

The Nature of Time

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I do not wish to deal with all the domains in which the word time enters as if it were referring to an obvious aspect of the world or worlds that we human live. Indeed, the very fact that time can be made an issue of reflection shows us that what the word time connotes changes with the circumstances in which it is used. This situation alone, however, would not constitute a problem inviting us to enter in deep reflections if we just accepted that the context defined the meaning of the word in each case. But we do not do that, and we ask the question *what is time?* as if we thought that the word time referred to some independent entity or dimension of nature that could be properly disclosed or described if we tried hard enough, even if we could not the final essence of it. I consider, however, that the question *what is time?* is adequate because it implies from the start the view that *time* can be properly treated as some kind of independent entity or dimension of nature. And I consider that such a view is fully inadequate because I think that all that we human beings talk about are relations that arises in our operation in language as a closed domain of recursive consensual coordinations of behaviors. Let me explain what I say with a few words about living, language, and cognition, and then answer the question *what distinctions do we make or connote when we talk of time?*

Living

Living takes place in the now, in the moment in which it is taking place. Living is a dynamics that disappears as it takes place. Living takes place in no time, without past or future. Past, present and future are notions that we human beings, we observers, invent as we explain our occurrence in the now. We invent past as a source of the now or present, and we invent future as a dimension that arises as an extrapolation of the features of our living now, in the present. As past, present and future, are invented to explain our living now, time is invented as a background in which past, present and future can take place. But life, living, takes place as now, as a flow of changing processes. To say this, of course, is a manner of explaining the experience being now in which we find ourselves as we ask for the explanation of our living, of time, ...

Language

I have maintained, and I think shown, in other publications, that language is a manner of flowing in living together in recursive consensual coordinations of behavior, and that languaging consists in operating in a network of consensual coordinations of consensual coordinations of behaviors, in a relational dynamics of consensual coordinations of behaviors that is constitutively open to endless recursions¹. Moreover, we are, as living systems, structure determined systems, and nothing external to us can determine or specify what happens in us. So, the external agents that at any instant impinge upon us can only trigger in us structural changes determined in us by our

structure at that instant. As a result, all that we do at any instant arises in us determined in us by our structure in that instant, either as a result of our closed internal structural dynamics, or as a result of the modulation of that internal structural dynamics by the structural changes triggered in us by the interactions in which we participate. In these circumstances, we would have to say that we are constitutively "blind" to the intrinsic features of the medium as an independent reality, if to speak about the intrinsic features of an independent reality had any sense. This situation has the following basic consequences for understanding what we do and what happens in us as languaging beings.

- a) Languaging as a manner of flowing in recursive consensual coordinations of behavior, is a manner of living in coordinations of doings, not a manner of symbolizing the features of an independent reality. That is, languaging is a manner of living in doing things together in the particular domain of consensual doings in which the languaging is taking place through the flow of the interactions of the participants. We human beings exist in language, and as we language we can say nothing outside language.
- b) The way that we participate in the flow of languaging at any instant arises as a result of our interactions at that instant according to our structure at that instant. So, what we do in language at any moment is determined by our structure at that moment regardless of how we became with that structure at that moment.
- c) The main result of our recursive interactions in language is that our structure changes in manner contingent to the course of our languaging in the flow of those interactions. That is, we become in our structure moment

¹Humberto R. Maturana, 1982 *Erkennen: die Organisation und Verkörperung von Wirklichkeit*. Vieweg Verlag.
Humberto R. Maturana, 1991. Reality: the search for objectivity or the quest for a compelling argument. In: *Die Gedankenwelt Sir Karl Popper*. Edited by: Norbert Leser; Josef Seifert; and Klaus Pitzner. Carl Winter, Universitätsverlag. Heidelberg 1991.

after moment according to the course of our languaging, and we language moment after moment according to our structure at that moment.

d) We human beings exist in language; that is we are the kind of beings that we are as we operate in language and we arise in our languaging in the flow of our recursive consensual coordinations of consensual coordinations of behaviors. Or, in other words, we exist in a close dynamics of languaging and everything that we do as humans takes place in our languaging as a flow of consensual coordinations of consensual coordinations of behavior. So, all that we say or may say, all that we may distinguish as we do what we do as observers (as human languaging beings), takes place as an operation in consensual coordinations of behaviors without making any reference to anything outside our languaging. Whether we act as ordinary humans, philosophers, biologists, physicists, artists, or what ever, in the same.

e) Objects arise with language as consensual coordinations of behaviors that coordinate behaviors. As consensual coordinations of behaviors the coordinations of behaviors that constitute the objects operate as tokens for coordinations of behaviors, and as such obscure the behaviors that they coordinate. Furthermore, in the recursive consensual coordination of consensual coordinations of behavior of the flow of languaging, many domains of objects arise as different kinds of operations in coordinations of behavior become tokens for coordinations of doings in different domains of consensual coordinations of doings.

f) Ideas, concepts, notions, . . . constitute domains of objects that arise as abstractions from other domains of objects, and give rise to domains of coordinations of doings that they define or are defined through them. As the different kinds of objects correspond to different operations of coordinations of behaviors, abstract objects (ideas, concepts, notions) constitute the fundament for theoretical systems that bring forth coordinations of behaviors in the domains of consensual coordinations of behaviors from which they are abstractions.

In our culture we live our existing in language as if language were a symbolic system for referring to entities of different kinds that exist independently from what we do, and we treat even ourselves as if we existed outside language as independent entities that use language. Time, matter, energy, . . . would be some of those entities. Such attitude leads us to act as if we could characterize those entities in terms of their intrinsic independent nature, which I claim cannot be done because as soon as we say anything, what we bring about takes place in a domain of languaging as an operation in recursive consensual coordinations of behavior.

Cognition

The main consequence of our existing in language is that we cannot speak about what is outside it, not even imagine something outside language in a way that would make any sense outside it. We can imagine something as if it existed outside language, but as we attempt to refer to it, it arises in language characterized with the elements, concepts, and notions that arise through what we do in our languaging. Nothing exists in human life outside language because human life takes place in language, and although we may imagine an independent, objective reality, that which we imagine is not independent from our languaging. Indeed, as we reflect about this matter it becomes apparent that the notion of reality is an explanatory assumption that we human have invented to explain what we distinguish as our experiences in the happening of our living as if it existed independently of what we do.

I refer to this situation by saying that although we may claim that an independent reality seems necessary for epistemological reasons to explain human experiences, we can say nothing about it. Not even the notion of an independent reality has any sense outside languaging, and if such a notion were adopted would either be irrelevant, or be used as an explanatory *a priori* principle. But at the same time, it is apparent that not to have access to something that could be properly called an independent reality is not a limitation for our living or doings since nothing that we do in the flow of the consensual coordination of behavior in which we exist requires the notion or assumption that there is an independent reality. Reality, the notion or reality, is an explanatory assumption adopted as an explanatory principle taken as self-evident. If one is not aware of this, as happens in our culture, or if one is not willing to follow fully the implications of such awareness, as happens in various branches of our occidental philosophical tradition, one treats the notion of reality as referring to a domain of independent entities (of any kind) that would exist with independence of what the observer does. Yet, if through understanding language in the awareness that as living systems we are structure determined systems, we chose to follow the consequences of such awareness. we may become aware of several basic conditions which otherwise we do not see.

a) As we become aware that reality is an explanatory notion or assumption, we release the belief in it as a domain of entities that exist with independence of what an observer does, and we become aware that what we indeed do as we explain our experiences is to use our experiences to explain our experiences. That is, we become aware that as we propose an explanation we use the coherences of our experiences to propose a mechanism (a

generative mechanisms) that if allowed to operate would generate in the observer the experience to be explained².

b) We become aware that there are as many domains of explanations as domains of experiential coherences we human may live. At the same time, we become aware that the notion of structural determinism refers to the regularities of the coherences of our experiences, and that we operate in our life in as many domains of structural determinism as a domains of experiential coherences we live in the flow of our experiences.

c) We become aware that we do not experience things as features of an independent world, and that as we speak of experience we refer, as I said above, to that which we distinguish as happening to us as we operate in language attending to what happens to us as we live. At the same time, we become aware that as experiences happen to us, they happen to us out of nothing, out of nowhere, in a manner that we live in the comfort of living them as part of a known domain of experiential coherences, or in a manner that surprises us because they seem to take place outside the coherences of our other known experiences. If the latter is the case we may want to explain them, and we shall explain them when we make those experiences part of an already known domain of experiences, otherwise we shall remain in awe until we do so.

d) As we become aware that we find ourselves already living that which we distinguish as happening to us we distinguish it, and that our experience arises out of nowhere, we become aware that as we explain our experience with the coherences of our experiences. That is, we become aware that all our explanations take place in a closed domain, and that reality and other explanatory notions are *a priori* assumptions that do not take out of the explanatory domains in which we exist as languaging beings.

e) We become aware that the notion of structural determinism is not an assumption about an independent reality, but that it is an abstraction of the regularities of our experiences. Moreover, we become aware that, it is because structural determinism is an abstraction of the regularities of our experiences that we can use structural determinism to explain our experiences with the coherences of our experiences. Finally, we also become aware that we live as many domains of structural determinism as domains of experiential coherences we live, and every domain of explanation is indeed a domain of structural determinism.

In these circumstances, what is it to know? From what I have said, to know cannot be to make reference to an independent reality since that is something that we

as languaging beings cannot do. Yet, if we attend at what we do in our daily and technical life, we may notice that we claim that we know, or that some other being knows, when we see that we or the other being behaves adequately in some domain that we specify with a question, and does so according to some criterion that we put for what is adequate behavior in that domain. Knowledge is an interpersonal relation in the domain of consensual coordinations of consensual coordinations of behaviors. Or, in other words, knowledge is something that we attribute to ourselves or to some other when we see what we consider adequate behavior in a particular domain in ourselves or in the other, and we frequently use the attribution of knowledge for doing something together in some domain of coordinations of behaviors. If we are not aware of this situation, we act treating knowledge as a manner of referring to entities that are assumed to exist in reality, that is, in a domain of entities that exist with independence of what we human beings do. In these circumstances the search for knowledge becomes a never ending quest of the thing in itself.

That knowledge is not, and cannot be a manner of referring to a domain of entities that exist with independence of what we humans do as languaging beings, is not a limitation or insufficiency in the domain of knowledge, it is a constitutive feature of the phenomenon of knowledge. In fact, that knowledge should be a manner of living together in consensual coordinations of consensual coordinations of behaviors, is the condition that makes knowledge a domain always open to transformation, and human life open to continuous transformation through knowledge as experiences arise in human life from nothing (chaos). In these circumstances, what about time?

The Nature of Time

We belong to a culture that lives mostly, and particularly in the domains of science, philosophy and technology, in the explicit or implicit acceptance of some kind of independent reality as the ultimate reference for all explanations. This attitude permeates our manner of asking question and our listening for answers. Thus, in our culture as we ask the question what is *time*, we expect an answer with the form of a reference to some kind of independent entity, in the implicit understanding that such reference will give universal validity to our answer. According to what I have said that reference cannot be done, not due to a limitation in our capacity for knowing, but as a feature of the nature of the phenomenon of cognition. Therefore, that which we connote with the word time cannot be a thing in itself.

²Humberto R. Maturana, 1990. Wissenschaft und Altagesleben: die Ontologie der wissenschaftlichen Erklärung. In: "Selbstorganisation Aspekte einer wissenschaftlichen Revolution" Edited by: Wolfgang Kröhn und Gunther Küppers. Vieweg Verlag, Wiesbaden.

In our culture the notion of time is used as an explanatory notion or principle in the same way that the notion of reality is used. But if we are aware of this situation, and we are aware that the word time cannot refer to an entity that exists independently of what we do, we must ask our questions differently as we ask about to that which we connote in daily and technical life when we use the word time. What features of the coherences of our experiences do we connote or abstract as we use the word time?

a) We use experience to explain experience. Explaining time, therefore, is an operation that I shall perform with element of the domain of our experiences. Accordingly I shall use features of our daily experience, not notions external to it, as I explain or describe what I think that we do as we use the word time. Experience is our starting condition both to ask question and to answer them. Thus, I shall start from finding ourselves doing and in the capacity of doing all that we do daily or technical life. Experience is not our problem as we want to explain what we do, explaining it is our task.

Similarly, the use of the word time or any other word in daily life is not the problem, but to explain or reveal what we do as we use them, or how we live them is.

b) I maintain that the word time connotes an abstraction of the occurrence of processes in sequences as we distinguish them in the coherences of our experiences. As we distinguish sequences of processes, we also distinguish simultaneity of processes as a feature of our experiential coherences that we connote with the expression “at the same time”. Such an abstraction is made possible in the first place, because in the operation of our nervous system sequences of activities are distinguished as configuration of relations of activities on the surface of the nerve cells in the generation of the nerve impulses. As a result that which from the perspective of an observer is an operation in time, in the distinction of time as an abstraction of a process appear as an operation in the present.

c) At the moment of the abstraction of the relation of sequence in the distinction that we call time, time arises in the experience of the observer with directionality and irreversibility. Even in the case in which we distinguish cyclical reversible processes, we make such a distinction in the context of the directional irreversibility of time that permits the distinction of the sequence process and its reverse as a process configuration that we call reversible time. So, reversible time is an abstraction of a particular irreversible and directional experience.

d) Once time arises as a distinction in the domain of the experiences of the observer it becomes an operational entity that in our culture appears as having independence from what the observer does. An this is so because once

time has arisen it can be used by the observer (any one of us as a languaging being) in his or her reflections on the regularities of his or her experiences precisely because it arises as an abstraction of the regularities of his or her experiences. With the notion of time, therefore, happens the same as with the notion of structural determinism that is also an abstraction from the regularities of the experiences of the observer, which can be use to deal with the regularities of the coherences of the observer precisely because it arises as an abstraction from them.

e) I consider that what I have said is valid in any domain, including, of course, physics. The domain of physics arises as a domain of explanations of certain kinds of experiential coherences of the observer through the use of certain kinds of experiential coherences of the observer. So, physics is not a primary domain of existence, it is a particular domain of explanations of a particular domain of experiential coherences of the observer. Theoretical notions are abstractions of the experiential coherences of the observer in some domain, or at least are intended to be so. Due to that condition, theories are operationally effective only in the domain where they apply as such abstractions.

f) Unidirectional time and reversible time arise as theoretical notions in physics as abstractions that the observer makes of his or her experiential coherences and that he or she denotes with the words time and reversibility. As theoretical notions unidirectional time and reversible time can be handled as entities that have operational effectiveness in the experiential domain from which they are abstractions. That seems obvious. What is not so obvious, however, is that we frequently forget that unidirectional time and reversible time are indeed abstractions of the experiential coherences of the observer as I have indicated above. When the latter happens, we treat unidirectional time and reversible time as if they were entities that exist independently from what we do as observer, or as if they were reflections or representations of such independent entities, and we generate conceptual and operational conflicts. When the latter happens we do not even see that mathematical formulations in theoretical propositions arise only as effective in their coherences as the abstraction of the coherences of the experiences that they represent.

As the notion of time has been generated as an abstraction of our experiences of sequences of processes in the many dimensions and forms of our human existence, it has been generated in relation to the multiplicity of forms in which we live. As a result there are as many forms of time as forms of abstracting the regularities of the experiences of processes and sequences of processes. Thus we speak of fast and slow time, passing time, letting time pass, having or not having time, time

coincidence, networks of time, simultaneity, ... in many different fields of experiences, and in all cases we refer to the same kind of abstraction in the domain of sequences of processes. Indeed, each domain has its own time dynamics as it has its own process dynamics. The awareness that the notion of *time* arises as an abstraction from the coherences of the experiences of the observer that he or she uses as an explanatory notion is not a problem. What becomes a problem in the long run, is the unaware adoption of the notion of *time as an explanatory principle* that is accepted as a matter of course giving to it a transcendental ontological status.

Finally

I have answered the question *what distinctions we connote when we talk of time?* by showing: 1), that we do not and cannot connote an entity or natural dimension that exists with independence of what we do as observers (humans); and 2), by showing that we use in daily life the word time to indicate or to connote an abstraction of our experiences of the succession of processes. In other words, I have shown that the foundations of the notion of time in any domain rests on the biology of the observer, not on the domain of physics which is a domain of explanations of a particular kind of experiential coherences of the observer. Furthermore, in this process I have also shown that as time arises as a primary abstraction of the flow of experiences of the observer, it arises with directionality and irreversibility, and that reversible time arises only as a secondary further abstraction of the experiences of the observer that is possible only in a domain of unidirectional and irreversible time. Finally, I claim that the *notion of time* is frequently used as an *explanatory principle* giving to it a transcendental ontological status.

The observer is not a physical entity, the observer is a manner of operation of human beings in language. It is through the operation of the observer that all domains of cognition arise, even the domain of observing. Physics is the manner through which the observer explains with the

coherences of his or her experiences a particular domain of experiences that is connoted with the word physics. Indeed, the observer itself arises as an entity of which we observers may talk through the operation of the observer constituting the fundament for all that we humans do. No doubt we behave in our living as if we lived in a world that existed with independence of what we do, and that we call *reality*. And it is basically for this that we may ask about how do we know *reality*, or *time*, as if we were properly referring to something that exists independent from what we do. My concern has been different. My question is not about reality of time, or any other kind of entity, as if its independent existence could be taken for granted. My question is and has been here about the experiences or operations that we do as observers when we use different notions, concepts or words as implying distinctions of entities or features of an independent world.

Experience, that which we distinguish as happening to us is never a problem unless we accuse each other of lying. It is the explanation of experience, what constitutes a problem as a source of conflict. Experience arises spontaneously literally out of nothing, or, if we wish, from chaos, from a domain about which we can say nothing which does not arise from the coherences of our experiences. This that I say is valid for any domain of experiences, be this life, physics, quantum physics, human relations, ... All these different domains of experiences are experiential domains lived as domains of explanations of our experiences with our experiences. But our experiences are not disordered, they arise coherent as they arise in us from nothingness. So, we exist in this wonderful experiential situation in which we as observers that exist in the present, are the source of everything, even of that which we may treat in the coherences of our experiences as observers as entities that through their operation give rise to the operation of observing and the explaining of their occurrence in a closed domain of explanations. The great temptation is to transform the abstractions of the coherences of our experiences that we distinguish with notions such as *reality*, *existence*, *reason*, *space consciousness* ... or *time*, into *explanatory principles*.