

Temporal Collision Conjecture

Laurent Dubois - 2002

The question of the determination of a privileged time's arrow tickles the neurons of the most brilliant scientists, writers and philosophers since about 150 years.

Let's show a surprising and frightening possible consequence of the absence of an absolute time's arrow, all the more frightening that totally unpredictable!

Prelude: Origin of time

Let's make some mental gymnastics before burying ourselves in our studies.

Premise: before all, we have to define an essential term in our developments, the notion of "absolute" : by "absolute", we mean "something always & everywhere true, & totally independent of anything !", or a synonym of "totally" !

If one tries to bring a logical answer to the question of the origin of the universe, what does one note ?

From the start, we are confronted with paradoxes and are plunged in perplexity. Indeed, logically, three solutions propose with us:

1) Nothingness : time would come from the absolute vacuum. It's not question of the quantum vacuum full of virtual particles, but pure nothingness. With the clean direction, it is incredible. Time would have emerged from nothing, for example in a Big bang. Would time have to some extent a beginning? But a beginning determined compared to what ? Compared to " nothing " !

2) Eternity : time exists since always, at least in an elementary form, for example a singularity that would be appropriate for the theory of the Big bang. Contrary to the first assumption, the Big bang is only the development of something which exists since always and which did not emerge from nothing. Assumption seemingly as absurd as the first.

3) Infinite : one could not allot a beginning to time, but time is not there since always. We fall into the pit from the infinite regression, quite as incredible as the absolute vacuum and as eternity. This assumption joins a way of seeing of the English physicist Stephen Hawking for whom time has a beginning, but a beginning which moves back ad infinitum.

In fact, it is a combination of the two other assumptions. Maybe it can be seen as a variant, a translation of the "quantum indetermination"; reality cannot have nor not have a beginning!

For confusing that they are, these assumptions, whose the two first are variants of the Kantian first antinomy*, concern all our universe, and if one cannot distinguish among them that which is right, it seems that there cannot be another solution. In other words, the solution can be none of these three assumptions, but there is no fourth possibility; the solution cannot thus be other than one of these three assumptions. Can one still doubt that the world is crazy ?

Let us notice that the absurd character of these 3 assumptions does not appear in an so obvious way than one could believe it in everyone; if there is unanimity for seeing in the "spontaneous universal generation" an affront with the most elementary logic, certain people consider there is nothing surprising to design a universe "eternal"; however, even if the question of Leibniz "Why is there something rather than nothing" appears truncated, since one cannot put on the same level "being" and "non-being", one cannot not be struck dead by this possibility!

* 1) the world has a beginning in time, and it is also limited in space.

2) the world has neither beginning in time nor limits in space, but it is infinite in time as in space.

Let us look further into the study of these assumptions.

First, let's consider a beginning to the time, to the universe. In such a case, it was necessary that

an entity emerge from the absolute vacuum - what implies that it can disappear absolutely. This event constitutes the moment of origin of time and the universal calendar, even if we do not have any means of determining it and in so far as that has a meaning.

But precisely, if time had a beginning, that was in relation to what ? By definition, nothing. Absolutely nothing. Because if a kind of time existed before time, time exists since an infinite time. Retroactively, it was thus necessary to wait an infinite time before the world appears - which recalls us the infinite regression in the time of the birth of the universe according to Hawking.

But does one manage to imagine that it should not have been waited any time before the universe appears ? In a certain way, that means that time exists since always too.

If time has a beginning, it has, according to the observations of the astronomers, more or less 15 billion years, according to our scale of cosmological time, that is to say the age of the Big bang.

On a side, one thinks that if a first entity had to appear, it is that it took a time empties front, other, that seems so absurd to speak about time without reference to only one thinks that to be it since always already appeared, that it appears always already at every moment. Time has direction only at the present, neither with past nor with the future. It is what the image of time like an infinite train seems to suggest, as we will see it in the following chapter.

The question to be posed is: "Does the question of the origin of time have a meaning ?". Apparently not, because time is its own origin. The question of the origin of time has meaning only in time. If one assimilates time to be, to be "being in movement" as well as time, the question of the origin of being does not have more pertinence than that of the origin of time. Thus one realizes that the question "Why is there something rather than anything" is a false question because there is nothing " ", one cannot put "anything" on the same level as "to be". To tell the truth, it is about the same question as that of the origin of time. But it is a new way of considering it. Most disconcerting, it is that we managed to formulate questions which do not have any meaning and which we are deeply convinced that they have one, that they are even the only questions that have pertinence. So that criticisms of "bon sens" which we have just formulated, not convincing us deeply, do not prevent us from returning indefinitely to the question : "why is there something rather than nothing ?"

Absolute appearance and disappearance

The question of the origin of time leads us to question us on the concepts of absolute appearance and disappearance.

Can a thing which disappears absolutely, i.e. there remains strictly nothing, not even the most negligible particle nor the least undulatory form from it in the universe, reappear absolutely in a vacuum left by the universe which aged and which is "elsewhere" in time ? Or does it reappear in the future of the universe ?

In the first case, there can be a new universe all the 10^{-43} S in the past and the future, since the universe behaves as if he traveled in the vacuum, and that the vacuum is an ocean of virtual particles. But that contradicted the law of conservation of energy, modern expression of "nothing is lost, nothing is created" of Lavoisier. Indeed, the object that disappears absolutely from the universe causes a reduction in the mass of this universe.

In the second case, it is about one persistent present; in a certain way, the universe is there without being there, but always there. It does not move in a kind of vacuum nor in time. And that confirms the law of conservation of energy, since any form of being belongs to it.

If an entity is extracted absolutely from the universe during 10^{-43} compared to the calendar that was its reference, the universe is 10^{-43} further than it in time. But is this in the same space?

If this is not the case, how the entity could catch up with the universe? Is it enough for it to accelerate its own time of 10^{-43} ? But how to accelerate its own time ? According to Relativity, it is only possible to slow down the own time of an entity provided that it moves at a speed close to that of the light. One sees badly how to slow down the own time of the entire universe, this expression being probably without any meaning.

And could an entity which would take 10" of delay compared to its initial universe, appear suddenly in the universe which follows " it 10" further, a universe which is not its starting universe ?

From the answer to these questions depends the possibility of a catastrophe that we will evoke at the end of this study.

Nature of time

We are taken giddiness under the effect of this tension between nothing and infinite, but it is nothing yet. We are coming up to the heart of the mystery that coats the object of our investigation.

Permanent tension, evolution : time "is" movement!

Our thesis: time is not only the measure of movement, time "IS" movement !

Perhaps it is not from science that it is necessary to wait the most powerful testimony of the intrinsic and irreducible movement of reality. It is the place and the moment to point out the quotation of Wells already evoked in "Time Travel, Logic & Speculation I" :

"Can a cube that does not last for any time at all, have a real existence?"

...'Clearly,' the Time Traveller proceeded, 'any real body must have extension in FOUR directions : it must have Length, Breadth, Thickness, and--Duration. But through a natural infirmity of the flesh, which I will explain to you in a moment, we incline to overlook this fact. There are really four dimensions, three which we call the three planes of Space, and a fourth, Time. There is, however, a tendency to draw an unreal distinction between the former three dimensions and the latter, because it happens that our consciousness moves intermittently in one direction along the latter from the beginning to the end of our lives.' (The Time Machine)

Perhaps these lines constitute the major remark that was ever made over time. If he had been so far in its reflections, Einstein would undoubtedly have accepted the lesson of his equations which revealed the expansion of the universe to him.

Argentinean writer J.L. Borgès gave a beautiful formulation of time like movement: "time is the fundamental problem of the existence... Time is succession... To exist, it is to be time, and ourselves, we are time... I want to say that it is impossible to put it between brackets... Our conscience passes continuously from a state to another, and it is that, time, succession ". It will have been understood that the central thesis of this section, it is that not only the movement is possible, to contradict Zeno, but which it is "essential" to being. Time, movement, is even what gives the illusion of being.

Time: identity and difference I

Let us go even further and plunge to the heart of time. The pure reasoning can convince us that time is movement and that reality is "time", therefore that reality is movement : "time is the

only possibility for an entity of being different from itself or of changing its position. It is the only way for the change in general of being expressed". Time, it is to be oneself and different from oneself, it is to change or at the very least move. By what an entity is at the same time identical to itself, 1, and different from itself, -1. To persist, it is to be different. In a way or of another, time, it is to be moving.

Extensive et intensive movements

To define time as movement is not sufficient. It is still necessary to distinguish between two types of movements: the movement which is used as reference to the establishment of a calendar, like the rotation of the earth on itself, or its revolution around the sun, and the internal movement which animates any form to be, alive or "inert". One will call the first movement, which corresponds to a "displacement" in space, "extensive" movement ; one will call the second movement, which corresponds to a modification, even unperceivable, in the form of an entity, "intensive" movement. Any entity is at least moving intensively. And according to relativity, since the movement of an object or a person is relative, any entity is also moving extensively. A paramount question is : is any intensive movement composed of perceptible extensive movements on a smaller scale ?

Time: identity and difference II

Differentiation in the time of an entity is a discovery of the same type as that according to which the three angles of a triangle, in Euclidean geometry, i.e. in a flat space-time, always make 180°. The identity of an entity consists of the difference compared to any other form to be, and compared to nothing if it is alone; at least, the identity consists of the "presence" of the entity, and if the entity is not alone, in space specificity, i.e. in the fact that a person or an object occupies a position - a space - proper and different from any other object at the same time. But an entity can be different compared to itself only in time. Is an entity that is not different compared to itself, in time ? In the worst case, a thing perfectly identical to itself, i.e. which does not change, differs from nothing; we face 4 logical possibilities :

either it appears and disappears

or it appears and it does not disappear

or it does not appear and disappears

or it does not appear and does not disappear.

In 3 cases out of 4, there is an absolute time, a "before" and an "after" - disappearing/apparition; in the 4th case, it is eternity. But from a logical point of view, there is a perfect symmetry between these four possibilities.

An entity can be different from itself only through time. How does this difference appear? Through movements of particles, which are observable. That is to say a "spatial" difference. However, the space difference, the movement, is the obvious testimony of the passage of time for an entity – seemingly - perfectly identical to itself.

If an entity differs from itself only through its displacement, i.e. through extensive

movement – even if it were not considered time, but in time -, it is always in time. For such an entity, the extensive movement is assimilated to the intensive movement. A material entity can differ from itself only in time and from another entity in space or in time.

A nonmaterial entity does not use space. Does a nonmaterial entity have “inevitably” to thus use time to be distinguished from another nonmaterial entity ? If not, would several nonmaterial entities be confused the ones in the others ?

A material entity can change its position, - it is necessary here to include the movements of a body which does not move, like the blinking of the eyes, for example -, only in time.

This represents another knowledge of the same type as that, mathematical, according to which the sum of the three angles of a triangle is 180° .

An entity perfectly, absolutely fixed extensively and intensively is not possible according to current physics, because of the relativity of the movement, and of the ondulatory aspect of the matter. Indeed, it is always possible to find a point of view according to which an entity is moving; as for the ondulatory aspect, a wave is always moving. And if there was a purely corpuscular entity, it should be in the absolute black and inaccessible to any entity or field of forces, if not it is liable to deterioration. If it is completely insulated, nothing can distinguish it from nothing, therefore it does not exist. In addition, the universe is contents without container; there is not any potentially inaccessible place.

Can one extend the assertion according to which an entity can be different from itself only in time with the assertion that it can be “only” in time? Yes, if to be, it is to persist, to be still.

The more so as, by the absurdity, a fugacious entity of 10^{-43} s and thus perfectly identical to itself since it did not have time to change, is "in" time during this split second. A fortiori, an entity which persists longer and which will have time to be different from itself. The question could be: is persistence of this being the persistence of a movement, of a tension?

To be in time, it is to be distinguished from nothing. One cannot truly imagine to exist without being in time, since eternity is not any more the reverse of time, but the roof of time. An eternal thing, i.e. since always and forever perfectly identical to itself, express to the extreme the “persistence” aspect of time. The “degradation” aspect does not exist for it. An entity is either at rest, or moving. If it is put moving, it cannot traverse a distance lower than 10^{-33} m

Movement in 3D

Time is thus the only possibility for an entity of being different from itself or of changing position. This change, through an extensive movement or an intensive movement, is the actualization in three dimensions of the irreversible series of the real numbers. The movement, intensive or extensive, can be done only in three dimensions, but "to be in three dimensions", is it inevitably "to be moving", therefore to be in time? In the contrary case, the entity is perfectly identical to itself; whatever the scale of observation, it must appear without most negligible deterioration between two moments. In any case, we saw that an entity cannot be moving extensively without being in time.

Time's arrow, time's arrows

Actualization in three dimensions of the irreversible series of the real numbers determines a direction of time, but this is an a posteriori “arrow”, giving a privilege to the present and the future on the past, and which rests, if one can say, on what one could call the “a priori probabilities”. The a priori probability reveals us simply that the “development” of an entity precedes obligatorily its degradation, its wear, and that the development itself is preceded by nothing. It is the third observation of the type of that which affirms that the sum of the three angles of a triangle in Euclidean geometry always makes 180°. The expression “arrow of time” is due to the English physicist and astronomer A. Eddington, and it refers to the expansion of the universe and its thermal degradation. However Laplace insisted on the indifference of the equations about the direction of time. For him as for the majority of the physicists of today, time does not have privileged direction. An idea that endeavors to fight Prigogine, and which seems to find a confirmation in the existence of arrows of time as various as the arrows of psychological, historical, cosmological... time. Actually, the time of the equations takes into account only the space difference due to the extensive movement, and insists on the intrinsic identity of an entity from one moment to another. It does not take into account what the a priori probabilities teach neither the expression of time through an intensive movement, which makes secondary the presence or the absence of an extensive movement.

Perhaps the confusion that reigns around the concept of arrow of time comes from the fact that our assertion that the time just has one direction is of the same type as that, inductive, according to which “all the corbels are black”. One should not be satisfied with this assertion, it is necessary to go further, it should be shown. To show the precedence of the development of an entity over its wear is one of the ways of doing it. Time creates its arrow at the time of its development. It points in all the possible directions at the same time because, a priori, there is “nothing”, therefore no possible direction. It is the appearing which creates the direction. It should be understood that absolute nothingness - very different from the quantum vacuum, which is a false vacuum -, contains no potential, neither temporal, nor spatial. Another way of solving the question of the arrow of time consists in wondering what should be the specificities of the reversibility. From our point of view, the reversibility implies that some things run back compared to the course of the whole universe, in so far as an arrow of time opposed to ours exists. That means that one should be able to observe the sudden appearance of an entity that would rejuvenate. An opposite arrow of time - since time, by definition, has only one dimension, it can have only two directions, towards and backwards - means indeed that thing appears suddenly completely formed, then disappears or breaks up. If nevertheless there was an arrow of the time that is not opposed exactly to ours, this arrow would do nothing but cross the time of our universe, and one should observe the sudden appearance of an entity, which would last only 10^{-43} s to disappear at once. Being given that our average techniques do not enable us to observe such fugacious events, perhaps some occurs continuously without we realize their presence.

From the infinite train to the lit lamp

The train

Even if universally accepted, the metaphor of the line is not appropriate to represent time ; the metaphor of the train seems adapted better. But this is a special train. Which have to be its characteristics ?

- it manufactures its rails in proportion as its progression and they disappear at once ; in

other words, it is as if it marked time.

- it goes where it wants, can turn in round, there is no risk to cross its own road since it disappears progressively with its progression; it is as if it did not go nowhere, but it is moving
- it cannot make reverse motion
- it is absolutely alone
- it contains all that exists
- it contains any window, no connection with an unspecified outside because there is no outside
- it is infinitely large in the three space directions, which makes better understand that it cannot go nowhere; it is as if it did not exist
- its speed is constant, in any case, it does not exist any external point of view which enables to detect the variations of its speed
- thus no external camera; inside camera only, and it is the train itself too; and this comment itself “is” the train, it’s its own emergence; and the comment about this comment...
- it is not known and there is no means to know if it started or if it is since always moving
- if its movement ceases, it disappears; thus it cannot be at rest even if it always gives the impression to be at rest
- no possibility of reverse gear because speed would be null during one moment
- the extensive movement characterizes the displacement of the passengers in the train and the expansion of the train. The intensive movement characterizes displacement - the existence – of the train and the existence of the passengers. One thus realizes that even motionless in the train, fixed in their seat, the passengers are moving by law of composition of the movements.
- Of course, the distinction train/passengers is factitious. The train is its passengers; it’s changing and polymorphous.

Now, let us imagine that the rails that the train creates during its evolution do not disappear, or rather that the train itself remains at the various points which it traversed, i.e. at every moment. Let us go even further and consider that all the course of the train is already marked out and that the train has even since always traversed. And that at every moment a copy of the train remains at this step of its evolution. One quite simply meets the conditions of the possibility of displacement in the time, which requires that all the times, future as well as past, be carried out and remain somewhere. But to persist, it is to be moving. However no movement there is found; one rather finds the expression of the roof of the eternal and immutable form to be. And if the movement does not exist any more, “displacement” in time is not possible any more. In addition, according to the assumption of the existence of several “arrows” of time, what becomes our train ? That would imply that the train would evolve/move in a kind of more general space, whose the presence of the rails would testify, in which there would be place for other trains. It could logically be that our train meets another train coming from another direction. And what does it occur when two trains sink one towards the other ?

To identify the train with our universe, it is enough to make it infinite. One starts from a particular concrete train to which one applies characteristics that enable us to identify it with the

universe. It extends ad infinitum in the three directions of space. The only movement that seems authorized is thus the expansion. But at this stage of the representation of the universe, one realizes that the train, perhaps, is not yet the ideal metaphor to represent time.

The lamp

A lit lamp seems to be a better image than that of the train to represent time or the universe. The light is diffused in all the directions. Would it come to mind to speak about an “arrow” of time about it ? The train that stops gives the illusion that being is frozen ; when the light is extinguished, there remains nothing any more – no being without movement - which corresponds to what we currently know about reality. And this movement is the expression of a tension. From a moving train, we come to a light radiation that extends ad infinitum in all the directions. One can perhaps see in the evolution of the technology of the measurement and the representation of time, a testimony of the evolution of the philosophical design of time. Thus the watch with digital posting which stops does not post anything any more on its screen, because its operation also rests on the undulatory aspect of the atoms - light is a wave too. On the other hand, the mechanical watch which stops gives the illusion of an immobilized reality, since the fixed needles remain, in the same way that a fixed train gives rise to think that one can stop time. The paradox is that the watches with digital posting function according to the principle of the analogical one, from where the obliteration of the screen when the pile died, and that the needle watches give the illusion of an analogical operation, whereas their mechanism of notched wheels is digital ; they are the perfect illustration of digital, since with the stop, there remains a “discrete” unit, the moment indicated by the needles, as if time could be immobilized. In the same way, the expression “line of time” is a bad representation of time. It lets believe that each moment persists, autonomous, whereas there is one moment at the same time. The screen of computer is as for him a beautiful metaphor of the time conceived like movement : if the movement of the cursor stops, the screen is tired and disturbed, forming indistinguishable waves for finally dying out – besides it is said about a dead person that she died out. However, instinctively, one would be tempted to say that it is the movement which tires the screen. Let us insist on the fact that all these aspects of time should not hide its fundamental unity.

Back on the train: the passengers

Nothing being perfect, the image of the lamp presents a small disadvantage: the light does not have contents. The image of the train has the advantage on that of the lamp that it makes it possible to identify our condition with that of the passengers of the infinite train. Which are the characteristics of the occupants of the train ?

- they do not have apparently any means of leaving the train; it is not known if it happens that a mechanism ejects them from the train, which would mean that an entity can disappear “absolutely” and which would contradict the law of the conservation of energy
- they do not have any point of view external with the train, maybe in thought only
- they do not have any total capacity on the train, but only on the other occupants
- they can move ad infinitum in the train at a maximum speed of 300000km a second

- their own time can vary according to their speed
- their displacements can be spatial only
- they can establish a precise calendar until 10^{-43} s
- they are characterized by a relative appearance, an ageing and a relative disappearance
- the passengers are to some extent each one a small train which travels inevitably in the large train that constitutes the universe. It can arrive that two small trains are entering in collision. If they sink one towards the other, it is that they go in two opposed directions, it is that they have each one a different arrow. But it is obvious that they are “space” arrows. The arrow of time is common to them; it is that of the train-universe. To evolve/move according to an arrow of time different from that of the other occupants of the train, the passenger should leave the train-universe. Provided that the rails of the train-universe persist, it could then travel in time. It thus appears that a passenger who would become younger would always evolve/move according to the same arrow of time as the other passengers since it would always form part of the train-universe, without forgetting that the rejuvenation can be done only after one ageing; the outward journey has a probability “a priori” higher than the return.

A collision could occur between a passenger extracted from his train-universe and another train-universe which would follow it or which would come towards him, or even between the passenger extracted from his train-universe and the former or later copy of its train-universe at the station, at the moment when it arrives.

The image of the train makes it possible to answer the questions of the arrow of time, of the irreversibility of time, the voyage in time. Perception and lived of time, and its measurement, are the fact of certain passengers. The image even of the train and its passengers, the questioning on nature and the origin and the destiny of time, the train and its passengers, is the fact of some of its passengers. Certain passengers thus take the measurement of time whereas time is already moving for a certain time. Even if the train-universe can seem an absolute, there is not any means for its passengers of determining it. Let us imagine that with its appearance, provided that it appeared, the train contained already a conscious passenger able to take a measurement. At this time, the first level of the scale would be known, but the scale would be always relating only to the train-universe to which the passenger belongs. If, contrary to Newton, it is considered that time exists only with the train-universe, it is clear that there existed nothing, neither time, nor anything, before the appearance of the train.

Temporal Collisions

We saw that the great debate of this end of the end of the 20th century concerning time relates to the question of knowing if time has a privileged direction, a “arrow”. The will to draw all the conclusions from the existence of a multiplicity of arrows of time must lead us to emit a conjecture: the conjecture of the Temporal Collision. The Temporal Collision, this is two train-universes that meet together. For which reason, time being relative as well as space, would it not be possible to see something emerge in our past and precede us in the future ? Here takes all its meaning the concept of arrow of time. If time is not one-way, a collision with an entity of the future whose arrow is the reverse of ours is inevitable. A contrario, such a collision being never produced yet, that would constitute an argument canceling the conjecture. Actually, the temporal collision risk can come as well from the past as of the future, even if it is not very probable that the train that

follows us in our past is faster than ours. But the risk of a temporal collision opens unexpected prospects. If time has several directions which cross, time has several dimensions, and there must be a possibility of connections between these dimensions, or at least of meeting. If not, there is incompatibility between various times with single dimension, therefore we evolve/move in a time series, a history, with a dimension - a three-dimensional worm -, and it is as if other times did not exist, since there is not any possibility of connection between them.

On the other hand, there is not any means of determining the moment when the temporal collision will occur. In conclusion, the temporal collision would be the surest means of destroying the entire universe as a whole and in a split second, that is to say 10^{-43} s. Inevitable Question: is the temporal collision inevitable ?

Let's give to the Concep-T test taker the opportunity to conceive the possible issue !