

**TIME TRAVEL,
LOGIC
AND
SPECULATION II**

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In the first article, the infinite oscillation of being in the “grandfather paradox” led us to the conclusion that the “grandfather paradox”, the “paradox of knowledge” and the “sensitivity to the initial or final conditions” or “temporal butterfly effect” constituted 3 variations of one and the same paradox.

In order to solve these paradoxical situations, even if a reductio ad absurdum reasoning led us to the conclusion that we cannot have at the same time “Time” and “Time Travel”, and consequently that these problematic situations are, in a sense, always already resolved, let’s continue to consider systematically the logical implications of the possibility of the time travel at will to whatever time of the relative past or future, with or without machine ?

Doing so, we will be able to reach a deeper comprehension of the reality and we will gain higher degree of abstraction yet: speculation in its most stimulating aspect !

Clue: reductio ad absurdum in series: overprinting, multiverses, determinism.

TEMPORAL SHORT-CIRCUIT

The most radical way to avoid the paradoxes of time travel ! At the moment to approach a new time, the time traveller disintegrates in a phenomenal collision, because of the opposition of the contradictory flows/streams/flux-arrows: his own flux vs. destination time flux. In other words, two opposite time arrows ! Let’s keep in mind that the collision happens on the temporal axis, that means that it is totally unpredictable since the time traveler is nowhere in the time-space continuum of the destination time. The temporal short-circuit undoubtedly constitutes the most radical exit of the voyage in time ; to some extent a specific temporal collision, which differs from the “absolute” temporal collision in what it would touch only the traveller of time and the place and the moment of his arrival. But precisely, what becomes the place of impact ? It seems that no fiction novel nor scientific theory considers this possibility. It is true that it destroys the interest of the conjecture of displacement in time.

Perhaps can one nevertheless see the “chain reaction” of the famous episode of Star Trek “All good things” like an approach of the consequences of the temporal short-circuit.

PUT IN TEMPORAL NEST OF ABYSS OR THE INFINITE TEMPORAL INCREMENTED OVERPRINTING

Here is the most important and deeper discovery related to the time travel possibility !

Short-circuit has made long fire, and possibility exists to reach, at will, whatever time of the relative past or future, with or without machine. But the price to pay to enjoy our free-will : the setting in temporal nest of abyss, an infinite temporal overprinting with incrementation and a phenomenal overload which will lead us to the notion of reduction.

Let us illustrate this infinite temporal incremented overprinting through the trip of the little time traveler Cloc. In each step of the process, we have to focus on the initial Cloc and to wonder who accompanies him; let’s also remind that all the events occur in the same universe, or at least in the same portion of space-time ; no possible resort to any quantum-type reduction yet ; by another way, we must keep in mind that the events are random, non determined !

Cloc- I_n for the initial Cloc, Cloc- t_n for Cloc travelers :

a) Infinite spiral :

Cloc- i_1 is alone this 01/07/2002 at 15h35' 28,1578867219183457118552574627916122453040705”. He does not know that he will travel in time one year later.

One year later, Cloc-t₁ returns one year earlier, that is to say this 01/07/2002 at 15h35' 28,1578867219183457118552574627916122453040705". The Cloc which he finds at this date is different from initial Cloc-i₁ which was alone; moreover, this found Cloc knows that he will travel in time one year later, informed by his next himself, Cloc-t₁. So, we have Cloc-t₁ with Cloc-i₂.

One year later, return one year earlier of Cloc-t₂. This Cloc traveler is different from first Cloc voyager, because first Cloc traveler t₁, like the initial Cloc, did not know that he would travel, whereas he knows it. He thus meets the initial Cloc-i₃ accompanied by first Cloc traveler-t_{1bis}. Found/met Cloc is different from initial Cloc-i₁ who was alone, and from first visited Cloc-i₂ accompanied by a visitor, Cloc-t₁ since he is now accompanied by two visitors. So we have Cloc-i₃ with Cloc-t_{1bis} and Cloc-t₂.

One year later, third Cloc traveler cannot be the same one as the second since he was seen accompanied by two visitors, two clones whereas the precedent had been seen accompanied only by the initial Cloc; this third Cloc traveler will thus come to be added to both others : thus we have : Cloc-i₄ with Cloc-t_{1ter}, and Cloc-t_{2bis} and Cloc-t₃; and so ad infinitum.

Each stage of the spiral is marked by additional information compared to the preceding stage. To understand the process, it's absolutely necessary to grasp the positive feedback loop with geometrical resonance, amplification. The reasoning proceeds "by defect" : "X cannot be x-1". To know the number of Cloc at any step of the process, simply apply the well-known function : $f(x) = (x^2+x)/2$.

Of course, the situation has to be perfectly symmetrical for a trip in the future, i.e. an initial Cloc non visited and consequently without knowledge of the possible visit of himself, and from there, the "infinite temporal overprinting with incrementation" process can start.

- b) Let us repeat the experiment, through the protocol of the billiard balls elaborated by Kip Thorne and his team :

Let us recall that Kip Thorne and his team, in the Consortium, imagine that they succeeded in controlling a wormhole and in making a machine of it to travel in time.

They launch a ball of billiards towards the Wormhole :

The ball leaves alone,

re-enters in a mouth of the wormhole

and arises 15' earlier by the other mouth of Wormhole

to cross itself before it does re-enter in the mouth.

The met ball is not the same one as the initial ball, since this one was alone.

The met ball re-enters in the hole and arises 15' earlier

to follow that which crosses itself.

This met ball is not the same one as the initial ball which was alone,

nor that the second ball which was met only by one ball.

The ball crossed by two balls re-enters in the hole

and arises 15' earlier to follow that which follows that which crosses itself.

This cross ball is the same one as the initial ball which was alone,

neither that the second ball which was met only by only one ball,

nor that the third ball which was met only by two balls.

And so on ad infinitum.

There is thus a ball crossed by an infinity of itself.

Two opposite interpretations : either we sum all the individuals related to all the loops, that will lead us to the multiverse alternative ; either we consider that no loop is possible, realization of the travel trip being infinitely deferred ; and since reality "is", even if illusory – illusion and doubt have the

privilege with regard to absolute nothingness to have the ability to “express” this doubt and to distance itself, to break free from nothingness precisely - that will lead us to the “determinism” alternative.

In any case, there is complete incompatibility between the situation with initial Cloc alone and time travel possibility.

We understand that the “Groundhog day” scenario, even if a real pearl per se, is “logically” impossible.

Now, what is concerned by the temporal overprinting? The time traveler only, the space-time portion where Cloc or the ball moves or the entire universe? According to the Relativity, no absolute change, thus we will consider that the overprinting applies to the space-time portion where Cloc and the ball move.

To have an idea of the infinite temporal incremented overprinting, you can imagine a hologram infinitely cloned in the same portion of space-time, the infinitely long worm-image of two face to face mirrors in a stake in abyss with a conservation of the size and in taking into account the recursive incrementation – we stay in a first level infinite, aleph-0. The equivalent of a “*flou de bougé*” in *photography*, the overprinting, on the same cliché, of an infinite number of identical images, but shifted ones compared to the others. We consider here the most simple case, a uniform translation: translation shift and homogeneous overprinting. A kind of infinite 3D canon per tones to take a musical analogy. The Fourier-Transformation will be a useful tool to formalize and to program the phenomenon.

A very good example of temporal overprinting in the literature is provided by the novel "Of time and cats" by Howard Fast. Another interesting approach: “Me, me and me” by William Tenn. For his part, Stephen Hawking showed that quantum fluctuations of fields would become infinite in the vicinity of a mouth of a wormhole, preventing the formation of time loops or destroying the traveller who would approach a Loop of the time kind.

Of course, the infinite temporal overprinting situation is impossible per se, all the more if one takes into account the infinite number of grandfather/knowledge-type paradoxical situations the free-will will imply!

We saw in the first article that the possibility of displacement in time “at will” implies the overlap of all the times ; in other words, “past = present = future”, or rather, neither past nor future do not have more direction, there is not more than a multiple “present”, probably an infinity of presents corresponding to every moment of the history of the universe, floating in a hyperspace. However, the infinite overprinting requires the reintroduction of the distinction between past, present and future, because the free-will implies an indetermination, an uncertainty - indefinite which points out the potentialities of infinite, besides it is a question of “infinite” temporal overprinting - which doesn’t adapt to the fixing of the times. Since it contradicts the principle of overlap, the temporal overprinting contradicts a condition of the possibility of travel in time. So that the time trip seems impossible in its case. We have to find another way to ensure the traveller of time his free-will.

Finally, let us specify that it is not a question here of the infinity of visits of Cloc at the same place at the same moment, because in that case, Cloc has at each visit a different age, while the phenomenon of infinite overprinting sees repeating same Cloc at the same age. If the two situations are combined, the expression “phenomenal obstruction” becomes an euphemism. Indeed, imagine what would be the combination of the temporal overprinting and an infinite return of the same traveller of time or of an infinity of travelers of time at the same moment, or even of the temporal overprinting and an infinity of travelers of the time who return an infinity of times at the same moment! On the other hand, no panic! that reminds us the demonstration of Cantor to prove the equivalence of the infinity

of the number of points in a line, a surface, a volume, ... and a hypervolume – “ 2^{\aleph_0} ” transfinite,

the question of the transition “ \aleph_0 ” to “ 2^{\aleph_0} ”, “continuum hypothesis”, being demonstrated unsolvable by Paul Cohen and Kurt Godel, kind of mathematical equivalent of the Heisenberg indetermination, these oscillatory phenomena revealing a subtle and unexpected coherence in our

understanding of the deep paradoxical nature of the reality.

TEMPORAL REDUCTION

The alternative novelists and theorists prefer to correct the effects of the temporal overprinting: the reduction ad infinitum of the universe in coexistent branches : the “multi-verses”. The only way, apparently, of escaping the infinite temporal overprinting and of avoiding the paradoxes of displacement in time while preserving his free-will, it is ad infinitum to have one reduction of the times in which a traveller of time intervenes. Thus, in the case of the paradox of the grandfather, must coexist the two exits : that where the grandfather is alone and that where he is killed by Saint-Menoux. More, possibly, that where another traveller of time meets him, plus that where another traveller of time surprises or prevents Saint-Menoux from killing his grandfather, plus... plus... plus...

But does reduction really constitute a solution?

COLLECTION OR CONNECTIONS : FREEDOM ?

Temporal reduction can indeed constitute a solution to the infinite temporal overprinting by allowing the infinite variations to develop ; in the same way that a 4-dimensional space-time is made of an infinity of 3-dimensional space-time, a space-time with five dimensions is made of an infinity of 4-dimensional space-time.

But does multiverse, in the case of an instantaneous or of 10^{-43} s journey/transfer really makes it possible to escape the absolute determinism ?

We face this alternative : the multiple branches of the universe are connected in some way or not. In the first case, we face the following sub-alternative: conservation of free-will or not.

a) Connection & free-will

Really, in the situation of connections between the multiple branches of the universe and conservation of free-will, the “grandfather paradox”, the “paradox of knowledge” and the “temporal butterfly effect” paradox persist.

So, in the case of the “grandfather paradox”, if I kill in another branch of the universe a “clone” of my grandfather, maybe this is not really a parricide, but the action is denatured, and before all, somebody can come to kill my grandfather in my branch of universe, consequently... the paradox is not solved.

b) Connection & -(free-will)

Since the times are simultaneous, everything is always already accomplished. Moreover, the possibilities are fixed. Indeed, if I can go to kill my grandfather in another universe, nobody can come to kill him in my universe, since I exist. Can one even come in my universe ? Yes, but in the condition of not making certain things. That prohibits any free-will. I can thus return in my initial universe only in certain conditions. This is the situation of a “complete” determinism developed here below.

c) Collection

Third option: there is no "bridges" between the various branches of the multiverse, no possibility of passage at will from a branch to another, but then, the temporal reduction is assimilated to the achievement of all the possible ones in a deterministic spreading out, and it is not any more question of time travel.

In this case, multiverse applied to time travel means that "time is frozen" : all the moments exist currently simultaneously - nowhere from an absolute point of view – making a broken up reality; not only does it contradict, the very true observation "An object cannot be itself and something else at the same time." – even if I prefer the more complete "time is the only way for an entity to be different from itself and to occupy two different space's positions", even if one can argue that, in some sense, an entity, to be able to persist, has to be "itself" (1) and different of itself" (-1), which would lead us to a kind of illusory reality "à la Berkeley" – but goodbye free-will ! Just a floating collection of all the times ! Here we face a variation of the "absolute" determinism.

To be able to accomplish several pseudo-trips starting from the same universe, it is necessary that it is geared down ad infinitum, if not, only one possible trip, since any other universe is inevitably different and that I cannot return in that of departure. The journey is expensive : the eternal exile or the reduction ad infinitum. But in any event, all is fixed in advance. The roof : if Cloc cannot return in his universe, it is that he will continue to exist in a universe where he could not appear naturally since he killed his grandfather there.

Addenda:

- Mass paradox is not really a problem, with or without connection, we can even consider that entropy increases. Indeed, if the branches are connected, multiverse = universe and no absolute loss or addition of matter ; if no connection, no transfer of matter or energy at all, no more question of "time travel", and this is simply as if branches other than our own didn't exist.
- nor is the orientation : if time travel became reality, the spatial orientation would be a totally secondary problem ; our sympathetic Newton having given us all the necessary instruments to escape grave situations.

DETERMINISM

The easiest way to avoid the infinite temporal overprinting and the most economic too to avoid temporal reduction: the determinism. This is the occasion to evoke 3 kinds of determinism : absolute, complete/total and classical/mechanical.

Doubling

Before all, here the illustration of an often neglected consequence in the situation of the absolute determinism which will enable us to bring a response to the many paradoxes implied by the possibility of moving in time : let us meet again Cloc, our ten year old boy. We are the 01/07/2002 at 15h35' 28,1578867219183457118552574627916122453040705" and he wishes to go the 30/06/2002 at 15h35' 28,1578867219183457118552574627916122453040705". To simplify the situation, let us not make it meet itself. It emerges in the medium of a clearing and turns over at once to the 01/07/2002 at 15h35' 28,1578867219183457118552574627916122453040706", that is to say a measurement of the time of Planck to later avoid making it meet before or at the moment of his retreat in time. The

30/06/2002 at 15h35' 28,1578867219183457118552574627916122453040705", there is and there always were two Cloc, that which was there naturally and that which made a jump behind in time. Let us complicate the things and make Cloc meet itself in the past. To be the future voyager, Cloc which receives the visit of himself must live exactly what the voyager will have lived : buckle perfect, Cloc always already went visit the 30/06/2002 to 15h35' 28,1578867219183457118552574627916122453040705" and he is always already turned over the 01/07/2002 at 15h35' 28,1578867219183457118552574627916122453040706". Cloc never will thus have been alone this 30/06/2002 at 15h35' 28,1578867219183457118552574627916122453040705". There will never have been one 30/06/2002 at 15h35' 28,1578867219183457118552574627916122453040705" with only one Cloc.

a) Absolute determinism

We will not make again the development which can be found in the first article. Let's just remind that the simultaneity of all the possible times, determined by the minimal time of Planck, i.e. 10^{-43} s, induced the absolute determinism which constitutes the simplest solution, in any case the most economic, to the problem of the paradoxes caused by a voyage in time. But the price to be paid is high : the hope of the greatest freedom thanks to the time travel becomes the most solid nightshirt, the best kept prison. What an irony !

The roof of the "absolute" determinism is provided by the situation described by Moorcock in "Behold the man". Like points out it Christian Grenier, "... it is the incursion itself of the temporal traveller into the past which is at the origin of the History. This particular way to consider the temporal trips quite simply integrates them into a historical screen solid and single, which not only accepts them, but makes them necessary : without these incursions into the past, the History would have been different, or would not have been".

Let's emphasize that the multiverse conjecture is already implied in the absolute determinism configuration !

b) Classical determinism

On the question of the pure determinism implied by the resolution of the paradoxes of the matricide and causality, and more generally of the "sensibility to initial or final conditions", the Consortium puts forward an interesting idea. According to traditional physics, even out of the Loops of the Time Kind, the world is deterministic. "What occurs to one moment given is entirely determined by all that occurred before (or afterwards)". Indeed, everything push us into believing that we are completely determined by innumerable, maybe infinite, endogenous and exogeneous factors, in the spirit of Laplace. Thus the voyage in time is not opposed to the free-will more than a classical world is.

c) Complete determinism : inertia

Applied to time travel situations, this transition by the classical determinism leads us to the notion of «complete determinism».

So there are authors for whom no problem arises in consequence of the intervention or of the simple presence of the traveller of time in the past or in the future. Thus, the philosopher David Lewis is satisfied with the infringement of the free-will in the paradox of the matricide or of the grandfather. According to him, there is inevitably something to prevent the voyager from changing the past, which, it should well be acknowledged, does nothing but move the problem ; simply, in fact the universe is

arranged so that the voyager does not make an incoherent act. Lewis thus admits that the past is fixed once and for all. He must recognize that the only presence of the voyager in the past constitutes an anachronism. Lewis draws on the cord by saying that the “hitches” that the voyager undergoes do not prove that it is not “really able” to act in the past and to kill his grandfather. In the normal course of the events, we often fail to achieve our goals. It seems that Lewis exploits the ambiguity, the ambiguous meaning of the word “ability”.

His point of view joins that of Fritz Leiber, who speaks about “Law of causality” or “Law of Conservation of Reality”. He illustrates his conception by the possibility of minor changes in the course of time : a tree pushes back where another was torn off ; if a traveller of time kills the woman whom her grandfather must marry, in other words his grandmother, the grandfather marries her sister ! According to Leiber, that would not prevent the grandfather from marrying the possible sister of his promised in marriage.

But “close to” means “different”, thus... In addition, a surprising consequence in this way of presenting the things is that the future should then be as rigid as the past; thus there would be no free-will, not more than in the acts of the characters of a film, whose sequences are predetermined.

It is with this situation that it is necessary to apply the expression “total determinism” of Jacques Van Herp. Van Herp speaks indeed about a total determinism which weighs on the world insofar as the interventions in time disturb the individual destinies, but do not modify the history in its broad outline. This determinism is distinguished from the absolute determinism. The “absolute” determinism is related to spreading out in the same moment of every moment of the history of the universe. The determinism that evoke Van Herp, Reichenbach, Watzlawick is put up with the flow of the duration. Simply this duration is such the carpet which one unrolls, with here and there some irregularities without consequence, a preexistent future which is achieved, like drawn towards an omniscient purpose.

Unfortunately, this kind of determinism is definitely impossible outside the framework of the multiverse, indeed, we are brought face to face with the “infinite temporal overprinting” again ; let’s go back to square one !

CONCLUSION

First, we make the conjecture that the ability to travel in time at will would give us the supreme liberty.

But in order to infer all the logical implications and to solve the numerous paradoxical situations in the hypothesis of the possibility of the time travel at will to whatever time of the relative past or future, with or without machine, a series of reductio ad absurdum lead us inexorably toward the “determinism” spectrum.

The promise of the highest free-will turns into the assurance to carry out the data of a plan always already printed.

Now, by a boomerang effect, the nature of the reality in which we evolve, without the ability to travel in time, seems to be the best mean to escape these “complete” and “absolute” determinisms synonym of non-being ! The discreet presence of a mechanical determinism is of little importance: Reality is liberty per se, by its own existence ! Auto-constitutive freedom. Ironically, being the determinism complaining about its own abyssal limits and its sadly planned course, I am precisely the true expression of my free-will. Reality is logically divergent.

NEXT DEVELOPMENTS

- Temporal collision (Time's arrow: Anisotropy of time; not simple logic barrier; the microscopic time's arrow is obvious),
- Mathematical demonstration of the impossibility of time travel,
- Mathematical demonstration of the similarity of the “grandfather”, the “knowledge” and the “temporal butterfly effect” paradoxes !

See Temporal Collision Conjecture.