This is the usual way that we see the system we are embedded in. The alternative is to somehow imagine it. And to imagine it is not easy, and to take the biosphere into consideration is not easy.

The background in which the homosphere is embedded, and in which all human activities are eventually involved, has no presence in human activities unless we consider it as being there. The biosphere only exists if we wish to see it. What happens with our purposeful and intended behaviour will depend on our understanding of who, and how, and where we are. In this sense the homosphere is different from the biosphere. Our behaviour as living systems is modulated by understanding, and understanding is possible as we live in language. We can have whatever purpose we wish, we can choose what it is we wish to conserve. We may wish to conserve quality in a particular activity. We may wish to conserve the reduction of costs, or efficiency, or growth. We may wish to recover well being and responsibility in the realization of a particular activity... and whichever we choose the consequences are different.

And the consequences accrue not only to ourselves, but to the biosphere. We modify the biosphere. There is no particular way we are supposed to go with this. In this process of evolution nothing matters, there is no direction, there are no purposes or intention. The cosmos doesn't care, the earth doesn't care, the biosphere doesn't care what we do. The whole history of the biosphere is a history of tremendous alterations and massive waves of extinctions. Much has disappeared, and new things have appeared. In this sense if we modify the earth so that we create total ecological disaster, it does not matter. But for US it matters, or rather, for us it may matter.

Identity

I would like to say a few things that pertain to the notion of a robosphere, but first I would like to say a few things about us, about our human identity.

We began the second morning of this meeting with a slide show of human faces. Isn't it interesting that this show of faces, of people we do not know and will never meet, is important to us! You might say, "of course", simply accepting that humans are interesting to humans - but why is this so? I think it is because they tell us about us, we find ourselves in the others, we discover our own existence in the

existence of the other. If we don't have strong prejudices we can find ourselves in every animal. If we see couple of dogs copulating, we react, because it has to do with us. A mother might tell her child "Don't look at them!" precisely because she feels this has to do with us humans.

Human identity is a systemic phenomenon. There are two things I want to say about this. First, we are not genetically determined. Let me explain. There is a distinction between structural determinism, and pre-determinism. We are structurally determined molecular systems that exist in the present. We exist in a flow of existence without alternatives in the flow of existence, but we are not pre-determined. Genetical determinism implies pre-determinism.

Our genetic constitution, including the DNA, the RNA, the cytoplasm, its inclusions, indeed the whole structure of the fertilized egg, defines a starting point. The total structure of the beginning organism constitutes a starting point, and whatever happens along arises as an emerging path which we can later describe as its life history. What happens arises moment by moment in the interplay between the realization of the living and the circumstance in which the living takes place. It happens in a process called epigenesis. I don't use this word because I am a biologist and want you to know biological words, but because the word says what it means: epi "on top of" and genesis "the beginning" - so on top of the beginning, whatever the beginning is. As soon as something begins, its history begins to take place, and whatever takes place arises moment after moment, on top of each moment as a new beginning place, in an ongoing interplay between the living system and the circumstances. In this sense nothing is predetermined, nothing can be predetermined, not even genetically.

It is true that if one changes some features of the genetic system, one changes the structural characteristics of the beginning, and the history of interactions will be different so the structure of the organism is different. But for those changes to have one character or another, the circumstances must also have one character or another, because whatever happens will arise in the process of epigenesis, which is a temporal dynamic.

The same thing happens when you make a cutting from a plant, and the new piece is rooted and begins to grow. Whatever structure is there, is the beginning. Whatever the conditions are, determine what happens. Twin fawns separated at weaning and fed a diet that corresponds to the climate in British Columbia or to the one in

California will develop the body form that corresponds to the northern or southern subspecies. In us mammals there is a "standardization" of the medium in which early development takes place; the uterus is a very uniform environment. Nevertheless there are differences even there. It has been shown that the nervous system develops one way or another depending on the circumstances that the mother lives. Some of these transformations may be so subtle, and so fluidly a part of our living, that we do not notice them, yet they exist. For example a new born baby, one hour after birth, can distinguish the voice of his or her mother. This shows us that there is a transformation of the brain that has to do with hearing in the womb.

You can see the influence of both initial conditions and medium in homozygotic twins. They begin with essentially the same genome, and the medium of uterus is fundamentally the same (with minor differences associated with position), and then the human domain in which they live is fundamentally the same, so you get essentially similar beings. Even if the two twins are separated, and one lives in the United States, and the other in Germany or Chile, the human domain is fundamentally the same. Yes, there are differences between the cultures, and those differences will appear in some form.

One of the things that was most surprising for me when I came as a student to Harvard, happened when I went to movies. I didn't laugh at the same moments as all the other students! When I laughed everybody would look at me, and when they laughed, I would look around, bewildered, because I couldn't see what they were laughing at. Humor has to do with the emotioning we learn in our culture, not with words. After I had lived four years in the United States, people back in Chile found me different. Of course I was different! I had been transformed through living in a different cultural medium. I was still more Chilean than American, but not fully Chilean any more -- people in Chile sensed there was something funny about this Chilean.

So epigenesis is happening all the time, but the initial structure is not trivial. Epigenesis takes place over the whole lifetime. We become the way we live, our reacting, emotioning, moving, dressing, doing things, taste for foods -- all, according to how we live. Although epigenesis begins in the womb in the circumstances in which the fetus develops, any moment in our life is a starting point for epigenesis from that moment on. Any moment. If you say "Aha! This is the case!" this becomes your starting point and what will happen from then on will depend on how you flow in your living from then on. You are never determined by the medium, it is always an interplay between you and

the medium. Neither the medium nor the structure determines what happens. The manner of living is what leads to whatever results, and the manner of living is an ongoing interaction between the organism and the medium.

And this is epigenesis - a process of historical transformation starting with a particular structure, in a particular medium, in a circumstance in which something is conserved. If you specify the initial structure, and you specify the medium, and there is a way of conserving the changes in the medium over the history of development, you can repeat the history adequately to generate similar beings.

The second thing I wanted to say about identity as a systemic phenomenon is that what conserves an identity is the conservation of the manner of living in which that identity is realized. The identity of a human being has existence as a dynamic process of conservation of a particular manner of living so that we slide in our living in way that this particular manner of living is conserved. If this manner of living is not conserved, then the identity disintegrates.

We can have an identity in various domains, but one of them always has to be our identity as a living system. If that is not conserved, we die, and no other identity is possible, so I refer to this as a carrier identity. We can also have an identity as a husband, as a friend, as a CEO, or a doctor, and each of them is conserved as long as the manner of living which comprises them is conserved. For example I studied medicine, I'm supposed to have a diploma that says I am a physician. But if someone were to ask me, "Doctor, please heal this illness" I would say I am not a doctor. I have not lived as a physician, I have not participated in the systemic dynamics in which I contribute to create the conditions in which my being a physician can take place. To be a physician, one has to slide in the world in a way that one encounter illness as a physician, and illness comes near you so that you can indeed be a physician. Similarly, if a person says "I am a manager" this means that he or she slides in the world conserving the particular systemic dynamic relation that constitutes being a manager in the domain of managing. In the long run we are continuously making the world we live, whether we are aware of doing so or not. Through living we create the conditions that conserve our manner of living.

What is peculiar to human beings is that we can reflect on what we live and say "I don't like it!", and suddenly there we are, going in another direction, and we begin to conserve another manner of living.

But, in this reflection we can also say "I don't like it, but if I turn I shall loose something I do like" and hence go on doing what we don't like doing - in one mood or another. I say we always do what we want to do, even when we say we are doing something that we don't want to do. This is so because in the circumstances that we claim we are doing something we don't want to do, we are doing that to conserve something else that we do want. All these complaints "I am doing what I don't want to do" (excuse me) are lies. We are always doing what we want to do because we want to conserve something that matters to us.

Since the human identity is systemic, as we live a particular culture, our identity changes according to the culture we live. Thus too, the domain of existence that we generate in interaction with each other has one character or another according to how we live, according to what we conserve through how we live. If we conserve cooperation, then this is the world that arises, and this is the psychic space that we generate. I could say this is the mind that we generate, or, as Gregory Bateson might have said, this is the soul that we generate. All these expressions refer to dimensions which are not readily apparent, but which belong to the manner of living we generate in our living in the systemic conservation of living in that manner.

We human beings are very strange beings. We can live any culture that does not kill us before it is conserved in the learning of the children. We can live as loving beings or as aggressive beings, we can live in cooperation, or in competition, appropriation or sharing. We can live ANY culture as long as we don't die before our children learn to live in that way. As our children learn to live in that way they conserve the systemic dynamics in which that culture is conserved. The character of the culture doesn't matter, as long as the minimal dynamics for the conservation of the culture are conserved. This is fantastic! This is why there has been, and still is, such a tremendous diversity of cultures.

You can see that the way our children live with us is very fundamental. I often say to people, please do not do anything more than 70 %. Part of what I intend with this is that they will have time to be with their children. I'm not asking that they be kind, or care for them, but simply that they BE with them. We adults create history, our children carry it. We create the present, the children make the history. They will make whatever world they will make according to how they have lived their childhood. And they may live their childhood in awareness, in responsibility, in love, as persons, being listened to, and open to

participation - or they may not live any of this. And the world they will generate as adults will arise according to how they have lived.

We don't need special scientific studies to know this. We can see it in our own lives, or we can use episodes from history as case studies. Ghengis Khan made his seven year old child kill prisoners so he would be able to kill others with absolute freedom, that is with no qualms about doing it. He trained his child to be what he thought he had to be, which is a warrior ready to kill immediately.

Our children grow in epigenesis, we do not always see how they grow, we do not see all the dimensions of their niche. Sometimes they are hardly in our own niche. We provide food, gifts, we provide a house, but we do not provide ourselves as persons, as companions, listeners, and participants. We are very busy earning money. I remember myself, when I was holding one of my children in my arms, but my attention was elsewhere. Here I was with my son, who reached up, pulled my cheek so that I was facing him, and said, "Father you are with me now!" He was in my arms, but I was not with him. That the child is there does not mean that you are with him or her, you have to see the child as a legitimate being, and actually BE present. Depending on how we are with our children alters how epigenesis takes place, how human history is goes, and what manner of living is be conserved.

Yet this is not entirely a matter of chance. There is still something in us that brings us back to the quality of living that we value if we make of it an object to reflect on. When we see photographs like the slides that have been shown here, of waterfalls, and skies, of plants and animals, we find that we like them, and this is so even in our modern culture where we live far from these things most of our lives. When we want to rest, to recover ourselves, what do we do? We go back to the biosphere at large, in complete easiness and freedom. We earn lots of money go to the forest or the beach on our holidays. I am not telling you this as a contradiction, rather I think it is a wonderful thing. It tells us we are not yet separated from the long history of living things in which we belong. So we find photos of the natural world beautiful, and we like beauty. We like it because it has to do with us, with our history. It has to do with the fact that we have a particular structure that has arisen in a history in which we are a part of the biosphere. We are a part not only in the sense that we are nourished by elements of the biosphere, but because our structure matches it, and this is so on account of a history of congruent changes. We are congruent with the biosphere, it is our medium. The beauty of a landscape is part of

our animalhood.

Some years ago I was in Boulder, Colorado. One summer evening I went up to the mountains to contemplate the landscape in the sunset. I sat down on a rock, and there I was contentedly contemplating the sunset. Then I happened to glance to my left, and there I saw two chipmunks, and then I looked to the right, and there were three more. They were sitting close to me, and closer to each other, in absolute comfort and well being. So there we were, all six of us enjoying the beauty of the sunset! Nice, isn't it! Heinz von Foerster, a very distinguished cybernetician, used to go camping, I think it was in Yellowstone Park. He told me "I discovered something most extraordinary! I discovered that the most beautiful places were those that the elk liked to be in."

So beauty has to do with us and our connectedness with the world in which we have been living, the world that has been changing together with the history of our biological lineage. As I said at the very beginning, this is not a trivial point. It is this sensibility to beauty which shows that we are not yet isolated in a robosphere.

Robots

What is difference between humans and robots, or for that matter between animals and robots, or between living systems and robots? (Now, you know more about robots than I, living in Chile as a professor, so please forgive me if I use trivial images.)

If we were to go some place, such as a factory, in which robots are used, we would see them doing things like moving materials from one place to another, or picking up two pieces of metal and welding them together on a conveyor assembly for cars, or whatever. As we see these machines operating so perfectly, doing just the right thing in the right moment, we might ask the plant engineer how the robot knows what to do. And the engineer is likely to answer that the robot has sensors, and it has manipulators, and these are connected in such a way that the robot can do what it does. Indeed the description that the engineer would give is the same kind of description one would give when explaining how an animal 'knows' how to do what it does. If you look at a machine operating in its proper circumstance, and an animal operating in its proper circumstance, you cannot see a difference in terms of their knowing what to do. This is how we come to the science fiction fantasy of robots that look and act so human that we cannot tell they are robots - until some unexpected circumstance happens that

reveals that they are in fact not fully human.

So what IS the difference between robots and living systems? The difference is historical. Robots are designed to operate from the moment they are completed. It may take 10 years to design them, but once they are built, they arise as a totality as the last component is put in place. This is not so with living systems - living systems have become what they are through a history. This makes a big difference, and the difference has to do with how they are connected with their circumstances.

When you design a robot, you also design the circumstances in which it will operate; robot and circumstances are designed in a matching way. When the design is proper, the robot operates in perfect congress with its circumstances, right from the beginning. The robot will work as long as it is in place. But circumstances vary, and a moment may come in which a mismatch occurs. If there is a mismatch between the robot and its circumstances, the whole thing crumbles down.

The congress between living systems and their circumstances does not happen through design. Living systems are congruent with their circumstances because they have a history in which they and their circumstances have arisen together, in a history of congruent changes in both the living system and their circumstances, including all the other living systems that are part of their circumstances (Figures 3 and 4). This is a remarkable thing!

So here we are with a body structure and internal dynamics, living in circumstances that match this structure, because both have appeared together as a history of changes. Unlike robots, our circumstances have evolved along with us. This is a monumental difference, it means that living systems are never out of place; if they were they would be dead. It's as simple as that. You have never been out of place in your whole life, even if you have been ill. You are alive, so you are not out of place. When I was a young man of 19 and 20, I spent two years in a hospital with the AIDS of the time, that is TB, but I was never out of place. If I had been out of place, out of the domain in which my living could be realized, I would not be here.

This makes living systems in general, and human beings in particular, autonomous systems which are never out of place, but which become ill and die when their autonomy, and the flow of congress with the changing medium, is interfered with. We slide in our medium, much

like surfing. The beauty of surfing is that the surfer slides along the wave, continuously changing his or her relationship with the continuously changing wave, while continuously conserving one particular relation, namely equilibrium. Similarly, the living system continuously changes its relationship with its continuously changing medium, while continuously conserving one particular relation, namely living. The surfer doesn't fall until he or she falls, the living system doesn't die until it dies.

In us human beings, this coherence with our circumstances also entails awareness, consciousness, and reflection, that is being able to look at our circumstances. We can become aware of whether we like or dislike them, and flow in one direction or another according to the reflection one makes. To choose, we need to live in language. Animals that do not live in language cannot choose. To choose means to treat the circumstance as something you can look at from the domain of your desires, and act according to what you want, wish, or prefer. So we human beings have arisen as beings who live in language and can reflect. We can talk about what we do and what we like, and our circumstances have been changing along a history of changes in a way where talking about what we do and what we like has been part of the flow of these changes. We could say that we surf on a dynamic surface of conversations. In this way, our world changes congruently with our reflections and our conversations.

When we attempt to specify the behaviour of people so that we obtain a particular result, for example by specifying the circumstances in which they operate, we change their fundamental congruence with the circumstances. We prevent the circumstances from changing congruently with the living system in the manner that they have changed together along the history of living systems. And since we humans beings live in language, we are always on the edge of saying "I don't like it!" and choosing to go another way. But to go another way, we need a space. If there is no space to go away, people find themselves in a cage. Thus, if we want to create humans as robots in the sense that we not only specify the behaviour that we want or expect from them, but also specify the circumstances in which they live, we generate unhappiness, suffering, resentment, frustration, opposition, aggression, revolt, and revolution.

I have been saying that with language we humans have generated a new domain of existence in conversations, namely the homosphere (which we hopefully live with awareness of biosphere which we are embedded). In this homosphere we now live a culture, and a psychic

space, concerned with effectiveness, efficiency, production, etc., which demands that we behave like robots. Yes, because only when we have specified the operation of the system, and circumstances in which the system will operate, can we specify the outcome. But if the system is a human being that can ask "Oh my goodness, do I want to be here?" then we cannot specify the outcome unless we restrict the possibility for acting out of awareness, or we restrict mobility. And we do restrict mobility in many different ways: by putting a key on the door, or putting a penalty on coming out, or putting a demand on what takes place such that if this person does not do what is required, then he or she is expelled or ostracized. When we really wish to control the outcome, we restrict reflection in general, and create a tyranny, and we create slavery -- slaves are like robots. We do not like this, we do not feel well in this, and we sicken, or we rebel.

As we release these restrictions, as we let humans be humans, without this demand of robotizations, then creativity, cooperation, conspiracy, and co-inspiration appear. If we have the same inspiration we don't need control, we have freedom, and we have responsibility. In a way all these reflections lead us to discover that we can do all we wish to do together as a co-inspiration when we let human beings appear. This is a very interesting phenomenon, because it is exactly contrary to the path we usually follow when we want certainty in a particular outcome; that is demand, force, threats, and power, or through more subtle ways of restricting vision, such as competition and ambition.

Social systems

When we speak about social systems we usually speak as if all human relationships were intrinsically social and social systems included all sorts of relations including work, school, castes, armies, etc. We say societies have a diversity of relationships, but I do not think this is the case. I think that different emotions constitute different domains of relational behavior, not all of them social. It is not the same to relate in one emotion or another. I think only relationships in the emotion of love constitute social systems. Or put differently, if there is love, what appears in the interpersonal relations is a social system; without love there is no social system.

We speak about power as something one has, but the emotion that constitutes power is obedience. We give power by obeying. In 1979, during the military dictatorship in Chile, we were talking about things of this nature. I was teaching a course on the biology of cognition which lasted the whole year, so I could say many things - because it

was very slow. So I brought a toy gun, and said "Let me show you what I mean by power." And I pointed the toy gun at one of the female students and said "Stand up or I will kill you" She stood up. "Come here!" and she came to the middle of the room. "Lie down!" and she lay down. "Take your clothes off!" and she immediately stood up and said no. Power disappeared. It didn't matter that I had a gun, I could have killed her, but she would not have given me power, because she did not do what I had demanded. I would have been ultimately frustrated in my demand by killing her.

Power arises in obedience. So power relations are a manner of relating in which obedience is the fundament. Hierarchical systems take place under power relations, that means obedience. And in obedience there is no collaboration. Collaboration is only possible when the relation is based in the emotion of love, acceptance of the legitimacy of the other in coexistence with you.

A work relation is a relation in which one commits to fulfilling a task in exchange for some retribution. Imagine this scenario: I go to a company, knock on the door and say I want a job. The person who is interviewing me, says "Please come in and sit down". And we talk, in a social dynamics, because we treat each other as persons. And he or she says, OK, I can hire you, and this is the contract, that is a statement of the commitments I and my employer make to each other. One commitment of the employee is to arrive at 8:30 in the mornings. One day I arrive at 9:30 and the employer says "I am going to reduce your salary, you did not keep your commitment!" I tell him that my wife was ill, and I had to take her to the doctor. He may reply that I made an agreement, and show me the contract, and my wife becomes a mere impertinence. Alternatively, the employer is committed to pay me every week. One week, he says "Sorry, I cannot pay you right now. We have just been robbed, and I do not have the money". And I could complain "But you made a commitment to pay me every week" and treat the situation of the bank robbery as irrelevant.

If these kinds of problems arise at work, then the work relation is not a social relation. That is why labor legislation was developed, the purpose for labor legislation is to recover those human dimensions proper to social relations which have disappeared in the work relationship.

It is possible to retain the work space as a social space. We can, for example, sign an agreement which defines the labor space for a year,

and henceforth that labor space can be lived as a social dynamic. The changes in Shell Oil were grounded in the transformation of a labor space to a social dynamic in a background of trust. Commitments continued to be fulfilled; they constituted the background, but they were not the essence. In such a situation the work relation will appear only if someone does not fulfill the intent of the commitment. The rest of the time, which may be all the time, work can be lived as a social dimension.

I have been at the University of Chile with an agreement to fulfill a certain task. This agreement has defined the ground on which I have been free to participate in the social dynamic that the university can be. Work only leads to robotization if the work relation is the one that is prevalent every moment, enforced through demand, restrictions or punishments that continuously put people in a cage in which they disappear as persons. When the only thing that is important is that a particular task be realized then the person can be replaced by a robot. Being a person is not necessary at all for the realization of this task. In a social system one cannot replace persons by robots, because they require the particular kind of beings that humans are, with the particular kinds of emotions humans have, so that humans can participate in the particular kinds of conversations that constitute collaboratively doing things together in a social dynamics.

It is in that sense that I say I have been at the University of Chile for many many years, but I have never worked there. I have been a member of the university, I have done research and taught courses, and they have paid my salary, but I have never worked. Relations of work are not social relations, they are relations of commitment for the fulfillment of a task for something else in return, and you disappear as a person, you become a robot.

, then the situation is different. Or if we are using the technology I think it is possible to have a social interaction in a computer based high technology world, provided the technological instrument becomes completely transparent, like the telephone. But if our attention is on the technology for hierarchical relations, control or obedience, then of course the technology does not permit social relations.

I was asked to write an article for a book, Metadesign that reflects on all the beautiful new technologies that are there for doing things together under the view that a new kind of human being is needed. What I say in my article is that in fact we do not need new kinds of humans, that it is the technology that will change. The whole problem

is in our emotions, how we live the technology. Is the technology an instrument, or is it an end in itself. Does it become fundamental for our existence, or is it an instrument we use for social dynamics. We can become friends thorough the Internet, email, or telephone. And as we are friends, and we are biological entities, we shall want to see each other. We see each other through a video screen, and we shall want to touch each other, to smell each other, to have this nearness. Because there are certain dimensions that are not being replaced by the technology. I suppose some could be replaced eventually; for example we could have telesmell transmission.... Maybe if we have only tele-relations then the population growth problem could be solved. But we would not happy because we need the multidimensionality of a tangible relation in the same niche.

I see two problems with technology. One is that technology becomes the central thing, that we are driven by the technology. In Chile we are on the fringe of technological developments, new technology comes from outside Chile, and the manner of speaking is that "Technology drives us!" we have to keep up, or we will be left out of the world, we have to follow it." Here you have more freedom to say, "Technology is an instrument, it does not drive us, what do we want to do with it?" For that you have to have a standing that is independent of the technology, because you love yourself, you respect yourself, you are a social being. This is part of our problem, there is such a fascination with technology "We human beings are so imaginative, we create such fantastic things!" But these fantastic things channel what we do, and what we become. The second problem is that we are being guided by someone making and selling these technologies for their own profit. The motive is not social, it is based in appropriation, dominance, and control. But we don't have to follow the path that tantalizes. We can say this is an instrument, and I shall use it when it is necessary for what I want to do, and I shall leave it aside when I don't want it.

Responsibility

When one of my two sons was about eighteen, he queried me "Father if you are right in what you say, then anything is possible." I said "Yes, of course..." and he continued "Then you could kill your neighbor. Why don't you kill your neighbor?" I answered "I don't want to!" - and he was content.

Just because something is possible, we do not have to do it. There are many things we can imagine but we do not do. We can even imagine

that I have machine gun hidden here (in this country one can imagine that). But the fact that I could have a machine gun behind my back does not mean that I have to have it! It depends on what I want. Being able to do something does not mean I have to do it.

I am responsible in the moment in which I act according to whether I want or do not want the consequences of what I do.

Responsibility takes place as an experience when one is aware, of the possible consequences of what one does in relation to other human beings or other circumstances, and one acts according to whether one wants or does not want those consequences.

If I want the consequences, I go on. If I do not want them, I stop. In either case the experience is of responsibility. Someone can ask, "Why did you not do that when you could!" and I can answer "Oh, because I did not want to." Because I did not want the consequences. The consequences are in relation to whatever domain I exist in - and in the homosphere that includes other human beings - so the consequences could be what happens to me, or what happens to someone else, or both. I don't want to kill anybody because of what happens to me and because of what happens to other people.

So responsibility entails awareness, and desire. I am aware of the possible consequences, and I act according to whether or not I desire them. There is a tango, I will not sing it, but I will tell you the last stanza. I call it the tango of responsibility. "Officer, arrest me, for I am criminal. In this suitcase I carry the tresses of my beloved, and the heart of the traitor, who was my friend". This is a responsible criminal, because he is willing to take the consequences of what he did. Responsibility does not mean goodness, it does not mean compliance with agreements, it means that you act with awareness of your wanting and being willing to live the consequences of what you do. What happens is that we are loving animals, so what we desire has to do with our being loving animals!

Freedom

Freedom is a very interesting thing because freedom is also an experience. Suppose that I think "If I do this, such and such is going to happen" And then I wonder, "Do I want that to happen" and realize "Yes, I want that to happen." That is responsibility. Then I may ask myself "Do I want my wanting? Do I like what I want?" And in that moment I have the experience of freedom. Because now I can say

"No! I don't like what I want!" and I don't act. Or "I like what I want!" and then I act.

Freedom is the experience of being responsible for your responsibility.

Freedom arises when you have the experience of doing something in a way that you are responsible in the space of reflection about whether you want what you want. Whether you do or don't want that, your experience is freedom.

We speak as if freedom had to do with actual possibilities, but possibilities are possibilities only to the extent that one sees them. They are not possibilities in themselves. If you see something in your niche as a possibility, it is a possibility; if you do not see it as such, or do not see it at all, it is not a possibility. Freedom does not have to do with possibilities, but how you live your possibilities in your awareness. So freedom is an experience, and it is a very fundamental experience. This is why when you invite a person to participate with you in a conversation, in the co-inspiration of an activity as a person, in his or her legitimacy as a person, responsibility and freedom appear. They cannot but appear, not as a forcing situation, but as a natural outcome of the kind of beings we are.

At the same time, this does not mean goodness. Yet as a person arises as a human being love appears. Love is seeing the other, the other has presence.

Authority and obedience breed irresponsibility. In Argentina the military has generated horrible situations, and the argument of the people involved is "I was only obeying orders." This is authority. You can say that a company is not like an army, but if the company is centered on authority, then it is like an army. Obedience means self denial; whenever you obey you deny yourself. Suppose I were to say "Ladies and gentlemen be objective!" What am I saying? What do you feel? I am demanding that you agree with me, in the threat of you appearing inadequate if you do not. You disappear in this, there is no self respect in an agreement invoked on such grounds, and hence you resent it. We think we live as rational animals, but we do not. We are emotional animals who use reason to justify our desires.

The only way that you can have responsibility and collaboration is in social dynamics. But this collaboration does not mean blindness about what the tasks of the other person, or about the abilities or responsibilities of the other person. On the contrary, it means seeing

these things, and then acting while listening to one because she knows something, or listening to another because he has a particular responsibility guiding that other thing. You do this knowing that they will also listen to you and act accordingly to everything else that also pertains to the circumstances. Love opens responsibility and freedom, authority reduces responsibility and freedom.

Blindness

A puzzle of human existence is that we appear to create conditions that conserve blindness, or prevent us from reflecting, even as we maintain that we do not like blindness.

What is blindness? Blindness is a commentary by someone else about what you do. If you are blind you are blind, you don't see what you do not see: this is nature of being blind. So when I am blind, I am not blind in my own experience, but another person tells me that I am blind. I can either listen, and say "Oh! what am I not seeing?" or I can become irritated, feel inadequate, or deny what the other tells me. Blindness is not bad in itself, it is something we always live with, and we can always expand the domain of our vision according to what becomes relevant to us. We are blind because all we can ever see is our niche, we cannot see what surrounds that, we cannot see our environment.

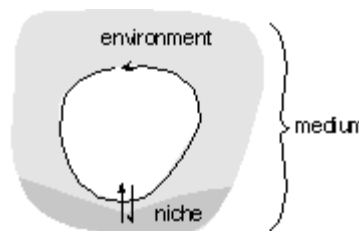


Figure 5 A living system embedded in a medium encounters a part of that medium in one way or another in its living. This is the niche. The part of the medium the living system does not encounter, and hence is unaware of, is the environment. An observer can see some aspects of the environment, and imagine its extension. An observer can only see the niche to the extent that the living system reveals it through its behavior.

I shall explain by simple analogy. If I stand on the podium I stand on a particular part, my niche. My niche is that part of the medium that I in fact encounter in my living. An observer, you, in this case, sees a broad space where the living being is, and imagines it being still bigger. That is the medium. You imagine my medium to include things

you have never seen - like my lab at the university. The niche is that part of the medium where we encounter whatever dimensions we are encountering.

The observer also sees something around the living system, which I shall call environment or circumstance. You as an observer may notice things around here that I am unaware of, that is my environment. But the observer cannot see the niche, each system obscures where it is. You don't see where I stand, in order for you to see, I have to show you by lifting my foot. Or you deduce it by observing where I stand. An observer can only deduce what comprises the niche of a living system through its behaviour. What you see is what is around me. But I cannot see what is around me, I can only see what I encounter. We cannot see beyond our niche. The person observing, of course, can only what he or she encounters, and this comprises part of my environment. When someone tells me I am blind, that I do not see some particular thing, what this person is telling me is that "I see here, in the environment, something that you do not see". In that interaction I may come to see something. When this happens, that thing stops being part of my environment and becomes part of my niche.

The niche is not fixed, it is fluid. But we cannot step out of it, it just transforms as we move: it transforms as our understanding and our vision changes. We know this, it is part of our daily life understanding. We tell our children to go and study so they will be able to see different things. To study means to go to a place where your niche begins to change. Studying does not necessarily mean that your niche expands. If you study something that expands your reflections, your niche expands, but if you study something that reduces reflection, your niche diminishes.

So when somebody says you are blind, they are saying that there are features of the medium that he or she sees that are outside of your niche. It may be that in a conversation your niche expands and you begin to see something which then becomes part of your niche. What you now see is not necessarily the same thing that the observer who called you blind sees. We can never see what the other sees, niches are always bound to each individual. But what may happen as we participate in an interaction with somebody else is that our niches begin to change together congruently. We can say that a social niche appears while we remain in an interaction.

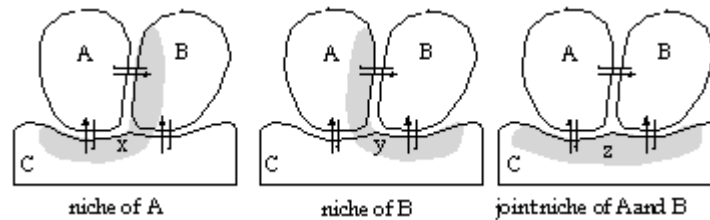


Figure 6 As two living systems (A and B) interact, those aspects of the other which are encountered are part of each one's niche, the rest of which consists of encounters with the medium (C). Thus the niches of each system are different (x and y). As long as the two living systems are in interaction, a joint niche (z) of the interacting unit also comes into being.

So what may happen when you are conversing with someone who claims that you are blind, and you do not deny it, is that your niche changes, because it includes something triggered by what the other is telling you (not necessarily whatever he or she sees). But then the niche of the other changes as well, because a conversation is an interaction between two persons. As the other explains to you what he or she thinks your blindness is, he or she begins to see things that have to do with the things that you see. And then something new appears, namely the niche of these two persons together, a social niche. This may be fleeting, or it may be lasting -- it depends. The interesting thing about this niche is that it is a space of knowledge. I speak of knowledge as doing, because we assess knowledge based on the actions of another. So the social niche is a space of action.

Surprise

You will notice that there is always a whole domain that is intrinsically outside our niche, outside our existence, but elements from it may suddenly appear in our existence, because the medium has a dynamics of its own. For example the homosphere is embedded in the biosphere. When something happens in the dynamics of the biosphere that we do not know, do not see, something new may appear in our niche. Suddenly we find ourselves facing a situation which is completely unexpected, and our niche expands. Similarly we also have an internal dynamic which is invisible to us, and sometimes suddenly in our reflections an idea, a notion, or an emotion appears... which surprises us.

There are always circumstances which arise in the independent dynamics of our intrinsically invisible medium, and this we cannot control. Last March I made a presentation at the American Society for

Cybernetics about something that Peter Senge also mentions in his book "The Fifth Discipline", something that all you know from your personal experience: namely plans never work. I mean they work for a little, but then they begin to fail because there is this tremendous dynamic of things which go on in the environment, and then suddenly appear in the niche. Something unexpected is always something that could not have been imagined because one can only reflect and make plans in the niche. Inevitably something unexpected does arise, and we can treat it as a failure that deserves punishment, or as an opportunity for expansion of our niche. The only possibility for remaining in adaptation, is to be open, to see failure as an opportunity for expansion of reflection, both personally and for the community, or the company. In order to treat it as an opportunity the company would have to be open to accept these things as legitimate and to talk about them.

Friendship

We may turn to each other in the desire of reducing our blindness, or in the desire of helping the other see what it is we see. People set up intentional partnerships with each other to do this, and report that what seems to work best is to ask the other what it is they notice, rather than tell the other whatever he or she appears oblivious to. This difference, like the difference in most interactions, depends on emotions. If you are too eager that the other see something that you see, it is very difficult that this person will see it. Because with your eagerness you are pushing rather than opening a space. You are not inviting a freedom of reflection, you are creating a cage by attempting to design the circumstances such that this person will think like you want them to think. So for being able to tell someone something that you think they do not see, you have to invite them in friendship.

Friendship is a very wonderful thing because friendship is living in love. There is no demand, no expectation - you put in a demand or an expectation, and the friendship comes to an end. With friends you can talk about anything. A friend knows that whatever you say is in the acceptance of his or her legitimacy. Even when you are talking about something that you think is inadequate. For example you could say to a friend "My goodness, why did you put poison in the president's coffee?"

I will tell you a story that is told in Chile. These kinds of stories have an element of aggression, but they also show something. This is a story of some students who went to a boarding school where a young

Chinese man worked as an attendant. They played pranks on him, put animals in his bed, tied up the sleeves of his nightgown, and so forth. The Chinese fellow said nothing. One day the students repented, and decided to stop playing their pranks, and told the young man that they were not going to be mischievous any more. "No more animals in my bed?" "No, no more animals." "No more knots in the sleeves of my nightgown?" "No, no." "Then I shall never put peepee in the coffee again!".

If you are in friendship you can say things like "I shall never again put peepee in the coffee". It is the emotion that determines the character of the relation, what can be said, and what can be heard. In aggression it is much more difficult to be heard. If someone is trying to convince you, you may of course eventually come to accept the notion, and say "Oh my goodness (grumble, grumble) he might be right...." but this acceptance has to do with the dynamics of your own internal reflection, not with being convinced by the other.

Our possibility

When people are not satisfied with the way things are, they look for change. Some doctrines tell us that we can always only change ourselves, others talk about creating circumstances which will evoke change in the other. I think it is possible to change together congruently, if we have the appropriate emotioning. If we remain isolate -- well we remain isolated. If we want change through causing the other to do what we want them to do, then there is pressure, the dimensions of demand and the negation of the other appear.

However, if we open a space for co-inspiration, we open a space of conversation. If we open a space of conversation to last as long as it may last, sooner or later the dimensions of love will arise through the very fact that the other person will arise as a legitimate other in coexistence with you. This has to do with our biology -- we are not yet robots, we are loving animals. As soon as you let the other BE near you, the other begins to see you also as a person, and can listen to you. So here I am, an employee, and the manager comes to talk with me. As I speak I discover that he is speaking with ME - not with an idea, not with a demand, or an expectation. And then I begin to see this person, and as we see each other, our niches change together, and co-inspiration is possible, even if the co-inspiration results in us separating.

The interesting thing is that what appears as soon as we let the person

appear is -- a person! And then we can begin a conspiracy of "this is what we would like" - and suddenly something appears in which all are involved as persons, with all the elements of knowledge, flexibility, imagination, etc. there, participating in this task that has arisen together.

To achieve this as a person in authority you will have to listen. If I am a worker, I will have to have the tranquillity and self confidence to bring whatever anomaly or unexpected thing I notice to the attention of someone else so that it is seen by all the members of this community that may be concerned such that a conversation can arise and something can be done. But if I am fearful, and I am rebuffed, then I shall not dare to reveal what I see, and it will remain hidden until the thing is kaput, or an explosion arises.

In social dynamics one can speak. For example, often one does not listen to children because they don't know. One does not listen to subordinates because one loses prestige. We have all kinds of arguments not to listen. But if we listen, then the person we listen to becomes a collaborator. The child can understand all sorts of things and become a collaborator with you about doing things together in the family. We can do this very well, because we are all equally intelligent. This is a very serious thing! Due to the nature of language as a phenomenon of consensuality, the plasticity for consensual behavior is so gigantic, that whatever one human being can do, others can learn and do. Learning is a transformation in living together. We tend to think of learning in terms of the acquisition of information, this is not what it is. It is a transformation in living together, it is a transformation of doings in a process of doing things together with others.

I think our fundamental resource is the biological background from which we human beings obtain the fundamental elements not only for creativity, but for the possibility of living a decent life. By a decent life I mean something we would recommend because it is accessible to everybody else around us. A decent life has to do with material, intellectual, aesthetic and spiritual well being. And well being means not a cage; but a possibility for reflection and for movement.

During the year before the military coup in Chile, during one of the strikes of transport, many people did voluntary work. I volunteered, and my task consisted in transporting bags of onions a hundred meters from the rail car to a truck. There I was, picking up a heavy bag, staggering along under it and carrying it to the truck, and doing

this over and over and over again. And the fantastic thing was something you know happens: at the end of day I was exhausted, I could think about nothing. The only thing I wanted to do was to lie down and sleep. The country didn't matter, science didn't matter...politics, family - nothing matters when one is that exhausted. There is no space for reflection, for being a citizen, for being a responsible being, for being a caring companion - nothing! If we have to be like that it doesn't work. So I discovered that one should never do anything at a full 100 per cent effort, one should only work at 70 per cent. Otherwise one has no flexibility, and no space for reflection. Without space it is like being stuck on the ceiling, trying to keep afloat in a continuously filling cave, desperately trying to breathe.

As living beings living in language we can operate according to the open view we have in the understanding that we have. Understanding takes place in the moment one looks at a particular situation in the context in which it has meaning, and then one acts according to this double look. This applies to our relations with each other, and ultimately to our relation with our whole medium, our world. And ultimately our existence as living beings depends on how we live in the biosphere.

Thus we can operate with understanding with respect to the circumstances of our embeddedness in the biosphere. We can look at any particular situation, and while doing so maintain a view of the circumstances of our existence in a finite world. In so doing we can consider whether we wish to conserve the biosphere, and we can see whether our actions are congruent with this desire. If we wish to conserve the biosphere, we can do that. This does not mean that we do not touch it, it means a participation which allows a dynamic to be realized that does not rest on infinity. If we remain in this assumption we will destroy everything. If we do not wish to destroy everything, we will have to reconsider what it is that we desire. Maybe we will not want to continue growing. This is the position of understanding, an expansion of our view, grounded in the knowledge that everything is changing together. This changing together is unavoidable, it is happening whether we notice it or not, and whether we like it or not.

But this business of understanding in a continually changing world requires understanding that whatever we plan will fail. All our plans will fail, precisely because we are embedded in a domain which is much, much larger than the domain in which we have our understanding. So we must be open for failure as an opportunity. When we have a failure, we have an opportunity to think again! After

all, the failure is only a failure with respect to our desires - the system was operating properly according to its coherences, whether or not we had been aware of that. The system itself didn't "fail". If we act knowing that we shall never have the perfect answer in absolute terms, we shall be able to proceed in a way that the biosphere is not destroyed, and the homosphere does not become a robosphere.

This is what I desire. I would like to keep both the homosphere and the biosphere. That requires freedom to change, and to change requires an understanding of what one wants to conserve. And it requires an acceptance of failure as an opportunity for reflection, for doing something different, not for guilt or despair.

Yet, our problem in the long run is our blindness concerning the finite nature of the system we are embedded in. As long as we remain in this blindness, our possibility for cooperation is constrained.

I think that in the end our fundamental resource is the fact that we are the kind of animal that we are. We are the kind of animal that can enjoy beauty, that can reflect on what we do, and act in accord to whether we like it or not. We are a loving animal for whom aesthetics and ethics are a fundament of our well-being.