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Y: OK. This is about, almost the last one, Introduction to the Lila Paradigm. The title is *The Reality behind Phenomena*. The abstract reads

> A new paradigm to account for the reality behind phenomena is outlined. In the model metaphysical agents are related in simple structures that function as the mechanism of quantum theory that causes reduction observation, resulting in those agents being observed as quanta of physical matter by other agents. Some of the structures included here form the basis of elementary space and time and we believe such structures underlie all the phenomena of our universe. This approach leads to the explanation of what reduction space and time are.

It's written in 1990. Then I quote H. G. Folse from his book *The Philosophy of Niels Bohr*. And he said about what Bohr had to say.

> That the important point is not the terminology but the recognition that what complimentarity allows us to say about the reality that lies behind the phenomena, is that it has the characteristics of being able to produce different sorts of phenomena in different sorts of interactions. And the way these phenomena are described cannot be used to characterize the reality which causes them.

I have used this in other papers also.

> So I say, "What might Folse's "reality which lies beyond and behind the phenomena" be? And how would it produce the various sorts of phenomena?" Since such a reality cannot by definition be observed it cannot be part of the physical world. Therefore if it exists at all, it would have to be a metaphysical reality. But what sort of metaphysical reality? If Folse is correct that the phenomena cannot be used to characterize the reality, how are its characteristics to be determined? John Wheeler says in his paper *Strangeness in the proportion*. He says, a substrate call it pre-geometry, or call it what one will, that is not and will not be revealed by reasoning from the top down only from the bottom up not from the obvious but from strange.

And he has certainly got his wish with the Lila Paradigm. So if John wouldn't listen while he was alive maybe he will listen now.

B: He (was distracted).

> Y: So I say, instead of trying to model the reality behind the physical world by synthesizing observations of the world, we derive the general characteristic of the metaphysical substrate by logical analysis by a single premise. As Wheeler has suggested the premise is indeed strange as is the metaphysical substrate that proceeds

logically from it, a pre-geometry or network of directed relations formed by metaphysical agents. Nevertheless, from this metaphysical realm many of the phenomena we find in our universe emerge. Two measurements of the physical universe, however, are necessary to determine the number of agents and direct relationships of the specific network underlying our universe. It is these numbers which decide which universe of all the theoretically possible universes is our universe. Not that there are (more?) universes existing. But there could have been a lot of different ones. And still can but these numbers that we get by measuring this universe tells us from our general statement about what universe would form. Given those numbers, it spells out this universe.

Because the measurements were taken from this universe. And those two measurements are enough to develop all the rest of the measurements.

That's the Introduction for that paper. You can see how they overlap. But they all say something a little different also. OK, now, Biljana has been busy. Bret has been busy and Punita has been thinking.

B: Busy thinking.

Y: OK. So Biljana you go first.

B: I am encouraged by the fact that what you have been reading contains part of what I have been thinking just now. And in a way, I admire the way you have designed the order of presenting to us this article because really this article comes at the end or at this particular moment. At least, it is how I experienced it.

Y: (acknowledges)

B: Actually what I had in mind and I have just ten or fifteen minutes actually after the class is. Lagrange. Pierre Simon Laplace. Pierre-Simon Laplace. Who was a (Marxist?), and who wrote *Mecanique Celeste* which is Celestial Mechanics.

Y: Mechanics yes.

B: Celestial mechanics which was written in twenty seven thick books or parts and it was published right after *Principia Naturalis* by Newton. And it was done in times where everyone in scientific and philosophical world was amazed by the logic behind the universe which was giving by Newton. And he states at one point in this excitement, in this acceleration, he says, give me an exact mathematical model with all the parameters including these hidden parameters we are all looking for. And give me precise instruments and I'll predict, the, what is the word when you… not the evolution but unwrapping… I'll come later on to this… I'll tell you the state of the universe, thousands of years after this moment and I'll tell you what was the state of the universe one hundred years ago. So simply he says, give me a mathematical model and give me instruments and I'll give you the state of the universe after a thousand years. Or I'll tell you the state one hundred years before. But, but…

Y: But.

B: This is a reduction of… or reduction is a point of view. This is… I'll come to the real world. ( ). It is not the way things are. The development of contemporary science tells us something else. For instance, the theory of relativity states that the state of moving of the observers implies the duration of time, for instance. Later on the theory of chaos states that a model is not sufficient as we have shown in one of these sessions. For instance, a very simple statement as X (N) plus 1 which is alpha X (N) 1 minus X (N) which is so simple that the simpler it could not be actually. It is so simple that everyone could say, "Ok, if I have this model and if I know the present moment then I'll tell you in accordance with this equation what will happen after a thousand years because I have X 0 then I have X 1 and then I have X 2 and so on."

Y: (acknowledges)

B: But we have seen by demonstrating these lambdas, lambda one, lambda two, then the doubling of the periods, first we have so on and so on. And then at a certain point when we have lambda C we chaos. So mathematical model is not sufficient.

Y: (acknowledges)

B: Theory of chaos shows us this. Further on instruments, the uncertainty principle of Heisenberg shows that instruments are not sufficient. It shows clearly. Either I have in uncertainty principle of Heisenberg, I have delta V where V's position multiplied by delta whatever…

Y: Momentum.

B: Momentum is H bar which is H over 2p. So either I have the position or I have the momentum. When I tried to increase the accuracy, then I might bump this particle which I am observing with a higher frequency with a monochromatic rate of higher laser… Ray of higher frequency. But then I change its momentum more by trying to…

Y: Locate it.

B: Locate it more precisely because I could only see it in this positive part of the wave.

Y: (acknowledges)

B: So the instruments are not enough.

Y: So.

B: So La Grange… Pardon me Laplace's statement, the statement of (person?) Laplace's is not correct. Further on to this, we should add Gödel's Law **w**hich shows that logic is also not enough. So mathematical model is not enough theory of deterministic chaos shows, instruments are not enough, uncertainty principle shows and in your paper you have been reading just now you are mentioning complimentary principle which is actually the uncertainty principle of Heisenberg broadens. It is it is implied. Chaosity principle implies complimentary principle of

Niels Bohr. So Niels Bohr also shows the insufficiency of instruments. And so on we come to the logic we show the insufficiency of logic.

Y: (acknowledges)

B: So this is one point I want to stress out, and I'll come to this later. Now on the other hand, I was thinking about the direction we should take now.

Y: Hah ha.

B: I mean we are thinking on it in an implicit way, but maybe it should be stated explicitly. So what I believe is first of all, there are different directions in which we could go. For instance, logic, one direction, particle physics, second direction, matrices third direction, algorithms and computer fourth direction, improving the accuracy of charts and magnitudes fifth direction, writing articles sixth direction. So these are directions but they are of minor importance. What I think is of greater importance is, since our objective is ambitious, not just to improve what has been done, but to introduce something new. Then a more profound approach should be engaged into the picture. By this I mean, we should, for instance, distinguish the first level for building axioms which you have done so nicely. But maybe something should be added in light of the problems we have been working now.

Y: It needs to be better. I have stated initial actions about seven different ways. And I don't know which is better or it could be even better.

B: Yes. And what we have stated so far maybe could be included. Not in the essential axioms you have been giving, but maybe in some branches of them. In some branches, for instance, we have corollary to this. Amendment, like we have amendments in law. You have a law and then you have an amendment to this law. So first stage would be axioms in the sense that Spinoza did it. This is the first level, the essential level. For instance, what I have been talking this morning that we should differentiate between self-reference A to A and which is state of direct knowledge named at least until now. Of course, you have been describing so sophisticated levels in your writings. But in terms of Lila Paradigm, we have A to A. It is just an arrow and we name it direct knowledge A of A. And then we have A to B to C to A which is also stated as direct knowledge. But in this direct knowledge, we have memory, consciousness and so on. So these two should be differentiated as amendment one of those basic axioms. I am just giving an example. So the first level according to my opinion should be axioms. Then the second level should be if our objective is to build really something new although this new will be epistemology. It will be epistemology not ontology. Epistemology, maybe I am not pronouncing…

Bret: The word I don't know the meaning.

Darshana: Epistemology.

Y: Epistemology. Knowledge-based, the study of knowledge.

B: Knowledge, not the essence. I have seen somewhere in your writings. I am inspired by you when I am using this term. What I am suggesting, I am aware of it that it is on epistemological level, in the level of knowledge. And also you have given to ontology, the ontology is basic.

Y: Ontology must be there or there is nothing… you can't have the epistemology without the ontology. What exist, the individuals and then their relationship is the epistemology.

B: Yes. I mean…

Y: So what are you driving at?

B: I am driving at when I am trying to explain this second level. I have defined some levels. I have just ten minutes to explain some level.

Y: OK, I understand that.

B: I have first level is axioms, second level is algorithmic level, and the third level is discrete mathematical level. But this third level will be prone to all this limitations I have mentioned.

Y: But this one algorithm, what's that got to do with epistemology?

B: It has to do, at least in my understanding, that it will be… behind it, it is ontology; the ontology is what inspires this level. But still I am saying I am aware it will remain in epistemology in a sense. For instance, this algorithmic level, I include theory of matrices. And matrix is epistemology.

Y: So it has to do with describing the relationships between the individuals, relationships of knowledge.

B: Once again you denote epistemology to relations, isn't that so?

Y: Yes.

B: And ontology to non-physical individuals?

Y: Yes.

B: OK. Then I should think of it... I was using term epistemology in terms of something which is subjected to all these limitations, the limitations to mathematical models because the theory of chaos leads us to edge of chaos which is a limitation.

Y: Yes.

B: Laplace was wrong.

Y: Yes.

B: He belongs to a reductionist science. This is… So he is prone to limitations. Then we shall make the… We are making the bridge over the particle physics; we are including time units, Planck length/time, elementary time units. Then we are including into picture length quanta and so on. Once we are doing this jump towards physicality so to speak. Although illusionary space time, it's still space time. We are entering into the realm of space time. And therefore, we are using measurement. And by using measurements, we are subjected to this second limitation, the limitation of instruments.

Y: Yes.

B: And then finally when we will reach the level of discrete mathematics.

Y: That's discrete mathematics? Yes.

B: Or even on the level of algorithms, matrices, computers and so on. Then we are prone to completeness and to limitations of Gödel's law. So your theory is the most profound of all. But still at the level of presenting it to the world, we shall be subjected to all this limitations.

Y: (acknowledges)

B: So in a way, we should we should decide which limitation do so we accept. And we are just surrender to whatever it could be. Because if I say we shall build discrete mathematics for Lila Paradigm, maybe not in these few weeks, but maybe three years or five years. Then I won't be speaking truly as Spinoza had said or Laplace, it is not possible.

Y: (acknowledges)

B: Because the same as you probably you know the Zen story about Ganto's knife, he cuts. Ganto's says, "If you stop meditating, I'll cut your head; if you proceed meditating, I will cut your head."

Y: Yes. Well, I think…

B: So is Ganto's axe. It was Ganto's axe. We will cut our heads in a way so to speak.

Y: So it depends on what we want to do. What does God want us to do? What is the purpose of it anyway? The primary purpose from my perspective is to remove the mystery of what actually ultimate reality is, to remove that mystery so that they know. People that want to know, can know. It is not to become famous or to win the Nobel Prize or get rich or any of those things. I am interested in people so that they know the mystery of God is removed, and they know what God is. That's my purpose.

Now which way is the best way to do that, I don't know. The numbers will convince some people. The numbers and calculations will convince some scientists. It's applications to various fields will deal with those people, biologists and botanists and microbiology and that sort of thing. It can apply also to social systems; but I am not particularly interested in any of them. I am interested in describing just what is the ultimate reality. And what is the best way to describe that? I don't know. I think you have some good ideas; but I don't know which one comes first.

B: So we shall be doing, for instance, a little of logic as we have been doing until this point, a little particle physics, going deeper into what tau and anti-tau is, what all these arrangements are, then matrices. Then further clarify these algorithms. I have started although I know the limitations. I see the limitations.

Y: (acknowledges)

B: But it would be. Someone could be caught up by this because it…

Y: (acknowledges)

B. Then algorithms and (computer) programs. For instance, I haven't shown, maybe I should show. Bret, I have sent a program in C+ + for finding Hamiltonians. Maybe it could be adjusted; or maybe the infrastructure of this program could be used for further work. It is… not to start from scratch. But you have something. Then fifth is improving the accuracy of charts in sense of… We have seen that, for instance… and this I stressed out. We have F of 5 which is expected number of graphs of degree 5. And another parameter is E of 5… which is… Or some or doesn't matter the denoting, or some other expectance for such graph to appear but connected to a circuit which is another probability.

Y: Yes, all that needs to be done.

B: This is one thing. This probability and the other thing is to recognize that once we have this different structures connected to a circuit… But we are not interested in all these graphs. Then we should divide this by twenty one or twenty one factorial and so on and so on.

Y: But that's still a probabilistic approach.

B: It is still.

Y: Now, if we find some other approach that we can calculate the… not the probability, but the actual time that these will exist.

B: To do this. To do this, I have mentioned the combinatorics. The combinatorics used to do this has as an exception to have the number of non-physical individuals. You should start with the number. If we want to do not probabilistic but combinatorics with whole numbers, then we should know the number of non-physical individuals.

Y: (acknowledges)

B: You should know. When I know I shall say, this is 5 factorial. But I should know it is 5. Still I don't know. we introduce expected number of individuals.

Y: I am thinking what… this might work.

B: Just a minute. May I just finish...?

Y: Yes.

B: What I was aiming to.

Y: But I thought that was part of that, of refining the charts.

B: It is. But I was thinking that. For instance, you have… maybe I am wrong and probably I am, but as a for-an-example. We have the big bang line.

Y: (acknowledges)

B: Then we have Guth's line which is joining… merging with it.

Y: Yes.

B: And then you have Lila Paradigm and your line merging into it. And this… Your line is done based on these calculus in which expected number E of 5 for tau anti-tau particle, for instance, joined together in a circuit, not taking into account all these particular graphs which I have been presenting this morning.

Y: Yes, the twenty one.

B: This is why I presented it. Not to show you graph theory; it is not of interest. But to show you my point, you know, because I have a point here maybe I didn't emphasize this morning. This is why I joined a circuit to every, to each an every ( ).

Y: I see that.

B: To show out of this, this is non-isomorphic to this one. This is non-isomorphic to this one. This is non-isomorphic to this one. This is non-isomorphic to this one. It is not easy to distinguish between them because I made mistakes, you know. I thought this is different from fifth. Where is fifth? But later on I discover no it is the same as that. So it not so easy to see the non-isomorphism of graphs at first sight. You make mistakes and so on, and so on. But once we do it properly and once we are able to recognize tau and anti-tau particles, then we shall decide. This number E of 5 which was used for your curve should be divided by twenty one because we have twenty one of this or twenty factorial.

Y: Or whatever.

B: Then this line might come closer to Guth's.

Y: Yes, it all needs refining.

B: It is only refining, yes. Yes it is only refining.

Y: I agree with you.

B: So this is the fifth possible direction we could work on.

Y: But is that what we want to do? Maybe, maybe not.

B: Yes. This is why I have stated it. The fifth is improving the accuracy of charts.

Y: Yes.

B: The sixth is articles which you have mentioned. You are not interested in fame. Me, also. I also. I am… I want something true to my life, final truth. So this is why I am here with you and not with Guth. I have come to you not to Guth. So we are in the same line. I am just thinking loudly, you know. This is all known. We all know this. But maybe…

Y: I see what you are doing.

B: And now you have been explaining something.

Y: No.

B: You started something. So I believe now as in meditation, you which from gross to subtle, subtler to subtlest, we should go from this to this, and this to this, maybe.

Y: I am not sure what we should work on right now.

B: For instance, I need.

Y: There was one alternative way of finding the F formula called the random walk. I gave you a copy of it.

B: Ah, yes, I saw the title, unfortunately, just the title.

Y: That is one we could refine.

B: Ah ha!

Y: It was by Jude Wanniski. You haven't looked at that yet.

B: Just the title. Also I have drawn this picture; I'll show you later, maybe.

Y: Did you have a chance to look at it?

Bret: Not to analysis. It a great deal, but I scanned it and corrected it, and so I looked through it a fair amount and thought about it a bit.

Y: Think he is on to something?

Bret: Potentially, yes. But I need to… every time I ran across an objection in my cursory analysis, I thought of an answer to it. So I haven't discarded him by any means.

Y: OK, good enough.

B: So also in network theory, in network planning, it is part of optimization methods, dealing with methods to optimize the time duration of a project.

Y: Of a project.

B: Of a project. For instance, you have a project to build a rocket or something.

Y: (acknowledges)

B: And you need to determine the stages. Or you are building a house and so on, and so on. So you have activities in your project. And you have states. And these are different. Activities has duration and the states no. They are just a moment in time so on and so on. But when doing these charts, they divide this by defining here the earliest possible time of this event to happen, the latest possible time of this event to happen, the earliest beginning of the activity, the earliest ending of the activity, the latest beginning of the activity, the latest ending of the activity and so on and so on. So what we could use out of this is, maybe, to define the attributes of the individuals in such charts. For instance, this is a non-physical individual and it has four attributes assigned to it. And maybe this… this is epistemology, I know. I mean just knowledge not…

Y: Yes.

B: Not something essential. But this, maybe… for instance, this is one idea. And then the sameness should be seen maybe (richly?) or something.

Y: Well, that's one way. Show a graph.

B: Also it could be seen in matrices somehow. When we were discussing matrices, you have mentioned that when we are observing the matrices, we have just two parameters into picture. It is non-physical individuals and relations which we also have in these graphs. And implicitly every column has its identity. This is the W column this is the A column; so they have 'whoness' in a way but only implicitly. Also the have existence, they exist. So they have these two parameters implicitly but not explicitly because you have mentioned the space is derived out of the attribute of 'whoness' because each individuals has separate identity out of this space is derived. So this maybe could be shown in the matrices. There are three dimensional matrices.

Y: (acknowledges) This is the random walk.

B: Shall we read it then?

Y: You recognize these formulas?

B: Yes, in a way. I should read it. Shall I read it?

Y: Yah.

B:

> Random walk problem in two D. What is the distance traveled if a particle moves in two dimensional space randomly? Supposing that the particle is moving a distance of one unit each step and then the next step is totally independent from the one before. What is the average distance traveled after (N) steps? Translated to Lila, this would gives us the average radius of two dimensional or one dimensional universe where observation is taken along (N) individuals in the background circuit before returning to the start individual.

Y: (acknowledges)

B: The radius. In a way, we were discussing it this morning when deciding (a plan and so on.)

> The problem is still not defined completely as we see in a moment. Let's start with the simplest model. The particle starts at point 0. 0. After the first step, it is one unit away at 1. 0. Assuming that each step a new branch point in Lila defines a new space direction which is by the finish perpendicular to the distance from 0.0 to the current position, then the distance from 0. 0 will increase each step by L (N) plus 1. Is L (N) squared plus one, square of it? Yes it is (Pythagoras).
>
> L (N) squared plus 1 squared, square of it is hypotenuse which is L (N) plus 1. The result is that L 1 is 1; L 2 is square root 2; L 3 is square root 3. This is fractal. In normal, it is not drawn here. But how it proceeds, is we have here L M first step. Then we have here 1. Then the new is L (N) plus 1, which is, yes L (N) plus 1 is square of L (N) squared plus 1. Then we have this one here which is perpendicular. This one and this is L (N) plus 2. Then L (N) plus 2 is square root of L (N) plus 1squared plus 1 squared. Then L (N) plus 2 is square of… We have seen that L (N) plus 1 is the square of 2. Square of 2 squared is 2 plus 1 this is square of 3. So this is how they have obtained this square of 3. And then the same way if we proceed we have here rectangle and we have here L (N) plus 3. So L (N) plus 3 is square of L (N) plus 2 squared plus 1 which is square of L (N) plus 2 is squared is 3 plus 1 is square of four which is 2. And so on and so on. So we have 1 square of 2 square of 3; 2 which is square of square of 5 and so on and so on. And finally, we have the general number length is L (N) is square of (N). So this is clarified.

Y: (acknowledges)

B: Second in normal two dimensional space when we assume that the new step could be in any direction not only perpendicular, the calculation required an integral overall angles. Thus L (N) plus 1 is 1over 2 P integral 0 to 2 X square root of L (N) plus cosine of W squared (cosine?) squared D W. So 1 is…the hypotenuse is 1 for him; but now it is not perpendicular. It is under an arbitrary angle.

Y: (acknowledges)

B: And he has L (N) plus cosine. This one is divided into cosine and sine.

Y: (acknowledges)

B: And then the whole length becomes L (N) plus cosine. We have L (N) plus cosine squared because we have Pythagorean plus C M squared. And this is, this one, this is the new step, L M plus 1 in the case when we have arbitrary angle not orthogonal. And now, in order to have the whole circuit, because if we proceed to this, you know, it will become a circuit. This is very important. So maybe here another picture like this should be useful in order to be understood. And we have the whole circle then this is integral zero to 2 P. And normalized it is 1over 2 P. So it is all clear. So the result after you solve this, it is not difficult. You gain L M is square of ½ N.

Y: Yes! And that is different than the result that Michael got. He did not have it divided by 2.

B: Who does divide it by 2?

Y: Michael. Michael Baker. I'll be right back.

B: Yes. He has square of N because this is for [I] equals 2. We have square of 2 factorial (N). Square of 2 (N). Expected number for this. For F of 2, in Michael Baker's theory, expected number of F of 2 is square of 2 (N). And this gives the notion of time not of space. F 2 gives the notion of time. So I am glad this is all clear.

Y: Yes, I think it is correct.

b. This is correct.

Y: Based upon his diagram. Based on the diagram reflecting what we are looking for in the Lila Paradigm. He says so on the next page.

B: If we assume that the ratio of linear connections to branch points is equal to P and if we assume that a new linear section of average length to P is perpendicular to the old distance, then he has L M… And here he has pi. And then instead of… Then we have… Let me check this. Then we have L M plus one is square root of L M squared plus pi squared and L M. And further on. L M is according to his writings 1 12th M squared plus P squared. This could be… This could go outside. Ah ha, I should start from the beginning and find the integral. I should start from the beginning from this point here. From this to obtain this. So this is how you have introduce this square of P halved. Multiplied by N, not from Michael's but from this one.

Y: That's right.

B: This was not clear for me because I was searching through Baker's papers to find this, couldn't find it.

Y: I found that when I calculated the actual values. They came closer to the measurements than Michael's did.

B: This is not correct this one. But this is…

Y: This is OK.

B: This is correct. This should be started from the beginning. The whole procedure should be done once again with pi instead of 1.

Y: I think he assumed that here.

B: I believe he has done it with induction, the process of induction. Mathematical induction.

Bret: Could develop a *Mathematica* notebook of those pages.

B: What?

Bret: Put in a *Mathematica* and let it do the integral.

B: Ah, ha, yes. With *Mathematica* maybe it will give you the number, not ah... OK yes, yes.

Y: That could be done.

B: Also it could be done by induction, I thought, but no. I thought, you know, by induction. When I have one… when I have here in the picture… I have one here, the radial is one. This is L (N); this is L (N) plus 1. When the radial is 1, we have seen that it is all clear; it was all derived once again. When it is 1 then L (N) is square root of ½ of 1. And now we could suppose that when instead of one, we have 5. It could be done; maybe tonight I will do it. You know, maybe it is not so difficult. Or maybe now even with all of us observing. Then if it is L (N) plus one and this is L N, then instead of one I have pi and all the rest is the same. All the same… I'll do it tonight because it is all the same, just replace 1 by pi, and this then L (N) is P half N, which is correct because we have squares, you know. It is no big philosophy. Tonight I'll do it. I'll do the whole thing. I'll repeat the whole procedure to have it clear. I am glad we have found to this one. Both cases 3 and 4 have been only confirmed with computer simulation up to (N) ten thousand because the integral are not right away solvable. But why should it be different for larger (N)?

Y: So, he actually checked on his computer.

B: (acknowledges) Case 4 is the F2 formula in Lila. F2 formula is square of 2 N.

Y: Square of 2 (N).

B: F2 formula is square of 2 (N). Case 4 is not the same, I don't know why.

> This might be just coincidence, but I think on the other hand it is more plausible to the derive quantities on the result of the above equations, than on the number of arrows before a two fork will occur because the last number is only valid.

Ah no, not F2 formula. This 2 formula is two arrows. And he is talking about two fork which is space. This is time, this is time, this is space. We are looking for space now for length. So we shall look in Michael's paper and change this if you agree up to this point. So this is chapter, first crossover fork, twenty two.

Y: Crossover fork?

B: (acknowledges) First fork.

Y: First fork.

B: Frequency of forked structures. Frequency of forked structures. I am looking for pi somewhere here in this chapter but.