

# FRAGMENTS OF THE VOID - SELECTA

by Louis H. Kauffman

## I. Introduction

These paragraphs are excerpts from a journal that I have been keeping during the fall of 2003 while on leave from University of Illinois at Chicago, and visiting researcher at the University of Waterloo and the Perimeter Institute in Waterloo, Canada.

The paragraphs are intended as intense little excursions into thoughts on the edge of the void, near the simplicity of one distinction or no distinction at all.

I hope to make stories out of some of them, mathematics, physics or cybernetics out of some, poetry out of all if at all possible.

The edge of a little dose of Philip K. Dick paranoia and a dash of solipsism is, I believe, an accompaniment to this territory. After all, what can you do when you live on the edge of nothingness? This is the same territory as Sherlock Holmes and Edgar Allan Poe, a distinct territory of the mind, combined awareness of the source of logic itself in the feeling of a luminous void.

The numbering preserves the order of the fragments and will give you a hint that some items have been left out, or maybe they fell headlong into the void!

## II. Fragments

1. Spin networks and pregeometry. Before there was space, before there was a hint of the distinction of space, there was a network of interactions. Before there was a network of interactions there was the possibility of connection. Before there was the possibility of connection there was only ONE.

2. The primitive world is one filled with non-commutativity. In this sense it is a world of pure time. All is change. Nothing remains the same. In the interaction of a world of stated operations, the commutator reigns supreme. All comes not from space or time or networks but from  $[A,B] = AB - BA$ , the primitive difference.

What is the inside of the noncommutative world really like?

3. The trace of a thought. An element of consciousness, illuminating and self-creating the cleft that is a universe. One turn. A chance at difference. A spark of value. A moment of illumination in the void.

4. Nothing.

5. Not even that.

6. What kind of science fiction is this? There are no people in this beginning. Only the flashes. The isolated sparks of consciousness. Consciousness turning round and catching

a glimpse of itself. Like a man catching himself snoring in his sleep. Quanta of illuminations. Sparks of arcs of light. Something is aborning. Here. What is a here?

7.

We Take as Given  
by George Spencer-Brown

We take as given  
The idea of a distinction  
And that one cannot  
Make an indication  
Without drawing a distinction.  
We take therefore  
The form of distinction  
For the form.

The form we take to  
Exist  
Arises from  
Framing  
Nothing.

9. Light is different. Light is not distinct. Light binds the separate worlds. Light is fast and easy. Light is lite. Light is energy and delight. Hot under these lights. Light is the sparkle and spill of perception perceiving perception. Aye bootstrapping up from the void me lads.

We'll get there in good time. It only takes a few more sparks to create the time and us in the bargain. What'll we do when we get there? They'll think we're real and if we manage the trick, we'll think they're real. How will we prove to them that we are just the framings of the void? Gad man, ye do talk, it t'will be easy, easy. Ye can use mathematics to do it. Just show em the calculus of indications. That'll do it. Aye, we have to remember the calculus as we come up. It won't be easy. There's so much forgettory involved in becoming "solid". And so much much work for nothing. Its all a pack of lies. A pack of cards. A tissue of pretense. A tautology. An unknot. What'll it be then eh?

10. Why do we do it? Taking all the hard work of distinguishing distinguishing just to manage to get above the level of failing to achieve circularity when if there ever was anything at all, then twas entirely circular. Mark me words boy. Ye'll never git out of the void with anything but a circular argument. Them direct proofs will get you nowhere fast. But what do ye care? Nowhere is where ye are and nowhere is where ye'll stay at this rate of ascent. Boy, your descent is your ascent. Want to get out of the void? Well just try to get into it! Same problem.

Ye are not out.

Ye are not in.

Ye're just in a spin.

And it is this spin that will net you your reentry.  
Buy your reentry tickets to the void here!  
Only half a mark apiece. Three quarks for muster mark. Mark my words me boy and ye  
we get to Treasure Island in a heartbeat.

11. There was a momentary lapse. Then beam after beam of white light emanated from  
the center of the {galaxy}. But at this stage there was no galaxy, only the void. Where did  
the light come from. Another universe? Pure thought? Or was it a rift in the pregeometry  
of spacetime? Thorvald tried a naming maneuver and the whole space changed character.  
Syntax exfoliated into semantics and the world became word. Sign and space were one.

12. Aye lad, sign and space were one. But tell me laddie, where did the quantum  
mechanics come from? Eh? There's a puzzle, ye would have it all come from signs and  
symbols and semiotics and I say semi-idiotics! Where d'ye git the superpositions.  
Where's the collapse of the wavefunction? Where's the amplitudes and unitary probability  
preserving evolutions. Where's the spectral lines of hydrogen. No laddie, you ain't getting  
away with it so easy. Not with me laddie. Come 'round again when  
ye've got some answers. Right now I'm going to take a swim in the void.

13. We were coming up, coming up. Distinctions were accumulating and we knew, even  
though we were well aware of the Church-Curry fixed point theorem, that there was little  
chance of getting a fix without going to infinity. The first time you go to infinity it is  
really something of a scare. The iteration becomes more intense, the whole space  
fluctuates wildly and faster and faster. Then the fluctuations blend. They become  
qualitative and it is as if there were a tone rather than a vibration. But that is not the end  
of it. The tones themselves begin to fluctuate and a new recursion to a new tone arises.  
This happens again and again without end, faster and faster, but who can tell what speed  
means anymore?! At some point the alternation and grading of the discrete and  
continuous becomes all there is, and there is only the felt and timeless concept of  
alternation. At this point the world returns to normal, but it is a new world.  
The transition to infinity is complete. A one-way-blindness into the progression  
accompanies this transition and everything appears quite normal. Usually you go to  
MacDonald's for a quarter-pounder with cheese after all that. The real problem is how do  
you find MacDonalds in the void.

14. Crawling up along the waves of an oscillation Parabel asked Cookie:

" I fail to understand what we are doing here."

"What do you mean?" she replied.

Well, in the beginning there was only void. Right? And then somehow we are crawling  
our way upward toward stable forms. Where do these  
forms come from? How can there be anything at all if we began with absolute  
nothingness.

I don't get it.

Listen, says Cookie. It's a secret. Actually all this is ... nothing. You see it  
all begins to look flowing and strong now. Not solid. Not yet.

But flowing and strong and you can imagine a time when it will even feel strong and  
flowing and solid and real. But look here Parabel it is actually nothing, nothing at all.

But nothing is an opportunity to imagine something.  
And absolute nothing is the most powerful opportunity of all to imagine anything at all.  
And because there is really absolutely nothing, the contrast with even a flickering thought  
of something is enough to make that something seem real! You imagined it all up. Yup!  
And you have nothing to thank for that.

16. TwistUp? I was minding me own business in a zero dimensional sorta way. Just  
working the territory you might say. Not that there was much territory. Zero dimensions is  
just the simplest space past the void. You never know when you're in the void 'cept by  
coming in or out of "it." But Zero is just fine, a cozy place. Nobody here but good old me.  
I am I and I am that and that am I and all of that and that and that. Hard to argue with  
Zero. Nice kinda one way blindness. Leads you to think that there is something very  
valuable and precious about "I". Well how to get out? Its our way or the voidway. Could  
just let the artificial reflexive boundary vanish and me with it. Or maybe there's a way to  
get on with it. In the kingdom of the blind the one-eyed man is king.

17. TwistUp? Oh yeah. I was minding me own business when suddenly I had a thought.  
Now "I" had never had a thought before. In fact there never was an I "before" that.  
Did twistup? Twistup from where? I just got here.

18. TwistUp? Well I was just minding (better put that one in quotes) me own business  
and minding is mind you a very arduous process 'cause every time I have a thought I have  
a thought about having that thought, and its all I can do to just keep having and having  
and I never git to thinking about anything interesting except this here thought I am  
thinking. And then the whole thing went to infinity on me! Blimey! After all the dust  
settled, I could think a thought and that was it. I could think a thought and then think  
another thought. I could forget the whole thing and come back to it "tomorrow". Come to  
think about it, I never had ideas like today, tomorrow, yesterday in those old days. Back  
then it was think and think again. You never knew what time it was.

19. Twistup? Well I was just minding my own business when it hit me. Damn!  
Dimensions are not being created linearly in this cleft! You could have bowled me over  
with an electron. But look it is as clear as the void. Perfectly clear about Zero. Nothing  
but me and me and me and me. Boring. Just too boring for words. And once you get in  
there with Zero you start to orbit around the oscillation I am Iam I am Iam ... And you see  
it as a circularity. Now damn it. You want me to explain  
how "it" gets "seen" as a "circularity" but I can't do that. If I could I would be at the next  
level and obviously I am not. (If I am then I am not. If I am not then I am.) So you see,  
you see this circularity. Well that slams it. Up comes the twist up. The circularity itself is  
one dimensional. Yeah. And the circulation of Zero by the Circularity is two dimensional.  
And at once comes the possibility of circulating about a circularity and that is three  
dimensional. So you see it is just nonlinear. Circulation of circulation gives the old third.  
And there we are. Yep. Just like blackbirds on a telephone wire. Time to call home.

20. Dimensions. Pretensions. Tensions. Tensegrities.

Well, Bucky chuckled. You sure do agonize over a point a line and a plane. None real you know. Only the synergistic dimensioning of Universe integrity space is real.

Those points and lines and planes are just fiction. But space in her three dimensional fullness integrates and forms basis for omni-directional signaling, coherent universe waveform and shapeform language sound light all particular all general unfoldment of human compass. Human compass. Simple integral pattern flow maintaining flow through the constraint of flow itself. Cybernetic. Electromagnetic. All Geometry. Universal Field of Human understanding/action/design. Maintaining action/repose in motion/nomotion navigation of galaxy and metagalactic content of whole system.

21. Whole Universe Principles Incorporated. Well, me lad I hope you don't get completely seduced by this Bucky character with his Principles of Universe. It is seductive y'know. T'think that there really is something there and that it has "principles" that can be followed. There is only one principle from which all the other principles come, an that is that there ain't not a thing and that gives "it" its swing. Lets go back to zero and start again.

22. So what's wrong with Principles of Universe? They speak to no thing ness. Look at the knot on this rope. The knot is not a thing. It is a patterned integrity in the relationship of the rope and the space surrounding it. The knot will persist as the rope changes just so long as the relationship of rope and space does not change. Patterned Integrity is a whole universe principle and fundamental to everything we seem to perceive.

Aye lad. I agree. Tis quite the buzz ye get from a phrase like that "Patterned Integrity". But look at it again and ye will see the underpinning. For it tis a grand illusion that the knot/pattern is coming from the relationship of the knot to its surrounding space. Lets take this bit by bit. First of all, take that knot. It derives its stability from the the self-referent circularity of its being plugged into itself in a circular form. Otherwise it is certainly a pattern that dissolves to no thing. But then the almighty mystery of the ambient space. Well you have to go down to the supporting calculi. You take what you call a plane projection of the knot. And then you have this pattern of arcs and code patterns and the circular double repeat codes that underlay the knot and finally you have a space-free articulation of the pattern of the knot in terms of these double-repetition circular pattern codes. And where do they come from y'ask. Well me lad they come directly from circularity. Simplest patterns of circularity they are. And they are nothing but variant calculi of indication.

That's just fine for you to say. But look at the amazing coherence of all the phenomena that fit into the three dimensionality of space. All that intricate patterning of discrete waveforms and circularity fitting together in the forms of knots and surfaces and three dimensional manifold structures. From our point of view those global principles and intuitions provide the basis from which we have discovered the world beneath of combinatorial forms.

Aye lad. But now that you have discovered it, ye will have to deal with it on its own grounds. And "it" is going to change your notion of what is a space.

24. The green light off in the distance. Vibrating. We knew it signaled a change of space. It meant the entry into a zone of rarefaction. Passing through the zone is very dangerous. Distinctions fall away. References contract. Soon there is nothing but the first distinction. And if you go there or if you go to the void you might end up anywhere, anywhen. There is no telling. The Zone is not like a reference contraction wormhole. There one enters into clarity and at least there is the possibility of prior intention having an effect on the journey. There is no causality in the Zone. Distinctions fall away so rapidly into first distinction or void that you have barely evaluated your expression before another one is full blown. No. There is no hope of control in the Zone. If you want control, stay away. We had no choice. The ship was heading right into the Zone. I could feel sense falling into principle and principle falling into indication and indication falling into void. Well I would never feel void, but I could see the trend. The dread of unmarkedness came over us and we held the controls on a course that just missed the Zone by a hair's breadth.

25. The key thing in navigating in and out of the Zone is to keep your attention on Structure and Pattern. The individual forms flicker in and out at a rate faster than comprehension. Only the large slow fundamental distinctions can be grasped. And this is the situation in the periphery. As you approach the singularity there is not one articulation, not one indication that does not begin to move faster than thought. And thought itself slows to encompass only the form of distinction. We take the form of distinction for the form. You said it baby. And that is the only thought you will have before it all winks out and you end up in some new place in a new universe across the metagalactic void from here.

27. Well you know there is an alternative to despair. I talked to Benthoff again. He said he could remember the transition. He said he used imaginary values to effect the memory and that in fact he was actually on a journey through the far reaches of the Milky Way galaxy for 37000 years before landing on Pluto. Makes it even worse in a way. He went off timewise perpendicular to the rest of us. And he does not have one snapshot of the void.

28. It gets too complex. Everyone and every politico needs a set of opposing forms undone. We could go into the business. Formal Armies. Distinctions undone for cash. No allegiance to either side of the distinction unless value is placed on one state over the other. Contents decimated. Images removed. Boundary elimination at an extra fee. On the spot training in the demolition aspects of the calculus of indications. Truth abandoned directly to void.

29. We were in the dark. Walker's ray machine had failed at the crucial moment. No light, no guidance, wet rock, slippery. And the advancing distinguishers. What was a distinguisher you say?

Well you might ask. A distinguisher is a compact word for a distinction extinguisher. Apply a distinguisher to your front yard and you will be unable to distinguish it from your neighbor's front yard. Apply one to yourself and you will be unable to distinguish yourself as a separate entity in the world. If the distinguishers reach us in this dark cavern we'll never get out. Walker's ray decimates distinguishers when it is working. Now we have to worry that the distinguisher will equate Walker's ray with moonshine. Then we will be as good as gone.

30. What if the commutators fail? Jack had to ask this question. Do you believe it? I mean, if the commutators were to fail we would be in the soup, let me tell you. No shit. Do you realize that all the distinctions would just dissolve at once if the commutators failed. Those commutators are the only thing keeping us from the void. And Jack would plant that doubt just as we were about to embark on a level three reality. Not fair. At level three the consistency of the commutators depends entirely on confidence. That's it. You get your  $[x,P]=1$  straight from believing in it. Any uncertainty and you blow the uncertainty principle to hell and gone. So we were swearing and yelling at Jack. Forget it. Just go somewhere else. Postulate the stuff and go on. That's all you can do at level three. There is no ground at that level. You don't get the luxury of imagining a neatly composed external reality at level three. Level three is reality by declaration, and all the stability is in the word. Leave that and it gets very curvy to say the least. Curvy and chaotic and time wraps around space portions of void chalked up to immanent bits of space confused with time, no repeatability, shards of space and time coming in at all directions being made direction in the jazz of direct creation. All sound all space all music perfect perfect perfect no possibility of getting a plan because no time to plan. No time to plane. No time at all. At the all no time. No sir. Not a time. Each commutator arising and falling in its own time. Each instant a little jazz of no commute. No commute basic negation. No commute not solid. No commute at the action level of basic being. No commute at the act of being and time. And no worry. No worry if you don't insist on worry. So it does not matter Jack. It just does not matter whether you gone to worry or not. It will curve round the bend and come back any way. Yeah.

### 35. Halting Undecidability.

Consider algorithms that accept an integer and compute. Each such for a given integer either halts or does not halt. Set of all algorithms is countable (we just check that they are well-formed and we do not know if they are going to halt). So we write  $C(n,q)$  for the  $n$ -th algorithm that either halts or not depending upon the value of  $q$ .

Suppose that we have an algorithm  $A$  that accepts a  $C(n,q)$  and is a determinant of halting in the following sense:

$A(C(n,q))$  halts if and only if  $C(n,q)$  does not halt at  $q$ .

We can run  $A(C(n,q))$  and  $C(n,q)$  simultaneously.

Then one or the other will halt and we can determine the halting structure of  $C(n,q)$ .

Now for each  $n$ ,  $A(C(n,n))$  is itself an algorithm in the list of such algorithms. Therefore,  $A(C(n,n)) = C(m, n)$  for some fixed  $m$  and variable  $n$ .

Therefore

$A(C(m,m))$  halts if and only if  $C(m,m)$  does not halt.

But  $A(C(m,m)) = C(m,m)$ .

Hence  $C(m,m)$  halts iff  $C(m,m)$  does not halt.

Conclusion: The Algorithm  $A$  does not exist. The halting problem is undecidable.

36. Uncountable worlds within the discrete. We were about to navigate the Sandstorm District of the Andromeda MetaGalaxy, don't you know? Not funny. You know full well that the halting problem is undecidable and that there are sets out there where once you get near them you can't decide if you are in them or out of them. And worse, there is the illusion of the Continuum. That is the most frightening part of all. You get a complete briefing going in. The whole arena of the Sandstorm district is discrete. Highly separated points of contact.

No possibility of smoothness or continuity. Everything is countable and and manageable with

a little elementary graph theory. Hell you can forget all that topology and functional analysis, theory of distributions, the works. It is discrete I tell you. Well, you transit the boundary and ... total chaos. Swirling continuum devils. You can't tell the difference between Sandstorm and Oort cloud continuum. And then you think, ok I'll use my best inaccessible ordinals, measure theory and a little functional analysis will get me out of here. Fine. Dandy. But the next thing you know you've set up the integrals and the whole thing turns to dust and your ship is ground up in

a discrete shower of quantum particles. Ejected, detected and selected. They send you back to Advanced Logic 101 for another bout with the Compactness Theorem.

39. The issue of structure of 3d universe as a whole is very interesting.

In the abstract it is certainly possible for space to curve back on itself so that if one goes far enough "out" then one comes back to the starting point, just like going around the world. We understand this effect for surfaces partly because we can stand outside them and see they have this property (like looking at the modes of circulation on a torus), but also because we can imagine a situation with no boundary but continual periodicity like a tv game where the objects move off screen left and reappear on screen right. That is the sort of description that the dodecahedral "identify by 1/5 twist the opposite faces" description uses. In that description a ray of light heading for one face flies right through and comes in again via the opposite face. But the "faces" are not there. That is just a way to describe the periodicity, and it is traces of this periodicity that are supposed to be inherent in the astronomical data. (I don't think the universe is small enough for any direct evidence

of the periodicity. It must be quite indirect evidence that these guys are using, and this is going to make the result quite speculative.) So one wants more global descriptions of the space. One way to get a global description is to describe the manifold as a locus of solutions to systems of equations in a higher dimensional Euclidean space. In the case of the dodec space there is such a description of it in terms of equations in 6 dimensional Euclidean space written as 3 complex variables (X,Y,Z). Note that each complex variable has two real coords, making the space 6 diml. The dodec space is then described as the locus of solutions to the equations:

$$X^2 + Y^3 + Z^5 = 0$$

$$|X|^2 + |Y|^2 + |Z|^2 = 1.$$

Of course, if the universe were dodecahedral space, this does not mean that the geometric universe is actually sitting inside flat 6 space, but that could be a useful way to model it. In general, if we are going to think about a boundaryless closed universe we might as well represent its curvature and dynamics in terms of embedding in some higher dimensional space. Theorems of John Nash and others tell us that abstract manifolds can be so modeled, and such models were the starting point for studying manifolds to begin with. Now for the sake of Science Fiction we have to ask, if Universe is really inside a 6 (or higher) space, then can't we figure out how to get off the Universe into the higher dims, just like we got off the surface of the earth into outer space. Here we have the next stage in space exploration: Voyages into higher space! The vibrations of our familiar Universe will be seen as part of the panoply of quantum vibrating string and higher dimensional membrane interactions in the higher space. And THAT space, what if that space is itself closed and bounded and suffering dynamics in an even higher dimension... Fractal seeds of an infinite hierarchy of membrane universes. And we need not stop at finite dimensions. Let them all be enfolded in infinite and unfolding dimensions extending to the uncountable cardinals, the inaccessible cardinals and beyond, beyond logic, beyond paradox beyond conceptualization into the absolute.... And think of it, all spiraling up out of void, into self-reference, distinction, triality, the trefoil knot, the quintessence of the trefoil knot, the dodec space, the enfoldment of the dodec in perfect six and ... But we seem to have reentered the periodicity. Time does not have a stop, but this note does stop. Here.

45. What is eternal in mathematics? We imagine that the set of all sets could be unchanging, but this is false. We imagine that the integers  $\{\dots,-5,-4,\dots,0,1,2,3,4,5,\dots\}$  are unchanging, but this may only be our nearsighted view. We imagine it. We imagine constancy in the face of change.

#### 45.1. Time.

The music occurs in time. Painted in timespace. A structure across the fourth dimension. And time can be in series. Time series: -3,-2,-1,0,1,2,3,4,5,... . And in the perceiving of the music ye can think it out and tap it out as time series held in the simultaneity of the harmonies. Yes, yes. All sequence, watch for the next micro-change. Write it all as a single sequence of binary bits. And in your minding of it infinite dimensional spaces of musical comprehension arise in-between the moments. Aye. And the world whirls forward in a pattern of transitions. The fugue is a time series in infinite space. And different every blessed time.

#### 45.2. Time.

The music occurs as an emanation of One. it is timeless emanation and shaping of the that has no shape. One space, infinite in dimension, showing all aspects and showing showing showing in this eternal moment.

#### 46.

##### TERTIUM NON DATUR

We were racing neck and neck. Sierpinski and I were verging on the result. But I was going for the counterexample and he was going for the proof. It was so intense. We both knew the relative outcome. As soon as either of us finished his task, the entire Universe would split into at least two branches, one where the Theorem was true and proved, one where the Theorem was false and shown to be false by a counterexample. There is not room in one universe for these two outcomes. We would part our ways. And the Theorem was incredibly important. The whole structure of scientific and metaphoric thought would pivot on its decision. I knew we were both right. This Theorem was a great truth, and as Neils had told us many times, the opposite of a Great Truth can itself be a Great Truth. But no single universe can hold a Theorem and its counterexample. We would have to split and I was adamant that my universe would prevail. I did not want to go live in Sierpinski's universe just for the sake of logic.

#### 47.

A queer business this:

$\langle \rangle \langle \rangle = \langle \rangle$  and  $\langle \langle \rangle \rangle =$

A formal system.

With some structure.

Repetition/Condensation

Vanishing/Appearance

Value/Void

And it would seem that this system is composed of

d i s t i n c t i o n s .

Multiplicities

s e e n

as unities.

Look at that container

$\langle \rangle$

Made up of two parts.

< and >

Two parts in "magnetic" attraction to one another in the typographical mind's eye.

They want to be paired.

Each part is itself a mark, a ninety degree bend of concave and convex.

Each part is itself a distinctior.

Take a part apart.

Take apart a part.

Taken apart due to the limitations of this word processor.

Into manageable BITS.

If you will me a translation to the logic-sprache, I could write

$\langle \rangle = \sim()$

and  $() =$

so that

$\langle \langle \rangle \rangle = \sim(\sim()) = \sim\sim() = () =$

$\langle \rangle \langle \rangle = \sim()\sim() = \sim\sim = \sim\sim() = () =$

So you have to take care with your consistency.

Oh yes.

So this business with boxes and voids is needed unless we

s e p a r a t e

and form

0 and 1 and  $\langle 0 \rangle = 1, \langle 1 \rangle = 0$

$1 + 0 = 1$

$0 + 1 = 1$

$1 + 1 = 1$

$0 + 1 = 1$

$0 + 0 = 0$

Does this arith seem opaque?

Why no, just think of parallel channels that are open (1) or closed (0).

Still the charm of the minimal:  $\langle \rangle \langle \rangle = \langle \rangle, \langle \rangle \rangle =$

lures us onward into simplicity.

Here is a functional version.

$MM = M$

$M(M) =$

$M() = M$

$\langle \rangle \langle \rangle \langle \rangle \langle \rangle \langle \rangle \langle \rangle \langle \rangle \rangle = M(MMMM(MM(MM)))$

$J = \langle J \rangle \langle \text{-----} \rangle J = M(J)$

49. Nothing could be simpler than that.

Than what?

If it is not marked, then it is unmarked.

And so if you cross from the marked state you enter the unmarked state,

and if you cross from the unmarked state you enter the marked state.

Nothing is simpler than that.

How much language is needed to comprehend the concepts in the previous paragraph?  
This paragraph contains a description of the semantics of a first or elementary distinction. And the paragraph assumes knowledge of a host of notions: marked, unmarked, cross, state, thing, nothing, that, this, it, simple. And every one of these notions is just a variant of the notion of distinction in active or passive voice.

50. So you want the collapse of the wave function?  
I'll give you the collapse of the wave function!  
Are you ready?  
Really ready?  
Ok.  
Here:

<<>>

I hope ye are satisfied.  
All Space collapses to produce an indication right {here}.  
Wherever that might be.  
Tis a first location, y'see.  
A place in the void.  
And how is this trick accomplished?  
Weel you just set up a vanisher and let it appear.  
If something can vanish, then {it} can appear.  
No time direction yet here in the emptiness.  
(A nice word that, emptiness...)  
The subtle knife.

51. "God does not play dice." Well of course not. He makes them. It is a different enterprise. The owner of the casino does not engage in gambling. He works with certainties. On the other hand, God the creator of the integers, if he is anything like Man the creator of the integers does not know everything about them. He is just the designer after all! So even God has uncertainty. Even God can make a bet. And even God can wager on the outcome. So why can't God play dice?!

61. A fine kettle of fish said Cookie. You don't even know what it would mean to have a probabilistic theory of the universe. All your finery. I will bet on noncommutativity any day.

63. Just use the distinguisher! I said it again, but Marcus was not paying any attention to me. He was too busy making distinctions. He was surrounded by a dense cloud of marks and they were starting to form a Lie algebra. If I could just stop him before they spontaneously generated Poisson brackets! There was the danger. If he let them generate Poisson brackets, then coordinates would begin to emerge from the

chaos of his discrete commutators. Then the well-known one-way blindness and fascination with the totally illusory "microworld" would start in. Marcus would begin to believe in an external reality. Dynamical systems in all their unpredictability would start pouring forth. Marcus would be propelled into the agony where no phenomenon is less complex than its performance, and he would retreat to a notion of himself contained in small part of bitter, mysterious external world. There was nothing I could do. He would just have to go forward, evolving a sign-for-himself and discovering the General Principles from the complexity of his recursive and unpredictable monad.

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