On the autonomy of systems

A conversation: the limits of external determination

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(*Excerpt from a recently published book*[1])
(*Extraits d'un livre récent*[2])

Poerksen: In the process of your epistemological re-orientation you learned from experiments. This is the classical procedure of the realists: They test a hypothesis, it fails, – and they modify it. The circumstances, the real world, force them to revise their ideas. The course and the direction of your thinking, are they not essentially realistic?

Maturana: This is an interesting point. We might, of course, say that I acted like a realist when I changed the traditional problems of the theory of knowledge in such a way as to become an opponent of realism. But that is not of primary importance. I would claim that it was as a scientist and not as a philosopher that I tackled the problem of the possible existence and the degree of influence of an external reality. The distinction between science and philosophy that I am suggesting here has to do with the question of what the philosopher and the scientist want to preserve when they develop a theory. Their intentions are different.

Poerksen: What are they like? Could you clarify your distinction between philosophy and science in detail?

Maturana: Philosophical theories arise when we try to preserve certain explanatory principles that we consider valid a priori. This interest in the preservation of principles and their coherence justifies disregarding what may be experienced. Scientific theories, on the contrary, arise when we want to preserve the coherences in relation to what we are capable of experiencing. The scientist can, therefore, ignore principles, dissolve them, – and design a scientific theory. That is precisely what I did. I began with the coherences within experience, I investigated the colour perception of pigeons, i.e. I investigated the operations of living systems - and had to do terrible things to them for the purposes of my research. The question as to whether an external reality really existed had little relevance for me; it was not one of my problems.

Poerksen: Can you see experiments and experiences that might refute your present claims and put you back on the path of realism?

Maturana: I could only give up my views if the structural determinism to which all systems are subject were no longer in force. What happens in any system, we must bear in mind, is necessarily determined by its structure and not specifiable by external influences.

Poerksen: How would you like such a theory to be understood? What kind of truth status does it have? Is it perhaps even true in an emphatic sense?

Maturana: Of course not. The assumption that living systems are structure-determined systems is in no way related to an observer-independent reality; it is an abstraction resulting from the coherences that observers may experience. To abstract means to grasp the regularity of some process and formulate it without paying attention to the actual elements involved. Whenever I discuss the structural determinism of a system, I do not describe ontic or ontological facts or some truth, I merely present an abstraction from my experiences as an observer.

Poerksen: What do you mean by *structural determinism*? How would you define the

concept?

Maturana: When you press – for instance – the key of your recording machine with your index finger in order to record our conversation, then you expect the machine to record. Should the machine fail to do so, you would certainly not go and see a doctor to have the functioning of your index finger checked. You will take the recording machine to someone who understands its structure and will, therefore, be able to repair it so that it will react to the pressure of your index finger in the appropriate way. This means that we treat your little recording machine as a system in which everything that happens in it or to it, happens determined in its structure. I call this condition structural determinism, and I call this kind of system structure-determined systems. Moreover, we human beings deal only with structure-determined systems, and we are structure-determined systems ourselves.

Poerksen: In what ways? Could you give another example?

Maturana: Suppose you see a doctor about a pain in your stomach. You will be properly examined – and perhaps your appendix will be removed. So you will be treated like a structure-determined system: the pain you felt before the operation and the relief you experienced afterwards were both determined by your structure and its modification by the doctors. More generally, this means that an external agent impinging on some molecular system triggers certain effects but cannot determine them. Any impingement from outside merely triggers some structural dynamics; all its consequences are, however, specified and determined by the structure of the system itself.

Poerksen: Is this so? Let us assume I offer you medicinal tablets or hard drugs and we both take some; we shall experience similar things. Drugs have quite specific effects.

Maturana: Perfectly correct, but the similarity of our experiences does not refute structural determinism at all. Taking drugs means bringing molecules with a specific structure into your organism, which then become part of it and modify the structure of its nervous system. What happens will, however, necessarily depend on the structure of the nervous system itself. Without receptors inside the organism for the substances you put in, nothing can happen at all. A receptor, one must remember, is a specific molecular configuration that matches the structure of the substance in question, a drug, for instance. In this way, a change in the organism is triggered.

Organisation and structure

Poerksen: Perhaps we should put aside, for the moment, further illustrative examples and turn to the vital problem of the new concepts and the new kind of language that are definitely needed now to express what is traditionally called *stimulus* and *input* and is supposed to control the behaviour of living beings. Terms of this kind, although still widely current in our everyday thinking, can no longer be used because they obviously imply direct and monocausal influence.

Maturana: That is correct. The mistaken concept of instructive interaction must be corrected by an alternative idea: Whatever happens in a living being is determined by its structure and not by the structure of the external agent. From the perspective of the commenting observer, I speak, therefore, of *perturbations* to which a living being is subjected. The observer perceives some entity that, in his view, impinges on the system and triggers structural changes in it that do not lead to the destruction of the system but permit it to preserve its organisation. This form of encounter I call perturbation. Another possibility is that the system loses its identity and falls apart. In this case, a destructive change has taken place. When somebody pushes me I can say: Don't perturb me! When she hits me on the head with a hammer, however, the potential change of my structure may be dangerous and lead to my destruction. The correct expression for me to use would be: Don't destroy me!

Poerksen: Could you describe these variants of change in people, things, and systems more precisely?

Maturana: Here is a little story. One day I gave one of my sons a number of tools but forgot to give him wood to practise a little carpentry and test his new tools. When I came home from work, he had sawn off a corner of our table to have some wood for his purposes. „You have," I said to him, „modified the structure of my table." The table could still be used and had not lost its identity. Its structure was different now; its organisation had stayed the same. A few months later, looking for a board, my son had sawn a large chunk out of the tabletop. I could explain to him now that he had not only changed the structure of the table but also destroyed its organisation. „Now," I said to him, „I have no longer a table." What the story tells us is that distinguishing between the organisation and the structure of a system allows us to specify more precisely how a system may change. Had I wanted to make sure that the table remained intact I should have explained this to my son early enough.

Poerksen: This conceptualisation of yours solves the classical problem of identity and change, stability and transformation. It answers the old question of philosophy: How can something change and yet remain the same?

Maturana: The distinction between structure and organisation permits us to grasp the different ways in which any system may change and remain recognisably the same system. We can alternate flexibly between the consideration of identity and change. The structure of a system, which may change and whose modification may lead either to the preservation or the destruction of the organisation of the system, refers to the components actually given and the relations between these components that constitute a composite unity as a special kind of unity. The structure of a unity makes this unity a singular case from a particular class of unities. A table may have quite diverse structures; it may, for example, consist of wood, glass, metal, or some other material, but this does not affect its identity as a table. The organisation of something is, however, invariant. It refers to the relations between the components that let us recognise what class a composite unity or system belongs to. A table is – independently of its particular structure – always recognisable as a table because it exhibits a particular organisation. As my son demonstrated, the structure of a table may be changed so drastically that its organisation is destroyed, too; the table no longer exists, having lost its „tablehood."

Poerksen: How should we evaluate the sort of structural change that you call perturbation? The concept of perturbation has often been paraphrased as „disturbance" or „interference," making the environment a mere source of irritation for living beings, e.g. humans. This sounds very negative. I would prefer to think that perturbations might just as well be inspiring and uplifting events.

Maturana: Certainly. A perturbed person may be inspired, perhaps irritated, even disturbed, or terrified. Any system-independent evaluation of a perturbation, negative or positive, would be misleading. The concept cannot be used to justify any such evaluations.

Poerksen: Can the distinction between the traditional idea of an input and the concept of perturbation be made more precise? What is the central difference?

Maturana: The concept of input implies that there is direct influence, that something from the external world enters the system and determines what happens and occurs there. Such a view simply cannot be defended because it rests on the false presupposition of instructive interaction and contradicts the structure-determinism of all systems. When a perturbation occurs, a system encounters an entity that triggers a structural change without destroying the system. The concept of perturbation is in correspondence with the idea of structural determinism.

Poerksen: We could say, though, that those who are unable to intervene instructively and manipulate in a direct way simply do not know enough. They do *not yet* understand the systems in question. Apparently all the gurus, the psychotechnologists, and the successful salespeople, possess sufficient knowledge to be able to control the behaviour of living systems - other people - in a very efficient way? Seen in this way, the impossibility of instructive interaction is a problem of knowledge and of the difficulties of understanding.

Maturana: Of course, people may believe that they have special abilities and insights and are therefore able to transform a perturbation into an input and perform an instructive interaction after all. Such an erroneous conviction cannot, however, in any way serve as an argument to invalidate the structure-determinedness of a system of whatever kind. Two systems can encounter each other only on the level of their structures; and their specific structures – the components and the relations between these components – determine what happens in each system due to this encounter. When we analyse what the gurus and the successful salespeople actually do in the course of their manipulative activities, we realise immediately that they always operate with a special understanding of the structures of the systems which they perturb. They exploit the properties of the systems, e.g. the character traits of humans, their desires and needs, and with their insights they are able to trigger some behaviour in the other people which serves their own interests.

Poerksen: Is such insight not dangerous? If one has a grip on the logic of a system, the idea of manipulation is not far away: Systemic insight becomes the basis of even more effective control and dominance.

Maturana: I do not share such a view. I think that people who understand a system and use their knowledge accordingly, need not necessarily act in a manipulative way; such an evaluation of their actions requires knowledge of the emotions underlying these actions. Actions based on the understanding of a system might, on the contrary, be interpreted as an expression of particular wisdom. This means that I do not consider manipulation as a specific kind of action but rather as a specific emotion giving shape to some special activity. To manipulate means pretending to do something for someone but actually operating only in one's own interests. Manipulating people means cheating and lying. A liar knows that he is lying. That is, if you wish, the beauty of a lie.

Poerksen: If I had to reduce our conversation about structural determinism to one conclusion, it would be this: systems are autonomous; one can invade them only according to their own specific conditions but not determine what occurs and happens inside them. Would you agree?

Maturana: I would agree as long as autonomy is understood as *self-governance* and does not imply that a system can be separated from its medium. That would be completely unthinkable. There is no autonomy in this sense because every living system exists in a medium. What influences a system, however, is determined by its internal dynamics, which shapes these influences in quite particular ways. When the system finally dies, this means that it was incapable of keeping itself alive, that it lost its autonomy.

Understanding responsibility

Poerksen: In what sense are human beings autonomous? It would certainly not be quite correct to say that they are completely free.

Maturana: Autonomy in the human domain means that what is uniquely characteristic of a person is preserved. Freedom is something else: a human experience requiring reflection. Strictly speaking, there is no freedom at all; strictly speaking, there are no alternatives because every happening and every action results from the correspondence with the structural coherences of the moment. Persons ignorant of the given structural coherences believe that they see alternative ways of action. Arriving at a road junction, they can choose between two directions. They see, for instance, two alternatives for continuing the journey, which they consider identical because they do not know which to take, which is the better one. In such a situation, they must first create a difference and learn to see both directions as distinct in order to be able to choose. Perhaps they will flip a coin and so make way for processes revealing a difference that will finally permit a decision in correspondence with the given structural coherences of the moment.

Poerksen: You insist that human beings are structure-determined systems, too; they are

autonomous but not free. Stressing the feature of determinism in such strong terms, how can you still speak about responsibility in a meaningful way? My thesis is: Only those who recognise themselves as free can claim responsibility for their actions.

Maturana: Perfectly correct. Living systems cannot act responsibly because they know no purpose or goal; they simply live in the flow of existence. Only human beings can assume responsibility in the domain of relations because they exist in language. They are capable of describing a certain action as responsible. Language enables us to reflect and distinguish the consequences of our actions for other living beings. In this way, our caring for other people gains presence – and the possibility of responsible action arises.

Poerksen: But, surely, this requires freedom. Any person desiring to act ethically must have the freedom of choice and self-determined decision. Repeating the question: Do not your key concepts of structural determinism and your special understanding of autonomy force you to abandon the idea of freedom and, consequently, the possibility of responsible action?

Maturana: The experience of choice and decision, which we human beings make, does not at all contradict our structure-determinedness. Human beings will always remain structure-determined systems; they may, however, by virtue of a perspective opening up in a meta-domain, make the experience that they have a choice. Then they move in another domain but still operate as structure-determined systems. This experience of the potential choice between different possibilities, however, is a unique characteristic of the human species and requires language. Having a choice presupposes the ability to observe and compare at least two different situations appearing at the same time, and then to adapt one's perspective in such a way as to be able to make out a difference between these situations. At first one sees only sameness and is blocked. A change of perspective and position may enable us to see potential distinctions in what appears to be the same; then we can move – according to our own preferences and ways of life – and choose one possibility while negating others. As this process is an intentional act in the language of living beings, it is possible to classify it, from the point of view of an observer, as a process of choice.

Poerksen: Does this mean that it is the meta-perspective that makes it possible to identify an action as an act of choice and decision?

Maturana: Exactly so, yes. Only from this perspective does it become possible to characterise something as a choice and a decision between different possibilities. We perform an operation on a meta-level because we have the ability to use language and to make ourselves aware of an event and its consequences. In this act of becoming aware, the phenomena we are dealing with are transformed into objects of contemplation. We gain a form of distance that we lack when we are completely immersed in our activities and situations. If we accept this and consider it adequate, an action may then be described as *responsible* or as *irresponsible*.

Poerksen: Could you elucidate these ideas by means of a particular case?

Maturana: Some time ago, reports travelled round the world that a boy who had been trying to get to Miami together with his mother in a small boat from Cuba was saved from drowning by dolphins. For some reason, their boat sank and the mother drowned. The boy, however, was kept afloat by a school of dolphins, saved from drowning, and finally rescued. What those dolphins did we can, as beings living in language, describe as *responsible*. The dolphins do not, as far as we know, possess the ability to comment on their activities and to tell us about what happened between them and the boy floating on the sea. However, *we* are capable of talking about the relationship between those animals and the boy because we operate in the domain of language. We can characterise what happened as an effort to keep another being alive. From this meta-perspective the activity of the dolphins appears as a responsible action.

Poerksen: To act responsibly, then, means to care for someone else and, at the same time, to reflect on the consequences of what one is doing in relation to the circumstances in which one does what one is doing.

Maturana: Exactly. People are aware of the circumstances and reflect the consequences of their activities. They ask themselves whether they want to be what they are as they are doing what they are doing. In the moment of self-observation, all the certainties and securities of the state without reflection disappear. When, through the linguistic operation, a form of contemplation and an awareness has been generated that allows observation, then people will, at the next step, act according to their own preferences, that means they will act responsibly. And when they, at a further step, try to find out whether they value their own preferences and intend to maintain them, then they are free. Do I like my predilections? Do I like the decision I have taken and of which I have just said that I like it and that it corresponds with my desires? In this moment of the reflection of their own choice, there arises the experience of freedom, although they nevertheless operate as structure-determined systems.

Poerksen: I want to keep on questioning: How can a structure-determined system feel responsible for its own actions? If I cannot control and influence others then the effects of my activities become completely incalculable. We are confronted by a *paradox of responsibility* because we are to be held responsible for something the consequences of which we could not possibly foresee. Doing good may potentially trigger terrible consequences (and *vice versa*).

Maturana: The concept of responsibility is ambiguous. Some authors mean by responsibility that we must be accountable for all the possible consequences of an action. Responsibility then means causation. For me, responsible action is a question of awareness. Persons act or fail to act in the awareness of all the possible and desirable consequences of their actions. It is not necessary for the consequences of an action to be fully calculable and foreseeable; there may indeed be undesirable consequences in the end. In my view, being responsible simply means to be in a certain state of attention and mindfulness: one's activities and one's desires correspond in a reflected way, that is all.

Poerksen: The concept of responsibility is, for you, not linked to the idea that it is possible to plan the consequences of an action?

Maturana: This is not relevant. To plan something means to envisage ways and procedures for achieving a certain result and to subordinate the next chosen steps to this imagined result. These consequences need not come about, however, and perhaps they exist only in the minds of particular people. It is crucial, in any case, that the people designing things in this way live responsibly and act in full awareness of the possible consequences of their actions. They are responsible for what they say and do. Nevertheless, they are not accountable for what other people make of what they say and do.

A miracle is needed

Poerksen: You locate the experience of responsible action and freedom at the level of reflection. In this way, as I see it, the experience of freedom may be reconciled with structural determinism. How can we now view the phenomenon of surprise from your perspective? The idea of the structure-determined system certainly suggests that all behaviour can be calculated and predicted.

Maturana: People making predictions speak of their expectations as observers. They believe to know all the factors influencing a system and assert that certain states will result from other states that we can then observe. Living systems, however, are not calculable in this sense although they operate in a structure-determined way. Structural determinism does not entail predictability but is related exclusively to the structural coherences of the moment, which change all the time. By the structure of a system I mean, let me recall, the components and the relations between these components, which make it a particular kind of system. When the components or their relations change, the structure is transformed. If you slide around on your chair, then you change your structure; if you speak or keep silent and listen, then your structure changes. It is not rigid and firm but in constant change.

Poerksen: We are now left with the mental exercise to explore under what conditions structural determinism might no longer be operative. In other words, can you state conditions under which something dead or alive would no longer be subject to universal structural determinism?

Maturana: Only the advent of a miracle can violate structural determinism. Suddenly the impossible seems possible, inexplicable and totally unexpected things happen. An example: Imagine a person that deserves to be called a saint. Proof of the person's sainthood are frequent miracles supposedly worked by, and attributable to, that person. There are people suffering from diseases incurable according to present medical knowledge who, having prayed intensively to the saintly person for help, suddenly get well again to the doctors' surprise. Their affliction disappears and they recover again. What has happened? We do not know, and it will perhaps remain a mystery forever. A phenomenon of this kind exhibits the central property of a miracle: the apparent suspension of structural determinism.

Poerksen: The philosopher Karl Popper and the disciples upholding his theory of science demand that the conditions within which assumptions may be tested must always be stated explicitly in order for them to be refuted or falsified. Only the fulfilment of this requirement can raise an assumption to the status of a proper scientific hypothesis. Does it not give you an uncomfortable feeling to have to accept that structural determinism is more or less unfalsifiable? A singular miracle experienced by a few people cannot really serve as a counterexample.

Maturana: Please remember that Karl Popper merely wants to define the particular situation or the specific phenomenon that might potentially falsify a hypothesis. We must be able to envisage the conditions of falsification: that is the requirement he proposes. And it is precisely this requirement that I can meet by stating the crucial condition of falsification: Only a miracle could invalidate structural determinism. The practical difficulty or impossibility of falsification is not relevant in Karl Popper's theory about how to decide whether some assumption is a scientific hypothesis or explanation. An explanation remains valid until it is refuted.

Poerksen: Are you expecting a falsification? Are you waiting for a miracle?

Maturana: No. And I do not think that we could really do very much with miracles; they seem to me to be rather impractical events. Just remember the story of King Midas of Phrygia who offered his services to the god Dionysos. It shows - in a satirical way for me - the uselessness of miracles that suspend structural determinism. Dionysos asked King Midas what kind of reward he wanted for his services. King Midas answered that he wanted everything he touched to turn into gold. And that is what it happened. He touched the grass – it became gold; he touched the table – gold! Happily, he went home, and his daughter came running towards him; he embraced her – and she became rigid and turned into a golden statue. What is the tragedy of King Midas? My answer: His tragedy was that he had no chance of becoming an analytical chemist. Everything he touched was the same for him: gold.