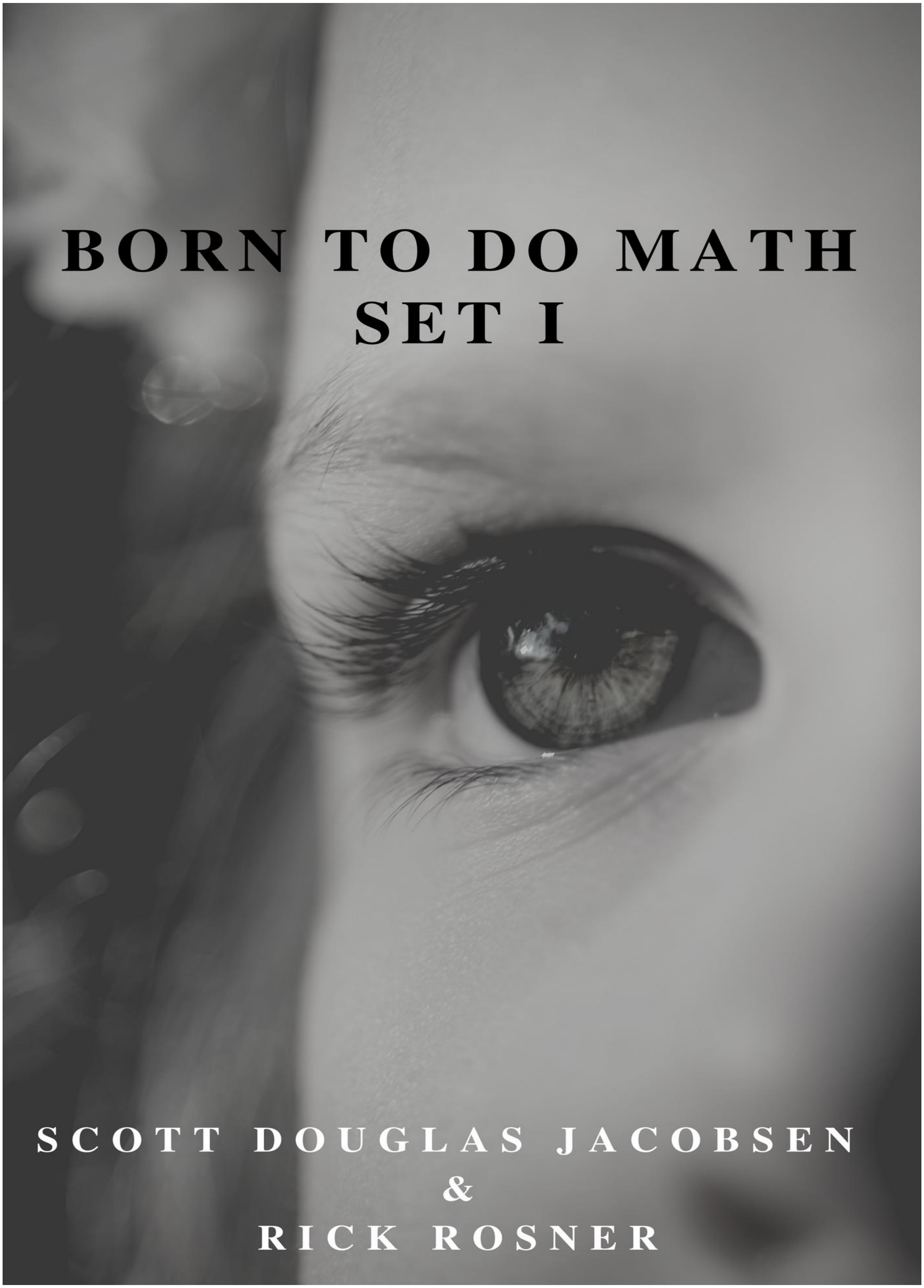
BORN TO DO MATH
SET I



SCOTT DOUGLAS JACOBSEN
&
RICK ROSNER

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Dedications

To three generations of women who support and tolerate me - my mom, Ruth, my wife, Carole, my daughter, Isabella.

Rick

To the love in my life.

Scott

Born to do Math 1 - Networks of Information Spaces

Scott Douglas Jacobsen & Rick Rosner

March 8, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: So you have a tattoo that says, "Born to do Math," as far as I know.

Rick Rosner: Yea, yea, I mean, it's old. I got it in like 1988, so it is not very legible anymore, but it's still there.

S: You have a child prodigy history. You have an obsession of numbers. You have a fear of some numbers, apparently. So there's a deep intimate connection in your life, personal and otherwise, with numbers, and therefore with math and physics. So I want to start a new series called "Born to do Math," where we just pick a topic and talk about physics and math or we research something beforehand and talk about that. You had an idea. Let's talk about that.

R: I was thinking about networks of information spaces with an information space as an arrangement of information within physics. Everyone has their own information space, just what they're thinking about from moment to moment. The connections among these information spaces are simple and weak, very narrow-band. We can only share the information from our information spaces with each other via speech.

I guess water colors, video, but we can't link information spaces. The links between us are very narrow-band. There's nothing like a true marriage of minds. So you've got these very relatively big information spaces connected very weakly. It could look like the kids' model of a molecule with Styrofoam balls connected by Q-tips and all of the pretty symbols. But that won't be how it always is.

There's a historical trend. It is not going to end for broadband transmission of information. It hasn't hit the contents of our minds yet, but it will be looking at the way things are progressing. Eventually, that will permit complicated connections among human information spaces. Plus, we've got this AI future coming, where some people think there will be a billion—not a billion, a trillion—information spaces.

S: You're talking about Chris Cole's extrapolation and theory.

R: Yea, I assume his thinking reflects a lot of expert thinking. There's going to be a mess of AI. Some will be trivial. Some will be connected to humans, to turbo-charge human information processing. Some of them will be massive on their own. They'll be connected to each other in increasingly complicated ways. Where you'll be able to have something like true marriages of minds, which will look in the geometry of information spaces, like not simple.

Then you can look at the rest of the universe with its 10^22 stars with an average of 1 planet per star. It is not unreasonable to think there are a butt load of places where consciousness originated and has been around a lot longer than we've been around. Those places must have at least a bunch of globby connected spaces, not to mention all of the other mathematically possible universe. You and I have talked about a ladder of information spaces.

Where each information space has an armature, a container, the hardware for each information space contained in a space beyond the space, which implies a ladder of larger and larger information spaces—but given the idea that they don't have to be simply connected, what can be simply imagined as a ladder—or more appropriately be imagined as a crazily, bubbly, tangle of information processing entities.

S: With the active input, retrieval, and processing of information, in an information based model of not only human computation but the universe reflecting that, the physics of that, of an information space, will reflect what we see in the universe in its physics. There's a parallelism there.

R: Yea, I imagine—You and I, I think, imagine—the active conscious center of an information space has physics looking similar to what we look at when we look out into the universe, and that nodes where you're receiving information are likely centered on galaxies, centered on the center of galaxies—where you have these black hole like structures with masses of a million stars on up—could easily—not easily but could reasonably—be hypothesized to be the pipelines where information goes in and out to other linked sources of information, whether in the organism itself—with information processing you're not totally consciously aware of the processing sploots out of the black holey thing and is processed by the arrangement of information that is the galaxy surrounding the pipeline.

S: So what's the summary statement?

R: Summary statement: we live in a world of information spaces, where every man, woman is kind of an island with the island being our information space or our consciousness, but in the future we will be connected more complicatedly and intimately—and there's a math for that. You can imagine an information space model that kind of looks like a universe with the connections being among, along, deep gravitational wells, where those wells represent pipelines for information from other sources.

[End of recorded material]

Born to do Math 2 - Bayesian Statistics and Bars

Scott Douglas Jacobsen & Rick Rosner

March 9, 2017

[Beginning of recorded Material]

Rick Rosner: Bayesian statistics is statistical inferences based on putting people in subsets. I use Bayesian logic when trying to catch people with fake IDs of people trying to get into bars. I worked in bars for 25 years. I caught about 6,000 people trying to use fake IDs. I caught another 6,000 people who snuck into bars through some other means. At some places, I was in the inside guy like Anthony's Garden.

It is five acres and holds up to 10,000 people inside the Harvest Hotel in Boulder, Colorado. One way I would catch underage girls who snuck in is I would look for a cluster of lame guys who came to the bar a lot, never went home with anybody. In the cluster of guys, there would be an underage girl who hadn't yet learned how to fend off lame-os. When checking IDs at the door, I have ways to find about 1 person in 90, which is the number of people who have fake IDs.

You can't accuse 100% of the people coming through of having a fake ID. You have to narrow it down and concentrate. You can have to slice away everybody who doesn't have a fake ID within 10 seconds. You should be able to deal with most customers within 10 seconds. You can do that by dividing people into subsets. If somebody comes up to you, you look at them. If they look old enough, look over 30, then they probably don't have a fake ID.

That leaves people under 30. Say half of the people coming in are under 30, and half of the fake IDs are under 30, so you've brought the number down from 1 in 90 to 1 in 45. If all of the features match, not a fake ID, now you're left with, say, 10% of the people coming through and you've concentrated the fake IDs by 10-fold. Instead of 1 person in 90 coming at you with a fake ID, it is 1 in 9, then you ask them questions.

What's your Zodiac sign—Taurus, Leo, Gemini? Very few people don't know their sign, so the concentration of fake IDs in the group of people who don't know their sign has gone up to 2 out of 3. Then you ask them, "What year did you graduate from high school?" It is almost 100%. The criteria of having a fake ID, the various criteria, and you increase your likelihood that somebody's bullshitting you to 100%, just by drawing Venn diagram circles and putting people in the various circles until you've got one intersection of they look young, don't know their sign, don't know the year they graduated high school, and their features don't match.

They're in the center of these four intersecting circles. So you've concentrated the subset of them that is highly likely to be lying to you. Bayesian logic is useful and dangerous. In that, it encourages you to stereotype. At the same time, some of the stereotyping and typing can be really powerful. Odds that a random person is having a kid out of wedlock. Say the odds for the general population are 10%, or giving birth to a kid of out wedlock, the odds for general population are 10%.

If you limit your population to women, you've double your odds because men can't give birth, so 20%. It is something that we subconsciously, unconsciously, maybe, do for good or for ill in a lot of situations, it is helpful to know how to do it, to know the dangers of it. Stereotyping rests on this stuff. So that's an evil it, but it can be helpful.

[End of recorded material]

Born to do Math 3 - 1,001 and the Box (Part 1)

Scott Douglas Jacobsen & Rick Rosner

March 10, 2017

[Beginning of recorded material]

Rick Rosner: The number 1,001 just seems—I don't know—like a number off of 1,000, but what seems weird to me is 1,001 is the 4^{th} prime times the 5^{th} prime times the 6^{th} prime. 7 times 11 times 13. I don't know what you want to do with that, so there.

Scott Douglas Jacobsen: I have a deep question about numbers.

R: Okay.

S: Are numbers out there in the world, to be discovered, or are they in our heads and derived from information processing about the universe, or both?

R: We've talked about this. Numbers come from the rules of self-consistency being necessary for existence.

S: Also, we talked about infinite series of zeroes behind whole, or natural numbers, means, or assumes, that there is an infinite amount of precision, but in a finite system or a finite universe, or an information space, then the digits will end at some point because an infinite amount information does not exist to provide an infinite amount of precision for an infinite series of zeroes on whole or natural numbers.

R: That's similar to quantum tunneling, in my head at least. An electron, or any particles, is never completely in a box, because due to quantum uncertainty and position, and some other stuff. The electron may find itself outside of the box, even if it is a substantial box, and the odds of it may be $1/10^{\wedge}200^{th}$, but the odds of the electron in the box suddenly not being in the box are never just zero because there's no hammering that tiny thickness completely down to zero.

[End of recorded material]

Born to do Math 4 - 1,001 and the Box (Part 2)

Scott Douglas Jacobsen & Rick Rosner

March 11, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: So they 3-dimensionally or 4-dimensionally ooze out, of a box, say? [Laughing] Where the box itself is oozing, probabilistically as a cloud?

Rick Rosner: You need 4 dimensions because that's what the world is. If you detected the electron in the box at T=0, and T=1, T=2, T=3. You've got a reasonable probability that the electron has been trapped in the box. Though even that's not 100%. It is based on the information that you've gathered. But let's say you've tested that electron 400 times, and it has been in the box every time.

There's still a non-zero chance that the electron won't be in the box, even though it is a closed box, the next time you test it because electrons are incompletely, particles are incompletely, located in space and that electron's wave function may find itself mostly out of the box to the point where if you tested, it wouldn't be in the box. It would be out of the box the next time you test it, or the $3{,}000^{th}$ time, or the 30 quadrillionth time you test it.

So numbers, we use them as if they are infinitely precise, but in the real world there's a certain probability that what number you think applies to the number of things you're looking at is wrong. It is certainly wrong if you look at the number of pigeons. If there's a bunch of pigeons sitting on a light pole with 17 pigeons. You have, maybe, a 10 or 11% chance of being right. There's a lot of uncertainty.

You haven't counted them one-by-one. You've taken at quick glance. Other things can affect your certainty when looking at a group of things and then trying to characterize that with a number. There are probably more metaphysical dimensions to whether something can be described or how using integers to describe the numbers of things out in the world are subject to other metaphysical uncertainties.

But small metaphysical uncertainties because an apple is an apple. There's a very small probability that it is somehow 2 apples because you don't have perfect, precise information about everything out in the world. There's a small chance that what you saw as one apple is really a different number of apples.

S: I should change the previous statement of mine from natural and whole numbers to integers. [Laughing] Please continue.

R: Things tend towards whole numbers. Like apples tend to come in units of one, it's convenient for apples and for the world for things to exist as discrete objects in the world. And that's due to, at the deepest level, the things that exist having to follow the rules of self-consistency or non-contradiction.

S: Are math and logic identical in this way?

R: I don't know. Math and logic both rest on simple forms and manipulations of things that represent—numbers represent themselves. They represent unitary objects out in the world. But it all comes from the rules of non-contradiction. Something can't both exist and not exist, at least in a well-formed world, in a macro world.

S: If the physics of the universe rest on the Law of Contradiction founded, and the Laws of Logic, by Aristotle, and various other things, and if the physics of human computation and other conscious beings that have information processing capacity rest on a similar physics because an isomorphism exists between the universe and conscious beings' information processing capacity and computation, then the inability of the universe to have infinite precise knowledge about itself implies that our conceptions of infinity are themselves finite because we are small, finite systems in a bigger finite system.

R: You can use logic to bootstrap. We use numbers as you said, which are infinitely precise even though we don't an infinite amount of precision in anything, but the logic that is involved with numbers allows us to pretend numbers are infinitely precise or do operations on numbers as if they are infinitely precise, and numbers pop up in math and in the world because they rest on simple, non-contradictory forms, and simple non-contradictory forms arise all over the place.

Because they are simple, and because they are non-contradictory, and being non-contradictory they are allowed to exist, which is a little bit hand-wavey. But that's enough for this thing.

[End of recorded material]

Born to do Math 5 - 1,001 and the Box (Part 3)

Scott Douglas Jacobsen & Rick Rosner
March 12, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: When I think about the quantum tunneling mentioned before, by you, I think about when I worked with Dr. Thabet, Manahel, she worked with various people: Raymond Keene, the chess grandmaster, Tony Buzan, the Mind Maps guy, and Michael Gelb, the Leonardo da Vinci systems guy. One project that we worked on was quantum biology and the prospects for quantum computation in the brain.

In one theory brought by Anirban Bandyopadhyay, Roger Penrose - who is more respected and prominent of the triplet of these people, and an anesthesiologist named Stuart Hameroff. it had to do with microtubule calculations in synchrony. Does any of this stuff hold water to you?

Rick Rosner: I don't buy quantum computation in the brain. One reason is—I don't know who has said this—you need a lot of things for things to be quantum entangled. You need to set up initial conditions. There are instances of quantum entanglement all over the place. But to make the brain's business run on quantum entanglement, you'd need less heat in the brain, much more precisely controlled conditions. I buy that argument.

I also buy the argument, which is that when you look at the grain of thought in the human brain. If we had quantum computing, thought would be much more HD, high-def, than it is. The level of computing or the graininess of our thoughts of the world seems to me consistent with a computer of a brain that 10^10th or so neurons. Somebody said 85 billion.

S: 86 billion is the standard metric now. 8.6*10^10?

R: Yea, yea, that with a bazillion dendrites with the dendrites constantly reaching out and pulling back to more efficiently wire the brain and its processing. Our thoughts seem consistent with that minus quantum computing. If we had a little quantum computer in each of our neurons, that would multiply the computational and information processing of our brains, I dunno, a million-fold or a billion-fold. Our brains are just not that powerful.

S: I have heard critics.

R: Yea.

S: I remain agnostic, remaining strongly towards the mainstream, because the full research has not come in. Although, I agree the arguments that you're stating are fair.

R: I've given two fair arguments. Let me make an unfair argument.

S: I was just about to.

R: Okay, you do yours. Then I'll do mine.

S: Okay, two. One is argument from authority. One famous researcher disagrees with the findings or disagrees with the theory. Therefore, the theory or the findings are invalid. I have heard this argument. Another, if I may, is simple *ad hominem*, which is to discount the person through a series of resorts to personal attack. And you?

R: Let me give my unfair argument. To me, the whole idea that there's quantum computing happening is like "woo-hoo" one mysterious thing kinda equals another mysterious thing. And quantum computing is powerful and mysterious and has intricate math, and consciousness is complicated, non-characterizable by current means for the most part and powerful and, therefore, consciousness must equal the other mysterious powerful thing of quantum computing.

Let's mush two things together, that are powerful and mysterious and say one is involved with the other. That's unfair.

S: That's unfair, and I can see good reason for it. It's mysticism or spiritualism injected into explanation for a theory. Those labelled and dismissed as spiritualists will label and dismiss the others are fundamentalist materialists. Both aren't helpful, and don't really do much, except tar-and-feather.

R: I've got one fair argument against. So in my opinion, consciousness is distributive, it is a trans-brain phenomenon. It is like Minsky's *Society of Mind*. It is chatter and gossip and information shared among the brain's various expert subsystems in real-time.

S: Do you mean module-to-module and neuron-to-neuron?

R: Module-to-module instead of neuron-to-neuron. It's your brain's vision centers. The various processing centers involved in vision to give a conscious feeling to vision, and those interacting with lexical centers to apply words, and emotions. Everything is—consciousness is shipping stuff on a grand scale among the various expert systems in your brain. I don't like the word holistic, but it is a whole brain kinda thing.

As opposed to trying to find consciousness in particular microtubules with each glowing consciousness seems to be counter to the way thinking actually works, it is not like tubules in their quantumness are somehow—now if you did have quantum computers in your brain, it could make the processing done by each of the expert subsystems much more high-def, and the high-def communication would make a much more high-def consciousness. But you don't need the high-defness of the microtubules being quantum computers to get consciousness. They would rev it up, but would not be these emanators with this green glow of consciousness.

[Laughing]

[End of recorded material]

Born to do Math 6 - 1,001 and the Box (Part 4)

Scott Douglas Jacobsen & Rick Rosner
March 13, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: Then I have a question.

Rick Rosner: Okay.

SDJ: Do the unfair versions of the arguments reflect less on the validity of attempted disproof and more on the tendencies in personal bias of the person making the critique? So someone has spiritualist beliefs or materialist beliefs.

RR: I don't know. So many bad ideas float around consciousness. Consciousness has this long history of bad explanations or theorizing or mysticizing, or unhelpful definitions of consciousness. That everything is conscious in its own way. Trees in a tree-like way. Rocks in a rock-like way.

SDJ: [Laughing]

RR: The term itself is subject to all sorts of abuse.

SDJ: Then I'll pose something else.

RR: Okay.

SDJ: The brain is a physical system. It is in the universe. The universe can be described by math. So the brain can be described by math. If a theory lacks math or the future prospects for math, then it seems to off-the-bat disprove that theory as a possibility.

RR: I don't know if it disproves it, but given the highly successful record of math in explaining things. Math can—it's not that math explains thing. It's that if you have a theory, and if you can mathematicize it, and the math fits, then that's a powerful thing. If you have a theory that doesn't have te potential to be mathematicized, maybe, your theory needs more work. However, I think there's a kind of reasoning via forecasting and poetics.

At various points in humans' intellectual and scientific history, you could kind of guess what was coming next. It wouldn't always be right, but using poetic irony three thousand years ago, we had supreme confidence we were at the center of existence, the universe, the Solar System. A cynically poetic person could've said, "Nah." What will happen is we'll get our asses kicked, we think we're all so great, and we're going to find out we're not that special.

That is a kind of poetic prediction. I don't know if any of the ancients actually reasoned that way, saying we had too much hubris and that we would have our asses kicked by actual conditions, but you can cynically reason or poetically reason the other way too. Which is for 300, 400, a

1,000 years, we've been finding ourselves. Every discovery we make tends to make us less important. More of the product of random processes.

On an ordinary planet orbiting an ordinary star in an ordinary galaxy, that's not at the center of anything. And somebody, I'd like to say some of my reasoning goes in the opposite direction, which is you can only go so far in that direction and the future will bring partial reconciliation between what we are and what the universe is, or what lots of things in the universe are. The cold, random universe of the 20^{th} century where nothing matters because nothing is in charge, except randomness and chance. That's not necessarily the end of thinking about the world.

[End of recorded material]

Born to do Math 7 - 1,001 and the Box (Part 5)

Scott Douglas Jacobsen & Rick Rosner

March 14, 2017

[Beginning of recorded material]

Rick Rosner: In the 21st century, I think it will be information in charge, and we'll find that we are close to the center of things in certain ways because we are creatures of information ad information runs the universe. Also, you can get cynical about what is—there's a principle in physics that is 'a good theory avoids special conditions.' That things work because we're at a particular point in space, and all of the most powerful physics of the past 100, 200 years sets up rules.

Starting with Newton's Universal Gravitation, it says, "Here's a deal that explains gravitation every place, across the whole frickin' universe." Everything is the same under this rule, at least gravitationally. You have these conservation of angular momentum laws that say the way things are here aren't special. They are the ways things are across the whole frickin' universe, and the Big Bang itself is a spatially homogenous theory, except the grain of the universe.

It says the entire universe exploded from a point, more or less, and that point doesn't exist anymore because everything is still the point. It's just the point keeps expanding, and everything being on a balloon, except the balloon is a 2-dimensional surface and we're expanding on the equivalent of a 3-dimensional surface, but no galaxy in this expanding universe occupies a special place in the universe spatially.

So we've got this whole deal where everything is spatially democratic. Nobody is privileged. However, to do that, we had to invent a theory that has no temporal homogeneousness. In a Big Bang universe, every instant is different. No point in time is the same because the universe is constantly expanding and playing out in a Big Bang way.

[End of recorded material]

Born to do Math 8 - 1,001 and the Box (Part 6)

Scott Douglas Jacobsen & Rick Rosner

March 15, 2017

[Beginning of recorded material]

Rick Rosner: Until the early 60s, when background radiation was discovered from the Big Bang, there were two big theories of the universe that were competing. One was Big Bang. The other was Steady State. Steady State hypothesized a universe that is temporally homogeneous. Yea, maybe, the universe is expanding, but in places that are more, and more, empty. Maybe, matter spontaneously arises and so the universe is looking the same because it is always filling.

I don't know if I have characterized that correctly. But in Steady State, new matter keeps arising to make the universe look the same from moment-to-moment-tom-moment-to-moment. And I a cynically poetic way or ironic way, you could argue, "Hey, everybody who is arguing the universe is spatially and isn't temporally homogeneous. What happens if we get our asses kicked by a theory that suggest temporal homogeneousness?" Which is what IC does to a pretty thorough extent.

That the universe looks Big Bangy due to nature of information, but the universe is actually, kind of, fairly homogeneous working off the same parts in cycling and occupying the same positions versus each other without—if there's expansion, it is a kind of cycling expansion where the universe 40 quadrillion years from now will look pretty much like the universe today. That resemblance wouldn't be true under a purely Big Bang universe.

So there's a little bit of reasoning via poetic irony. And I don't know. The guy who came up with—Gamow, Big Bang guy–a couple—Hans Bethe, I don't know how you say his name—Gamow, party dude, big tall Russian dude comes America. Likes to drink, can't do math for shit, he needs an equation or an equation solver. He needs to go down the hall to people who can do math. But Gamow, still the guy who comes up with the Big Bang.

[End of recorded material]

Born to do Math 9 - 1,001 and the Box (Part 7)

Scott Douglas Jacobsen & Rick Rosner

March 16, 2017

[Beginning of recorded material]

Rick Rosner: Here's how to quickly dissect a number, division-wise. In elementary school, you probably learned that if the digits of a number of add up to 3, then it's divisible by 3. You may not remember that. But that's the deal. If the digits of a number add up to 9, then it's divisible by 9. There are some bunch—of, of, of, not a bunch but—several other tricks. If you look at the last digit of a number, you can tell if it is divisible by 2, 5, or 10.

If you look at the last 2 digits of a number, you can tell whether it is divisible by 2 or 4, or 5 or 25, or, obviously, 100. The last three digits of a number whether it's divisible by 2, 4, or 8, or 5, 25, or 125, or 10, 100 and a 1,000. By combining things, you can get divisibility by 6, divisibility by 12. It's all of those little tricks, which are pretty much—if you were betting people in a bar just by applying those little tricks to a number and the number is resistant to division by all of the numbers that we went into, then it is probably prime.

There's on more trick, which is fun if you're a math geek like me. Which is if the odd digits of a number add up to be the same as the even digits of a number, that number is divisible by 11. By that, I mean, take 154, the first digit is 1. The second digit is 2. The third digit is 3. 1 plus 4 equals 5, which equals the second digit. 154 is divisible by 11. 1,331 is divisible by 11 because the 1 and the 3 add up to the same as the 3 and the 1.

Which also means that any number that's a palindrome with an even number of digits is divisible by 11, and oh! If the digits in a number differ by a multiple of 11, if some of the odd digits differ from some of the even digits by a multiple of 11—0, 11, 22, 33—that number is also divisible by 11. So 4,224, divisible 11. 135,531, divisible by 11 because the 1, the 3, and 5 add up to the 3, and the 5, and the 1. If your friends are easily impressed, then do something with that.

[End of recorded material]

Born to do Math 10 - Alpha Particles and Informational History

Scott Douglas Jacobsen & Rick Rosner

March 17, 2017

[Beginning of recorded material]

Rick Rosner: Alright, so, we believe—people who believe in informational cosmology, which is the idea that the universe consists of information and is information about something else; not just about the universe itself, and the universe is isomorphic to itself as a map to the information that it contains. It is a map of information. It is also the information. But if we're going to talk about that, at some point, we need to put the money where our mouths are and need to explain where the information is.

Our ideas at this point are, not non-existent but are, pretty vague. Most of the information—the universe consists of particles. Most particles have fairly simple structures, such that those structures can't contain much or any information on their own. For instance, electrons have no guts. They have no inner detail, no inner architecture. They are just whatever they are when they are localized to a point based on interactions or a probability cloud.

They have no parts. Ditto for photons. They are bundles of energy, not consisting of—anyway, protons consist of three quarks. Also, the very quickly emerging and vanishing particles that mediate the forces among the quarks. So protons have a lot of stuff going on. These protons bouncing and swirling off of and around each other. But still not enough inner structure to have any kind of readable history.

The only time you get history is if you get the smallest unit that contains any kind of readable history might be a nucleus that reflect or generally only arises via a series of radioactive decays. Some things start off heavy and unstable nuclei and spit out bunch helium nuclei. Is it alpha particles that are the helium nuclei? They spit out a bunch of those and you end up with some radioactive form of iodine. So you can look at that nucleus and say, "Yea, that's its history."

[End of recorded material]

Born to do Math 11 - More Informational History

Scott Douglas Jacobsen & Rick Rosner
March 18, 2017

[Beginning of recorded material]

Rick Rosner: Or you can look at beryllium and say, "Most likely, it became beryllium through this chain of fusion events. So it takes something like junk agglomerating, so you pick up a pebble. It is weathered and got some history to it. It also has like 10^28th or 10^30th atoms in there. It's not a lot compared to the 10^85th or the 10^81st atoms in the universe, but it is macroscopic.

So you'd hope—you have to think that the agglomeration of the clustering of particles at various scales throughout the universe. That there's a lot of information in that. You have to wonder if that's sufficient information. For some discussion later on, we can take stabs at how that information is encoded because it is probably not encoded in the way information encoded in computers, where you have definite 1 or 0 values.

Things mean something in the network of other bits it is plugged into. Anyway, the clustering is where the information is. That clustering, once you get to the macro enough scales, reflects some history, which contains information. But that history is contained in the cluster. It's not like you have history independent of the cluster. So you wonder, you look out at the universe and see clustering, but it looks redundantly clustered.

You have 10^22nd starts. But mostly one star looks like another star. There are different types of stars. But for every start like our Sun, there might be 10^18th or 10^19th stars like our Sun. You have 10^11th galaxies that take various forms, but once you've pinned down the forms. They all kind of look like each other. So it makes me as, "Well, is there enough information in this clustering to—is this arrangement of matter—

You have to figure it is the most efficient way to store information. But is the most efficient way with all of these redundant clusters. But then there's the matter that is actively interacting with all of the other matter in the universe. The 10^22nd stars that are boiling down hydrogen and sometimes helium into heavier elements. We're saying on the outskirts that you have a bunch of burned out matter that provides structure to the universe, which provides extra structure to the universe.

That more precisely defines the positions of particles in the universe. It, basically, enlarges space so that particles are more precisely defined within space. You can see this one of two ways. One, particles are shrunk down and made more precise and massive in space, and the precise localization contains information, or the space itself is larger than it otherwise would be, which, again, would make the particles more precisely located in space than they would otherwise be.

And that that precision contains more information than you would otherwise have.

Scott Douglas Jacobsen: It's a bit like the difference between a low fidelity and a high fidelity television. Even on YouTube, things that are higher fidelity—people going to 480p or 720p—take longer to load.

RR: Exactly! Exactly, yea, that's a good thang there. That's a beginning stab at finding the information.

End of recorded material]

Born to do Math 12 - Protons, Neutrons, and Electrons

Scott Douglas Jacobsen & Rick Rosner

March 19, 2017

[Beginning of recorded material]

Rick Rosner: Then there's one more thing, which is that protons and neutron—which are really protons with one quark flipped over. They're pretty much two flavors of the same particle, same composite particle. They are probably the engines of agglomeration in the universe. They are probably the workhorses. It probably does the most work in generating information and having the relationships, the clusters. Most of the work is probably done by protons and neutrons.

And then I'm going to waffle and say, "And they're associated particles." For every proton there is, there is a tension in the information structure, the net of information in the universe, and that tension is represented or reflected or manifested in what looks like a particle that we call an electron. But it might at some point, if this theory ever gets pushed in a productive direction, it might be useful to look at electrons not as particles or just as particles.

But as manifestations of the information created in information space by protons, and for some quantum mechanical, mathematical reason, this often takes the form of particles, like electrons in a 1-to-1 ratio with protons. The at-homeness of each proton, with its position in information space may be reflected by how tightly an electron is locked onto the proton. An ionized proton; that is, an energetic proton that has so much kinetic energy relative to whatever it is surrounded by.

Maybe, all of the other stuff around it probably has some kinetic energy. If everything around this proton has a lot of kinetic energy, enough kinetic energy so that everything's ionized and is a plasma, those protons are not very at-home with where they are in information space. They have all of this excess kinetic energy. They are bouncing around. A calmer proton, one that is more in line with local—I want to say, "Flow," but I don't because it's misleading—distribution of particles within its space, a calmer proton.

It has less kinetic energy. It might have an electron locked onto it, into orbit around it – reflecting the proton is pretty well-situated or in good agreement with the matter around it. A proton, a bunch of protons, with electrons in ground states are going to do less interacting with each other, or at least less energetic interaction with each other, than the protons and electrons in a plasma. Perhaps the calmest possible proton-electron pair is one where the proton has been flipped into a neutron, which effectively removes an electron from circulation.

So the whole thing has zero charge. The neutron isn't going to be doing any appreciable electromagnetic interacting with its surroundings. It's as situated, as comfortably taken care of, as it can possible be.

[End of recorded material]

Born to do Math 13 - Tension in Space

Scott Douglas Jacobsen & Rick Rosner
March 20, 2017

[Beginning of recorded material]

Rick Rosner: With electrons, we think of them as particles, but it may be helpful to think of them as reflective of the tension between individual protons and the rest of information space. Often, or sometimes, this tension takes the form of point-wise or point-like electrons interacting via photons. Other times, the electrons take the form of probability clouds – as we've noted off tape – because electrons don't actually orbit nuclei and protons like little planets going around the Sun.

They exist instead as probability clouds of various shapes, but not exactly spatially diffuse, but spatially undefined, clouds around the protons or nuclei that they are associated with. And that's enough of that—but! To wrap up, it might be helpful to think of them as the form that the tension between a proton—an electron can be thought of as—and the rest of information space, whether it is point-wise particle or a probability cloud.

Electrons are reflective of the tension between individual protons and the shape of space, basically, which is determined by the distribution of matter.

Scott Douglas Jacobsen: So you're talking about a tension between electron, proton, and space based on the distribution of matter, to summarize quick.

RR: Yea, my guess is that the electromagnetic interactions is what largely carries gravitation. That you don't need gravitons, which are gravitation carrying particles that have never been discovered, but which are brutally hard to discover because the gravitational force is $10^{\wedge}40^{th}$ times weaker than the other forces.

[End of recorded material]

Born to do Math 14 - Pseudo-Particles

Scott Douglas Jacobsen & Rick Rosner

March 21, 2017

[Beginning of recorded material]

Rick Rosner: But I would guess that you don't need gravitons, though they may still arise in certain situations. In quantum mechanics, according to the rules of quantum mechanics, you can have all sorts of pseudo-particles popping up in all sorts of situations.

Scott Douglas Jacobsen: Does this imply pseudo-antiparticles as well?

RR: I don't know. People know so little about gravitons that they are unsure whether—actually, I am definitely talking out of my butt, and I may or may not be talking correctly, but I assume among the things they don't know about gravitons is if they are their own antiparticles. But I assume one thing they do know based on the necessary spin of the gravitons, and I don't know what their spin is.

I know that neutrinos, which are super light particles – maybe the light particles known besides photons, which have no rest mass at all. Neutrinos are so hard to work with that it's not known whether neutrinos are their own antiparticles. But anyhow, I don't think there are gravitons for the most part. I think that what looks like gravitation comes from electromagnetic interactions, which themselves determine the structure of space based on information.

It's the most efficient structure of the information space containing these information generating interactions with these interactions, for the most part, carried by photons, which are, for the most part, the result of—is it for the most part? Not necessarily—well, they are all the result of electromagnetic interactions. But you have super powerful ones that come from, super powerful X-rays that come from, protons getting or fusing into a proton and a neutron. That releases like a 4-million electron volt photon, or something like that. Some hugely powerful X-ray.

[End of recorded material]

Born to do Math 15 - 5 Brothers-4 Sisters & 4 Sisters-5 Brothers

Scott Douglas Jacobsen & Rick Rosner

March 22, 2017

[Beginning of recorded material]

One more thing I was thinking about with regard to information in the universe. Inside of a computer, things have definite values and things represent specific. When you think about things going on in a computer, you think about every flip from a 1 to a 0 equals a definite change in some linear and very regimented process, which results in rigid calculations in the computer. But when you look at how we perceive the world, let's try to perceive an orange as an example.

Light bounces off the orange and hits your eye, and you get enough photons off the orange and you're able to perceive it as an orange, but it doesn't particularly matter which orange in the orange's skin.

[End of recorded material]

[Beginning of recorded material]

Rick Rosner: Photons carry the energy from electromagnetic interactions, and I think, it just takes small, not imbalances, but asymmetries. Asymmetries does not seem like the right word either—it just takes a small shift, a one part in 10^{40}th, in the characteristics of electromagnetic interactions. That would be enough to account for gravitation. That could be something as simple as taking self-repulsion or self-attraction of electromagnetic interactions.

But I don't know—whatever it's called, I'm talking out of my butt. So imagine a universe where you have 5 of each. So that should be a next attractive universe in my lame way of trying to understand stuff because each proton, because opposites attract, is attracted by 5 of the other thing, but only repelled by 4 of its own thing. It is like being in a family with 5 brothers and 4 sisters.

Each member of the family always has more of the other sexed sibling regardless of which sex you're talking about. Each boy has 4 brothers and 5 sisters. Each girl has 4 sisters and 5 brothers. If you're able to pull out some self-repulsion out of the next attraction versus repulsion, that might be enough to account for gravity, or some other trick that leaves gravitation in the hands of the electromagnetic interaction.

[End of recorded material]

Born to do Math 16 - Photons, Molecules, and Atoms

Scott Douglas Jacobsen & Rick Rosner

March 23, 2017

[Beginning of recorded material]

Rick Rosner: One more thing I was thinking about with regard to information in the universe. Inside of a computer, things have definite values and things represent specific. When you think about things going on in a computer, you think about every flip from a 1 to a 0 equals a definite change in some linear and very regimented process, which results in rigid calculations in the computer. But when you look at how we perceive the world, let's try to perceive an orange as an example.

Light bounces off the orange and hits your eye, and you get enough photons off the orange and you're able to perceive it as an orange, but it doesn't particularly matter which molecules in the orange's skin and which rods or cones, or whatever, in the back of your eye absorb the photons. As long as photons come off the orange and hit enough receptor cells in your eye, you're going to perceive an orange.

There might be 10^40th different ways to perceive that orange based on which molecules emitted the photons that you saw, and which receptor cells in your eye picked up those photons. So I wonder, "Is the universe a setup where every single interaction—

The inside of the Sun is a mess. The Sun is 100 times the diameter of Earth, and it's this big superhot swirling hot maelstrom of gazillions of interactions with everything smushed together super tight and exchanging energy all of the time, and is pretty dense for being as hot as it is, and so rich in kinetic chaos and relatively dense that it takes a photon that has been generated at the center of the Sun, where fusion is going on, 170,000 years to bounce its way out to the surface of the Sun.

So it is a giant scramble of chaotic interactions. The question can arise, "Does every single one of those interactions super-signify something?" For every interaction, the 10 to the who knows how many, 30th, 40th, 50th interactions per second, does each one of those interactions trigger a different version of some kind of many worlds thing? Is the universe different based on every little teeny interaction based on the mass of interactions going on all of the time? Or is there a rough or is it a general accumulation of interactions that roughly contains the information that the universe contains?

For instance, to move away from the Sun, you have a flashlight, it sputters out photons at a steady rate. You can imagine individual photons being emitted one second. You don't know exactly where they're exactly going. They're going somewhere in the flashlights beam. They either illuminate something in the beam locally and then move on. But does it matter to the matter in the universe and the information in the universe which specific atom shining the specific flashlight at a screen?

That's the only thing between the flashlight's beam and space. The photon hits an atom in the screen, is momentarily absorbed and then emitted. The atom that absorbed and emitted it goes back to the way it was. The photon goes off at a certain angle. The angle might matter, but does it matter as long as the angle is more or less the same. Does it matter that a 100 million atoms in the screen temporarily absorbed and then emitted that photon?

If you have a bunch of photons going off at once, does it matter which out of the 10^{30}th molecules in that screen – which particular subset of molecules are temporarily being transformed and being returned to the way they were by the stream of photons? Or is it a rough thing where the information is contained in the aggregate impression that is created, which is a beam shining on a screen as opposed to millions of specific interactions?

The same way it doesn't matter which particular photons and atoms and receptor molecules are involved with you perceiving an orange. It is a general thing. It is a general impression and that's something we'll have to figure out. The end of that thing there.

[End of recorded material]

Born to do Math 17 - "It From Bit"

Scott Douglas Jacobsen & Rick Rosner
March 24, 2017

[Beginning of recorded material]

Rick Rosner: We're trying to figure out where the information in the universe is, and we know some stuff. But it is not completely helpful stuff. When people started talking in the 70s, Wheeler and other people, there is this famous book called Gravitation. It is a 10-pound book. An awesome book about gravitation. There's this one page about "It from Bit." That, somehow, there's a way to look at the universe as a computer, as a codifier of information, as a processor of information.

It is like the way the computers process information. However, if the universe consists of information, it has to do certain things that when we look at how those things are done in computers they are very systematic and regimented. But when you look at how things are in the universe, stars boil for billions of years, then explode, then boil some more, then they explode again, and then they explode again.

And they bubble down until they blow off their skin again and again in novas, until you're left with this core of stuff that might be neutronium, or might be carbon-oxygen, or it might be a ball of iron slowly cooling because it can't do fusion anymore, but it doesn't look like those things are really good engines of the systematic storing of information. So you have to look at two things. Where the universe might store information, and how the universe might store information that is generated through mess, non-systematic processes.

The way a fusion goes on in stars is systematic. It's a well-understood process, but it takes place among 10^58th atoms in a typical star, just swirling in this big chaotic mess, and there's nothing, even though the physics is well-structured. The actual process is this chaotic swirl of nearly 10^60th atoms and who knows how many photons, all ping-ponging off of each other. It really doesn't seem to be a good way to store information.

So we know some stuff. We know there's information in the clusters. The universe has forms at various scales. The smallest cluster being, if you don't count quarks and protons – and you should, I think, but the smallest clusters beyond that would be nuclei. Protons and neutrons clustered in atomic nuclei. Beyond that, you have molecules bound by electromagnetic van der Waals forces that can—things that can stick together because of electromagnetic forces.

Past that scale, all you have are clusters gravitationally – asteroids, planets, stars, solar systems, and whatever groupings, sub-galactic groups there might be within galaxies. Then clusters and superclusters of galaxies, and then you get into the very largest structures like filaments, which are like strings of galaxies and some other junk across billions of light years. So there's information there.

[End of recorded material]

Born to do Math 18 - Choices in Worlds

Scott Douglas Jacobsen & Rick Rosner

March 25, 2017

[Beginning of recorded material]

Rick Rosner: The universe - reflects what has clustered together and how it's clustered together reflects – if you want to look at this way choices among multiple possible worlds, which isn't a really helpful way of looking at it. The universe could've clustered in any number of ways. Maybe, anomalies in density. Maybe, different parts of the universe getting hit with photons more than other parts based on light emitting bodies like stars.

Things are pushed into clusters, collapse into clusters. The cluster you have 10^80th or so atoms in the universe. You have 10^58th stars or so in the universe. You a have 10^11th galaxies. At some point, there was some choice within a galaxy, say, about how exactly its matter and its 10^11th stars will be divvied up, whether molecule A or hydrogen atom A was going to end up falling into a dust cloud that would form this star.;

Or whether that hydrogen atom falls into another cloud that will condense into another star. There's some choice in that clustering contains information. By just saying that, it doesn't tell you that much. It's also a good bet that memory in the universe—that the universe is able to store information by moving large structures to the outskirts of the universe where the time moves more slowly.

Close to an apparent T=0, there's less interaction and things are frozen in a relativistic sense because time is dilated and there may be ways to do that time dilation thing within galaxies via gravitationally collapsed object. It may be able to hold onto stuff until its needed by tossing it into a black hole. But the whole idea of the universe understanding itself, the universe containing the information it contains runs into the problem of anthropomorphization.

We see things because we receive perceptual information through our senses and then we process it through thought and brain cells that are connected in such a way that they clarify what we're seeing, which is sub-thought. And memory and various expert subsystems that provides various interpretations and clarifications about what we see. And we're highly evolved beings with highly evolved toolkits in our brains. And if we say the universe is made of information, the universe has to understand that information, but there are no mechanisms along the lines of what we have in our brains for the brain to understand itself in any way that might be familiar to us.

Because the universe consists of chaotically boiling stars and swirling galaxies, and it's not an evolved brain. It doesn't have evolved structures for thinking. |Yet we're still claiming that it is made of information, and thanks to the physics of the universe the universe is able to share information with itself and able to maintain order. So that sets out the problem: Where is the information? How does the universe understand it? How does the universe process it? All without evolved structures for that.

[End of recorded material]

Born to do Math 19 - "Welcome to the Universe"

Scott Douglas Jacobsen & Rick Rosner

March 26, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: We were talking for like 20 minutes on our irregularly regular Skype calls. So you wanted to talk about math, physics, and IC. I said, "Okay." We went from there. All sorts of interesting topic arose from it.

Rick Rosner: I am reading *Welcome to the Universe*, which is Neil Tysons's, and to other guys', book. It is a bunch of easy physics for the lay person. It is a nice way to trigger thoughts about physics. It also bums me out because it presents Big Bang physics as this perfectly established and proven bulwark against any other possible interpretation of the universe. And there was a tweet string from scientist Katie Mack.

She talked about the misery of—she's a working scientist. Every known physicist has lunatics trying to submit their alternate theories of the universe to them. She talked about the misery of that for her, having to tell people to fuck off. For people themselves who labor in delusion for decades, that whole thing is depressing because what we're trying to produce and present is an alternate view of the universe as an information processor with characteristics that - some of which – are inconsistent with orthodox Big Bang theory.

SDJ: It is not willy-nilly. It is based on or building on previous work don for decades in digital physics, which many mainstream have already done.

RR: Yea, but I mean, it is still enough of an alternative thing. The *Welcome to the Universe* book shows the theoretically predictive curve of the isotropism of the Cosmic Microwave Background – how clumpy it is. How clumpy it would be considered to be with Big bang theory, then they showed the experimental results and the degree to which the experimental results and predictive curve match is just crazily huge, and super precise.

It might be the most precisely matched curve between theoretical and experimental predictions and results in all of physics. I've never seen the curve before, which just speaks to my ignorance. The curve is so wiggly and kind of arbitrary looking. Yet it is a theoretical curve, and they plot the experimental points, and they match dead-on to 1 part in $10^{\wedge}8^{th}$ or some crap. The idea that you've got a theory that somehow says, "Well, that's not exactly what's going on," with that sort of evidence is a little demoralizing.

It makes one think, or it makes me think, that I'm one of those crazy guys with a bullshit theory. On the other hand, I don't think all of our thinking over the past – I don't know – is worthless. But you do have to address certain things. In about 1974, physicist John Wheel talked about "It from Bit" in his huge book *Gravitation*. It from Bit is the idea that the universe is an information processor and it is working through some code the way computers work through code.

When you think about how much code goes into computation, especially when he was writing in 1974, a modern video game's computation has millions, if not tens of millions, of lines of code that mediate between players, actions, and visual experience, and circuits being flipped, microcircuits being flipped from 0 to 1, in a computer. You've got the tens of millions of lines of code. The people who have written the game.

Then you've got compiler code that writes that into a more ground-level code to talk to the individual flappable bits of a computer, and who knows how many other layers of code that have to be passed through between the players thumb on the controller, through the computer, to the TV, and back into the player's eyes. It is so much code. If you've got It from Bit going on in the universe, in a digital universe and its code.

Where is it? Where is it hidden? Where is all of the code?

[End of recorded material]

Born to do Math 20 - 'Code, Where Art Thou?'

Scott Douglas Jacobsen & Rick Rosner
March 27, 2017

[Beginning of recorded material]

Rick Rosner: It seems—because – ugh – for the universe to be an information processor you've got an entirely different universe overlaid over the universe we experience. We experience the universe as matter. We experience the universe as matter. We experience it as a physical world. But if the universe information being processed, then that information is itself a picture of the world, and probably not the universe that we experience.

But a whole other construct made of that information. And to have to mediate between the physical world we experience, the code that would mediate between that and whatever world is pictured by the information that we don't experience as information, but that we experience as matter and space. That seems to be a huge burden, an impossible burden, for you to hang that much secret code.

Scott Douglas Jacobsen: It seems the same with our own minds.

RR: Yea! Where is all of that code, we don't see the world. Our brains model the world, so we don't see our dendrites or any kind of information map. We see the results of that map, which is a picture of the world. But we're not seeing the world. We're seeing a model of the world that has been constructed in our brains with thought plus sensory information. So it is a complete overlay.

You've got our brains, which is a whole physical environment. Then we've got this world that is connected to the brain, but it presents us with a whole different set of images and thoughts. That interface is—well, if that interface has to be based on code, that's a lot, a lot of code.

[End of recorded material]

Born to do Math 21 - Codeless Information

Scott Douglas Jacobsen & Rick Rosner

March 28, 2017

[Beginning of recorded material]

Rick Rosner: Then I was thinking, "What if there could be something like codeless information that is purely associative?" Maybe, that's more efficient.

Scott Douglas Jacobsen: That's different than minimized information as well, or minimized code. So in general, the previous models of artificial intelligence, or simply computer code, were super long in trying to code for every single possible problem. So that you could have an appropriate solution to it. At the same time, the more modern ones minimize that, and allow the computer to learn for itself based on its much simpler set of algorithms.

So instead of hundreds of thousands, even millions, of lines of codes., you have a couple hundred. Google DeepMind with this minimized model has great success. What you're talking about something even further, it is codeless code.

RR: I don't know because I don't know much about the Google deal. I don't know much about anything. But when you allow a system to build its own set of equivalences, which seems to be what Google translate is about. There may be no zero code way to do stuff, but this "minimized code" that you're talking about.

SDJ: I made the term. I invented term [Laughing]. I did not use it from a professional.

RR: There may be—instead of having explicitly codified code, computers don't comprehend anything they're processing. They work according to rules. But if there are systems that work on more global grasping of stuff. That may incorporate a more efficient, more explicit, less code heavy form of associative coding or information, or something that approaches codelessness.

[End of recorded material]

Born to do Math 23 - LSD & SAT

Scott Douglas Jacobsen & Rick Rosner

March 30, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: [Laughing] You were taking the SAT while on it (LSD), the old harder SAT.

Rick Rosner: That was just a joke. I was 20. I read a book called Texas Celebrity Turkey Trot, which was one of the first books ever about the coming celebrity culture. It is about a semi-successful—well, it is about a professional football player who is injured in a game and has to spend the year recovering and doing like things that a minor celebrity does, like going on radio shows and making public appearances.

This thing was in ’78 or ’79. Celebrity culture was just coming online. The message that I took away from it—the message that you’re not supposed to take away from it is that everyone is horrible. The message that I got away from it was that the people who are most horrible got most of what they wanted. People who had moral qualms did worse than people that blatantly did anything that they wanted. The message that I took away was that I need to be more of an asshole.

I need to be unafraid to go out into the world and just behave like a schmuck and do stupid things for the sake of doing stupid things. Next semester, in college, I had to take the mandatory expository writing course that every freshman has to take. I was in my third semester as a freshman. We had to do spontaneous writing things in class. One thing that came to me was to write stream of consciousness of a dumb kid who finds himself on a Saturday morning trying to take the SAT while he is still tripping from acid that he took from the night before.

It was a fun writing exercise. But I thought, “Alright, I’m doing new stuff.”

[End of recorded material]

Born to do Math 24 - LSD, SAT, & Stupid Ideas

Scott Douglas Jacobsen & Rick Rosner

March 31, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: Did you go into the implications of the equivalence between what happens in heads and the universe at large? [Laughing]

Rick Rosner: I thought. That's a good stupid idea. I will actually take the SAT on LSD because it is a stupid damn thing to do. I was just starting my career as being a specialist at doing stupid shit. That was one time that I took LSD.

SDJ: LSD messes with your head, your brain, with the information processing in it. So the "red" doesn't necessarily mean red by standard experience.

RR: It does, but LSD doesn't mess with—it doesn't entirely mess with your associative structure. It just makes it crappy. There's a lot of information processing that goes into translating what you see when you see somebody's face. Your face has a bunch of subtle curves. Every facial feature has its own curves. You're trying to translate emotions and what somebody's emotional state is.

At some point, you're add the auditory information by watching their lips. It is easier to understand what somebody is saying if you watch somebody talking at you. To some extent, you're adding to the auditory information by watching their lips. It is easier to understand what somebody is saying if you're watching them talk rather than just listening to them because you're getting a lot of additional information.

On LSD, all of these little processors, little specialist subsystems in your brain, have their functioning knocked down by something in your brain, so you don't get gentle curves when you look at somebody's face. You get their face broken up into stupid polygons because that's the best your brain can do at that point. You're not getting smooth skin effects of light, shading, and glow of blood circulating beneath the skin and people can look like lizards.

They can be talking to you, but it is garbled mush. You know they're saying words, but it is echoed, choppy – and so on.

[Attempted impersonation by Rick Rosner of LSD auditory alterations.]

SDJ: [Laughing]

RR: It's been a long time.

[End of recorded material]

Born to do Math 25 - LSD for 4 Times (Part 1)

Scott Douglas Jacobsen & Rick Rosner

April 1, 2017

[Beginning of recorded material]

Rick Rosner: You're scrambling to keep your shit together. One time, I took LSD. I took it 4 times. One time was because I was dating a girl who wanted to take it. Remember, at this point, I was 20. So I was really stupid at this point. I was into speed reading. I thought, "If I took LSD and hid in the library overnight"— I'm not saying this isn't the stupidest thing in the world.

Scott Douglas Jacobsen: Can I add a preface for you, for anyone reading this now or into the far future?

RR: Okay.

SDJ: There's recent research to show young women's brains are ready to go, fully developed, at age 22 on average. For men, it takes until age 30. That can be delayed – or never even reached – with substance use or other things. In general, age 30 is when you can expect or predict fully intelligent – socially, emotionally – integrated thoughts and behaviour from men. I am taking that into account when you're saying, "I was 20."

RR: Plus, I'm dumber than a lot of 20-year-olds because I was nerdy. It helps if you're a cool guy in junior high and high school. It helps your emotional development. Say you are part of a sports team, which seems to be a way people are socially acclimated, but I was too geeky for sports. I didn't get any of that stuff. So I was probably extra immature for 20. Anyway, I thought that if I took LSD, hid in the library overnight.

Somehow, I would blow open my ability to absorb information and be able to absorb a large chunk of the information in the library.

[End of recorded material]

Born to do Math 26 - LSD for 4 Times (Part 2)

Scott Douglas Jacobsen & Rick Rosner

April 2, 2017

[Beginning of recorded material]

Rick Rosner: That if I could at 2,000 words a minute without LSD. What could I do with a night of having my perceptions blown out?! It—it didn't go well.

Scott Douglas Jacobsen: [Laughing].

RR: I take the LSD. I hide in the bathroom as the library closes. As it turns out, I am completely paranoid about a janitorial crew.

SDJ: [Laughing].

RR: My perceptions are pretty whacked at this point. I'd see a garbage can on wheels where there hadn't been one before. Then I would get hungry, and would go down to the basement, and I knew how to reach into the vending machine to get stuff without paying for it.

SDJ: [Laughing].

RR: I would pull half of a burrito, only a torn half of a burrito during the extraction process [Laughing]. Ate half the burrito, it didn't make me feel a whole lot better. I freaked out. Finally, I gave up, and had to go find a janitor. At this time, your processing is all messed up because everything is moving slowly. My freaking out probably took like 5 hours. By the time I go find a janitor, and begged to be let out of the building [Laughing], it is almost sunrise.

SDJ: [Laughing].

[End of recorded material]

Born to do Math 27 - LSD for 4 Times (Part 3)

Scott Douglas Jacobsen & Rick Rosner

April 3, 2017

[Beginning of recorded material]

Rick Rosner: I'm trying to talk to the janitor and keep my shit together and explain that I must've fallen asleep! But he is all lizardy and saying words to me, and I don't understand them.

[Impression of non-word words by Rick Rosner.]

Scott Douglas Jacobsen: So that can happen. But that implies the information processing. That leads to three things: definite states, computers, and how the universe is not like that as an associative structure as a map of information and how that might imply a new set theory.

RR: I don't know if it is a new set theory.

SDJ: Adapted.

RR: We'll have to talk about the different forms of information that the universe might encode or might be incorporated into the universe. And at some point, we might have some yes-no/0-1 situations. For instance, one way that the universe contains information is via the clustering of matter. And much of the clustering of matter, and all of the large-scale clustering of matter is gravitation, but the way that gravitational clustering is locked-in—

Before we were taping, you were talking about a slingshot maneuver. Where you can shoot a satellite at Jupiter or something, and the satellite whips around Jupiter and receives a boosts by moving in a hyperboloid, hyperbolic, trajectory around Jupiter. In a slingshot deal, the satellite is only temporarily close to Jupiter and having its trajectory changed hugely by Jupiter.

[End of recorded material]

Born to do Math 28 - Slingshot Deal

Scott Douglas Jacobsen & Rick Rosner

April 4, 2017

[Beginning of recorded material]

Rick Rosner: In a slingshot deal, the satellite is only temporarily having its trajectory changed hugely by Jupiter. The two bodies come together and then they each go on their way more or less separately. There is no gravitational locking. If there is a part before, then there is a part after. When you have a gravitational locking together, when a bunch of matter comes together and can't get away later, that locking together-

The lock happens because those interacting particles, objects, bodies emit energy to the rest of space – could be in the form of heat. It will mostly be in the form of electromagnetic radiation. Two things crash in space. You might have like debris go flying away, but you'll have a lot of heat emitted from friction in the form of light – electromagnetic waves to radio waves, and so on. So gravitational aggregating is locked into place via electromagnetic interactions.

So even something as gentle gravitational locking together, gravitation has only 1/10^40 the strength of the other forces of nature. It is hard to detect gravity unless you have two super macroscopic objects interacting, at least one macroscopic planet-sized object. Two billiard balls are not going to suck each other together via their mutual gravitational attraction. The force is too gentle and you could say nebulous.

But it isn't quite the right word. It is too soft and squishy and just not powerful. But! That gravitational interaction might be locked in and/or codified by electromagnetic interactions, which are themselves kind of 0 and 1 or the have the potential to be 0 or 1 interactions – either an atom emits a photon or it doesn't. Either an electron falls into orbit around a nucleus via the emission of a photon or it doesn't. So that seems like a possible 0 or 1 proposition.

[End of recorded material]

Born to do Math 29 - Duality

Scott Douglas Jacobsen & Rick Rosner

April 5, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: I would add to that then, some thoughts, maybe a thought. The duality of particles and waves, where an electron can be a particle and a probability cloud. It can be a 1 or 0 in a particle context, but as a wave, as a probability cloud – as we've been calling, it might not necessarily be. So maybe there's a duality in information interpretation. Both definite and probabilistic, at the same time: "both… and."

Rick Rosner: I agree with that.

SDJ: I had ideas about information before. A couple of days ago, a few days ago, one was information can be taken as stuff now. Stuff being processed in the moment, like working memory. Other can be stuff to be used later. Another one is not only stuff to be used later, but also to be used in some interpretive frame to be used to predict something into the future. Then there's the "both…and" of that, which is an implied past and a possible future.

Two more, I think, one is a nothingness of information. Stuff destroyed or never existent. And the last one is the information—well, it is a meaninglessness form of it. Stuff that is uninterpretable in any framework. These layers of definitions of information in addition to the "both…and."

RR: So you're talking about a bunch of information in the context in with which we experience information as conscious information processing entities.

SDJ: Yea, and given the similar physics, you should be able to extrapolate to the universe.

[End of recorded material]

Born to do Math 30 - Isomorphism - Minds & Universe

Scott Douglas Jacobsen & Rick Rosner

April 6, 2017

[Beginning of recorded material]

Rick Rosner: Yea, but that's a tough order.

Scott Douglas Jacobsen: Yes, that is a very tough order [Laughing]!

RR: Because you have all of these different forms of information. For any information processing theory of the universe, there would have to be analogs, physical analogs, for what is going on in our experience of information processing, and in the physics of what processing the information. That's just—it is at the very least as complicated. So yea, the universe isn't 0 and 1 proposition because everything is smeared together in quantum mechanics. So what look like 0 and 1 propositions are only approximately or imperfectly 0 and 1 propositions because under the math of quantum mechanics, there's virtual stuff going on all of the time, ghost stuff, that helps structure the world. Stuff that is not quite real, but has real impact on real interactions. Real interactions are themselves smeared into everything else. Particles are only approximately their own selves.

To some extent, every other particle. Every interaction is to some extent there is a lot of tacitness going on. The universe via QM acts as if stuff happens. The definiteness with which things happen or have happened is all part of this associative net of somewhat nebulous entities in a somewhat nebulous space, which reinforce each other's imperfect actuality by mutual interaction. The universe bootstraps itself into existence by having a lot of interactions among a lot of particles. More than 10^{80}th particles all shooting other particles - both real and virtual – at each other to kind of reinforce each other's actuality with no perfect, immortal completely definite—God doesn't have a peg board upon which things actually exist. Things can only exist by establishing histories of interaction with a zillion other things.

[End of recorded material]

Born to do Math 31 - Effective Theories & Set Theory

Scott Douglas Jacobsen & Rick Rosner

April 7, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: When I was thinking about this theory we were talking about off tape, the new set theory. Usually, there is the labelling of things by letters: a, b, c; x, y, z. Those get clumped into two sets. Where the "a, b, c" is Set A, and the "x, y, z" is Set B, those together become Set A and Set B with an ampersand, &, or an "and" sign together, and can be made into a higher-order Set, C.

Those imply, simply by formalism, definite information, but if you could—

RR: —Yea, but even though nothing is definite, we could can use definite as a shortcut, definiteness as a short cut.

SDJ: Oh! I was going to get to that. Something a little bit new. So we list them (off tape) probability-by-probability on a chart. If one were to take that into context of effective theories in physics, so rather than describe every single aspect of every particle in a cloud, you describe basic physics and the math behind what makes a cloud works in interaction with stuff around it, and then you can make the set theory elements and the sub-sets effective theories themselves so that you can predict the effective theory of one hunk of cloud with another hunk of cloud. That might make it easier to simulate, if not easier to conceptualize.

RR: You mean one nebulous object interacting with another nebulous object.

SDJ: Yea! So you can have a lot of use of effective theories here.

[End of recorded material]

Born to do Math 32 - Louis de Broglie

Scott Douglas Jacobsen & Rick Rosner

April 8, 2017

[Beginning of recorded material]

Rick Rosner: In the 1920s, Louis de Broglie found that everything has a wavelength, which is an uncertainty in space that is inversely proportional to its mass. So it is like an exercise in a beginning physics class to calculate the wavelength of a baseball or the uncertainty in space of a baseball because a baseball has like – I dunno – $10^{\wedge}29^{th}$ atoms or something. I forget. Anyway, its uncertainty in space is super tiny – to the point where you'll never, ever, have to worry – in practical terms – about the uncertainty in space of any macroscopic object.

We are able to walk through the world barely ever experiencing the deep spatial uncertainty of positions of objects in space. I mean, we can make errors ourselves about where things are, but the universe itself is not entirely sure where things are, never comes into play, or almost never. Almost every aspect of the world in which we live has that tiny uncertainty that is so small that we are never aware of it.

We can use numbers, which are perfectly exact to represent things. That you look at the newspaper and you see a house with a 3-car garage. There are tiny uncertainties in everything that you are looking at, whether a house is a house or a garage is a garage or that set of 3 garages is really 3. You can imagine ridiculous situations in which that comes into question, but in reality houses are really houses and our ideas of houses conform to houses and garages to garages.

Weird variations of that never come into play. So we're able to use precise shortcuts in a world that is not perfectly precise, but is precise enough for our purposes.

Scott Douglas Jacobsen: I like that.

[End of recorded material]

Born to do Math 33 - Entropic Arguments

Scott Douglas Jacobsen & Rick Rosner

April 9, 2017

[Beginning of recorded material]

Rick Rosner: That you have entropic arguments. You can argue things about entropy and order that show why the world is not crazy. It is orderly. That the odds—this is a fairly common example. The odds that you would suddenly suffocate because all of the air molecules in a room randomly suddenly decide to be where you're not. The odds of that happening of that are so low that it wouldn't happen in a quadrillion lifetimes of the universe.

Yea, they might rush someplace else, but there'd have to be a reason. If you're in an airplane, and then hole gets punched into the fuselage, then there's a reason all of the air rushed to one place. So in general, we exist in a world where things happen for a reason and random action doesn't generally – unless things have been set up like a coin toss. Chaotic randomness doesn't happen. Things generally have causes.

One reason we will run into randomness making us suffocate is we don't live long enough to be threatened by random motion of air molecules. We are limited creatures – limited in space and time. There's the viral lady that says, "No time for that!" We don't have time for that in our 70, 80, 90 years on Earth. We have to take shortcuts that reflect the extreme probability that ignore the extreme improbabilities.

We can deal with entities as if they are precisely existent because we don't have time to deal with the tiny improbabilities that might make non-existent.

[End of recorded material]

Born to do Math 34 - The Universe's Shortcuts

Scott Douglas Jacobsen & Rick Rosner

April 10, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: Same with the universe? So it takes shortcuts. We talked about this before.

Rick Rosner: Yea, it is probably having stuff on the margins fizzle in-and-out of existence, which is probably how the universe having bootstrapped itself. It is probably how the universe creates information. It bootstraps itself on the margins based on incorporating new information. That's how time plays out. It's the moment-by-moment marginal accumulation of further information, which is reflected by an increasing order in the universe.

The more information the universe is able to marginally accumulate moment-by-moment, then the more order and space and matter it encompasses to embody that information.

[End of recorded material]

Born to do Math 35 - Metaprimes (Part 1)

Scott Douglas Jacobsen & Rick Rosner

April 11, 2017

[Beginning of recorded material]

Rick Rosner: The number line itself and integers themselves while they appear infinitely precise can be seen as being defined by a bunch of relationships among the various numbers.

Scott Douglas Jacobsen: So what does that mean, affirmations of some things and negations of other things based on information relative to other things?

RR: Well, the number line is the most compact—the set of natural counting numbers is the most compact set of numbers that are defined by their set of ratios to each other. The distribution of primes and etc. There's a system of metaprimes, I guess, you'd call it. You can make a choice at any point whether the next number should be a prime or a certain kind of composite number.

SDJ: You published something about this in the 90s.

RR: Yea, but it's the numbers defined by their ratios to each other based on how you answer the question, "What number comes next?" Numbers whose value has not yet been exactly defined.

SDJ: If I may interject to get more precise on what you're saying, if you take the question and then you provide an answer, would the verbal or the linguistic representation of that be in conditionals or direct statements to provide the proper interpretation of the information there, of the associative landscape?

RR: The way you set it up is: Prime number A. You don't know the exact value it takes, but the next number in your number line can either be A^2 or B – in the most compact number line it is B.

[End of recorded material]

Born to do Math 36 - Metaprimes (Part 2)

Scott Douglas Jacobsen & Rick Rosner

April 12, 2017

[Beginning of recorded material]

Rick Rosner: A is 2 and B is 3. And then in the most compact representation, now, you can go either A^2 or C. In our setup, in the natural numbers, it goes A, B, A^2, 2, 3, 2*2. And then you can, again, ask whether the next number is C or AB. So at every point, you've got a choice to make between throwing in another prime or throwing in a composite. There's always a new set of composites based on the next—

The numbers begin to become defined because of the relationships you've already specified.

Scott Douglas Jacobsen: So I see two things there. The linguistic representation would probably be conditionals. If this, then this, and if this, then this, and if this and this, then this and this, and this continues indefinitely for primes, twin primes, sexy primes, and so on.

RR: The most compact set of relationships is the natural numbers because there is a value at every possible node on the number line. Every point on the number line that is created by adding 1 to the previous number.

SDJ: Why not integers as well? Why not add integers on the number line?

RR: I dunno. The next simplest or next most compact representation is probably—is, I dunno if it the next most compact, but another easily seen representation that is pretty compact is the primes minus 2. The set of primes without 2 as a prim, and then your pattern goes A3, B5, C7, A^2 – which is 9, D – which is 11, E – which is 13, AB – which is 15, and that's generates the set of odd numbers. If you carry it out so that whole deal is as compact as it can be.

[End of recorded material]

Born to do Math 37 - Metaprimes (Part 3)

Scott Douglas Jacobsen & Rick Rosner

April 13, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: As you know, math assumes axioms. So this is assuming some axioms. So one that comes to mind—well, even before that, when you're talking about – as a premise to this appendix to the previous discussion. It was codeless information in the universe with an example to metaprimes and the axioms that are being assumed here are a) the prime sequences and b) [Laughing] the metaprime sequences implied within that.

So it is not necessarily codeless. Is it? Or if it isn't, how?

Rick Rosner: I'm not saying that it is. I am saying it is a way of defining words by their relationships to each other, via the integers and their relationships to one another. I would think it has implications in terms of things like the Twin Prime Theorem, which is that – or postulates. It is not a theorem. It postulates that there are a limited number of primes that differ only by 2, like 3 and 5, 5 and 7, 11 and 13, 29 and 31.

SDJ: Is it the Twin Prime Conjecture? It is just coming to me now.

RR: Theorem, Conjecture, sorry. There's no biggest pair of twin primes. You can always find a biggest pair, which is the same as saying there's an infinity of them. You can't – to be clear—there's only one set of primes that differ by 1, which is 2 and 3. There are no more primes that differ by 1. That would require one of those numbers to be even and each of those numbers is divisible by 2.

But you can have a bunch of numbers. People conjecture that there is an infinity of them that differ by 2: 100 and 103, you can't have 3 in the row except for 3, 5, and 7.

[End of recorded material]

Born to do Math 38 - Metaprimes (Part 4)

Scott Douglas Jacobsen & Rick Rosner

April 14, 2017

[Beginning of recorded material]

Rick Rosner: You can't have two sets of adjacent primes except 3, 5, and 7 because one of those numbers is going to be divisible by 3, but you can have two sets of twin primes with the middle one kind of missing out of 5 consecutive odd numbers like 11 and 13, and 17 and 19. There are a whole bunch of other things that kind of come off of this conjecture. That there is an infinity of primes that differ by 4 or differ by 6 or any kind of relationship like that.

Scott Douglas Jacobsen: That's interesting. That's interesting.

RR: I suspect, but have been too lazy and undereducated to do anything with it. That the way of setting up the primes via metaprimes. That is, that the numbers exist via their relationships among themselves prohibits prohibitive principles. That is, that there is not enough information. There's just enough information to define the ratios among the various primes to infinite precision, but to set up a deal where there isn't an infinity of twin primes would require superimposing more information on those ratios.

It would require a little extra cooking. I doubt there's extra information among those ratios to shut down the twin prime business. All of those statements that there's an infinity of these special primes will turn out to be true if they're of that type because there's not enough information in those ratios on the number line to plug the all of holes that you need to plug. So you make sure that every time you have a prime you don't have another prime two steps down the number line.

[End of recorded material]

Born to do Math 39 - Metaprimes (Part 5)

Scott Douglas Jacobsen & Rick Rosner

April 15, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: That's really cool and sparked two thoughts for me.

Rick Rosner: It is cool if it is true, but is a decent line of inquiry. But it could be bullshit.

SDJ: It is fascinating. I hadn't thought of that before. Assuming the axioms as true, taking them on hand, applying them in an IC framework, you get a minima and maxima in different domains. Minima in principles. Let's assume them. A set of simple principles, then you derive a universe. That universe begins to develop higher-order combinatorics. You get lots of information from that.

Then you have maxima in terms of how far the processing goes based on the amount of information that is there. And those, to me, tap really neatly into a lot of things we've been talking about over the last couple years about IC, about digital physics. For instance, you assume a couple things. You get primes and metaprimes, but there's a limit on how far you can go with them based on limits in processing. It is semi-neat.

RR: What that brings up to me is that, you need a—for the universe to be an information processor, for it to be true, or for it to be a map of the information in an information processor, it needs to informationally efficient in some ways. It also needs to be super messy because when we look out at the universe. We see great order. We also see huge messiness. What goes on in a star or in a star that's run out of fuel and exploded and restarted, exploded again, it looks sloppy.

We are highly ordered on Earth, but messy, drooly, meat machines. There's a mixture of deep order and associated with that is complexity in the form of messiness.

[End of recorded material]

Born to do Math 40 - Metaprimes (Part 6)

Scott Douglas Jacobsen & Rick Rosner

April 16, 2017

[Beginning of recorded material]

Rick Rosner: Any kind of theory needs to explain how something as chaotic as the guts of a star can be involved in the processing of information, which, I guess, implies a kind of looseness in the – what you're calling – the axioms.

Scott Douglas Jacobsen: There's probably a better term, but it comes to mind because we were in a math context at the time. So I used the term.

RR: Or it is a bootstrapping thing where order arises…

SDJ: Okay.

RR: …in proportion to a systems capacity for order. So things are always fuzzy on the edges.

SJ: You're walking along the beach. You have your ice cream. You drop your ice cream. Okay, it is slopped on the ground. Five second wait, you pick up some of it. You end up stepping in seagull poop. The water comes and washes that away. It smooths out the sand. There's some more order there.

RR: Yea. But quantum mechanics is the most powerful tool that we currently have that is really about addressing order in a world of incomplete information.

SDJ: It is a bit like a physics of association.

RR: Yea. Under quantum mechanics, you only know what you can know via association.

[End of recorded material]

Born to do Math 41 - Metaprimes (Part 7)

Scott Douglas Jacobsen & Rick Rosner

April 17, 2017

[Beginning of recorded material]

Rick Rosner: So if you go to the two-slit experiment, and it doesn't have to be just two slits or two holes, it could be a Swiss cheese experiment, where if you shoot a photon at a screen that has a bunch of holes in it and then you measure that there's a screen and there's your target, the screen is between the gun and the target. The screen has holes. These holes are the only holes the photons could go through.

Say it is sheet metal with holes punched through it, a detector behind the metal screen. It turns out that this setup – if you don't have individual detectors on each of the holes to tell you which specific hole the photon passes through, then you will get an interference pattern on your target wall that shows that each photon more or less, to some extent, passed through every hole on the way to the target.

Given that photons tend to travel, roughly—well, I mean, if there's a hole that's like 10 miles away, you won't get the much of the photon passing through the distant hole. But if the holes are a few centimeters or millimeters away, and you're shooting from a couple ten meters away, and if you're shooting each bullet of light one at a time, each goes through a hole. Which says informationally that if you don't have any way to determine by setting up your detectors which hole the photon went through, it will go through all of them.

So that information only exists to the extent that in the universe it is defined by its relationship with other things in the universe. To the extent that everything is defined in the universe, everything is defined by objects', particles', mutual interactions. It is a bit like the number line thing. I suspect there are an infinite number of twin primes because there is not enough information in the mutual interaction among the various prime values to stop there from being an infinity of twin primes.

Similarly, you can't have enough interactions to infinitely precisely define every object in the universe. You can set up an experimental apparatus to really pin down particles or the aspects of a particle. Its position and velocity. Some things can't be really precisely defined. But you can define some particle or system if you hang enough scientific apparatus on it, on a system, then you can detect a heck of a lot about it.

But this is at the expense of the universe. By focusing on some particles, other stuff will be less defined. You have a choice about what you want to define. Everything in the universe is roughly defined to the same extent in just normal interactions due to random action. Like the molecules in a gas are, generally, somebody would do a statistical analysis, but there is an average definition of a particle in space. Particles define one another via their interactions.

[End of recorded material]

Born to do Math 42 - Metaprimes (Part 8)

Scott Douglas Jacobsen & Rick Rosner
April 18, 2017

[Beginning of recorded material]

Rick Rosner: Basically, the interactions define their position and given all particles are defined by a bunch of random interactions. All of those particles are going to have roughly the same velocity, roughly the same uncertainty in position. Every one of them is going to be roughly as jittery as every other particle in that gas, excluding border conditions where particles in the corner of a container, say, will have different interactions than those in the middle of the container.

Scott Douglas Jacobsen: That's intriguing. It's effective theories again. Not only effective theories, as you've explained, as we've talked about, describing liquids and gases, which means the physics appears to be very established. If you take a 10-degree turn on that into digital physics lane, IC lane, you come into the thought, at least for me from what you're saying, of an effective theory of information.

Where things are being defined within a given volume over a certain amount of time, that can be described as an effective theory of information. An effective theory of the definition of data in a volume plus time, range – time range.

RR: Yea. When you say effective, I think practical.

SDJ: Yea. In colloquial terms, in common language, it's a "for all intents and purposes" theory. Right?

RR: Yea. What's crazy is that quantum mechanics, which is introduced to people with all sorts of disclaimers saying, "This is not the world you know. It is kinda crazy. If you think you can picture or understand quantum mechanics, then you probably don't." You can probably pick up a bunch of quotes from big physicists like this such as Feynman. That things are so absurd or strange compared to our macro world.

But in a way, quantum mechanics is supremely pragmatic. How can you define the world when you can't define the world precisely? How can you know things when you can't define things completely?

[End of recorded material]

Born to do Math 43 - Metaprimes (Part 9)

Scott Douglas Jacobsen & Rick Rosner

April 19, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: Also, off-tape, we were talking. What you were describing in things, it brought Gödel to mind. His two incompleteness theorems, where you're dealing with partiality of information. A universe with incomplete information, but built on simple principles, would come up with, likely, just by natural development or an organic development, an associative form of information processing, which is both incomplete but probably the most efficient given its conditions.

Rick Rosner: I think one reason people are fascinated with Gödel incompleteness theorem is that it generates all sorts of objects in the mathematical sphere like propositions that are either true or false, but can never be proven true or false. I think there's the idea that any axiomatic system that is sufficiently complex will generate weirdly undecidable propositions. So that's one thing that's interesting.

It's scary in that one of the efforts of 100 years ago by Whitehead and some other people was to put mathematics and logic on an unassailable foundation of pure—it was to have an infinitely defendable and concrete system of math with a completely unassailable foundation. That Gödel says, "No, there are always going to be pitfalls and exploding principles and that it introduces the fear that there may some aspect of math that makes math blow up.

That it is fundamentally inconsistent and you can't prove anything, which is apparently not the case. You may not be able to prove anything to an infinite degree of certainty, but we live in a world that's highly existent. At the same time, at the smallest scales, it is completely nebulous and fuzzy and only on the borderline of existent. It is only when you get macro objects that you get definite existence.

So even in a Gödelized world where there is not an infinite certainty or precision in anything, you can still build a solid world.

SDJ: Our language reflects that too. When we describe things, they are not complete, but given certain conceptual mappings. They describe something incompletely, but you string a bunch of sentences together that are appropriate to context and that provides a sufficient mapping in the other person's head based on their interpretation, if similar culture, similar conceptual mappings, similar language to relate to those. But it is incomplete. It is rough.

RR: When you're trying write, one thing that frustrates me is that when you're trying to write as precise as possible you're trying to reach into lexical space for the right word. Sometimes, you can get nearly the right word. Other times, there's just a missing word.

[End of recorded material]

Born to do Math 44 - Metaprimes (Part 10)

Scott Douglas Jacobsen & Rick Rosner

April 20, 2017

[Beginning of recorded material]

Rick Rosner: There's an idea or a shade of meaning that you know pretty precisely, but there's no one word that hits close enough to be satisfying. So you either have to string words together o better ou abandon that precision and go, "Well, who gives a crap? It'll be close enough." What's weird about the world is that close enough is good enough, we reach out to grab something. Our reach and our grasp is sloppy and never infinitely precise, but we can still grab stuff.

The universe tolerates imprecision. None of our actions are infinitely precise. Yet, we can still do stuff. That's due to the macro-structure of the world where you're not trying to line up one atom in your finger precisely over one atom of the thing you're trying to grab. The diameter of your finger is – I don't know – 10^8th atoms wide and the thing you're grabbing if it's a grape is also that—

If you grab that grape a 100 times, your average or the average offness—or standard deviation of where you grab that grape might be 10^5th atoms or 10^6th atoms or more, but every time you are able to pick up the grape because you can pick up these even with this vast imprecision. We are macro things in a macro world and that macroness allows us to exist and over a long period of time as opposed to things on a micro level because they are incompletely defined in the world.

Our macroness allows us to exist and to interact with other macro stuff.

[End of recorded material]

Born to do Math 45 - Metaprimes (Part 11)

Scott Douglas Jacobsen & Rick Rosner

April 21, 2017

[Beginning of recorded material]

Rick Rosner: Another thing is where the information might be in the universe. I tried to systematize it. I see three types of information. Although, this is not an inclusive list. This is what sloppily comes to mind. Information based on history. That's kind of past information. I don't know if that is its own category because that's macro stuff. Particles to a great extent themselves do not have a history or a capacity for history.

Looking at protons or electrons in isolation, you can assume certain things about their history. But electrons look all the same. To a great extent, protons look the same, but you can look at their guts. You can look at their fleeting internal configurations, probably detect them. But not much history, the history they do have is fleeting. Any history you find in the universe is a reflection of what's happened and is accessible in the present will be at the particle level.

Then you have tacit information, which is things happening in the universe that don't disrupt other things in the universe. The lack of disruption means that the universe is assuming those things happened anyway. Then you have present information, which is you have things in the universe happening and disturbing other parts in the universe – whether that part is ten angstroms away or 10 light years away.

It is the adjustment of the universe to new information and other things happening in the universe. So tacit and present information work together. It is the unfolding and incorporating of information into the universe. If there's—basically there's this particle flux through space, where every millimeter of space has a gazillion photons flowing through it at any given instant. Those photons are either going to hit something and cause an absorption in space or not.

[End of recorded material]

Born to do Math 46 – Metaprimes (Part 12)

Scott Douglas Jacobsen & Rick Rosner

April 22, 2017

[Beginning of recorded material]

Rick Rosner: You've got tacit and present information. I don't know if they are sharp divisions or exactly how they work in the universe. Obviously, each coin in the universe is processing based on its vantage point, on what it sees. What it sees is what radiates at it at any given instant, the radiation can take various forms. It's probably by, if you're going to do a census of the radiation passing through a point in space that may or may not have matter in it, I would assume most of the radiation would consist of photons.

You would still have a lot of neutrinos. If matter in that space, you have lots of evanescent particles like pions and gluons. Stuff that keeps track of keeps nuclei together. You've got both virtual particles and real particles. Virtual particles, you could consider maybe even a different form of tacit information. A sea of understoodness that provides a base of framework in which the real particles can have their interactions.

So you've got those forms of information. Then you've got the manifestations of those information. One large manifestation is the distribution of matter in space. The clumps you see when you look out at the universe. The nuclei and the distribution of molecules and crystals, the Solar System, galactic clusters, galactic arms – which are temporary clusterings of stars, then galaxies and clumps of galaxies and filaments of galaxies at the largest scales.

There's information in all that clumping. I assume that the mega-clumping, the macro clumping, is or provides information that can fit into the history hopper if you're going to provide classified information by historical, tacit, or present information. That clumping represents a vast history. Then you've got the flux through space of photons and other particles. Though it is a sloppy division because it is the flux of particles through space that provides the information about the clumping that you see.

You don't see anything without the flux, without see the distance radiation of the universe.

Scott Douglas Jacobsen: That's where the main associative part comes in. No connection between parts, micro and macro, in the universe and no information processing there, in the major way at least.

RR: Yea. So that's pretty much it. You can stipulate or say that one thing that is going on is that things that are clumped together and closely associated with each other have more interactions with each other. A clump of atoms or a given cubic inch of ionized atoms in the center of the Sun will more mutual interaction with each other per second than an atom in the center of the Sun than an atom in 10 billion light years away.

[End of recorded material]

Born to do Math 47 - Metaprimes (Part 13)

Scott Douglas Jacobsen & Rick Rosner

April 23, 2017

[Beginning of recorded material]

Rick Rosner: The clumping is—if you have a library of interactions or the set of all interactions in your system, space and time are ways of orienting those handshakes between particles in such a way that the total aggregate distance is minimized. In the space that's established, particles that do a lot of interacting with each other are going to be closer to each other. It minimizes the distance of these interactions when they're a lot of them.

If those particles are interactions a lot, you put them close together to minimize the distance in the space the interactions are creating, and minimizes the time the photons have to travel. A reasonable arrangement of space minimizes space-time, basically. It puts things closely associated with each other close to each other in space and time.

Scott Douglas Jacobsen: So the mass in a given cubic volume of space can imply the amount of information or information processing potential. The greater the mass in a particular volume, then the greater probability for high levels of information processing; the lower the mass in a particular volume, then the lower the probability for high levels of information processing.

RR: I guess so. Another way of looking at it. There is no essential difference between two atoms a millimeter apart exchanging a photon and two atoms that are 10 billion light years apart exchanging a photon. There are huge differences, but there are some essential similarities. For one, in both instances, the photon experiences zero time in transit between the atoms.

SDJ: Yes.

RR: because photons travel at the speed of light. Something travelling at the speed of light doesn't experience space or time. It sees space as infinitely compacted and time as infinitely dilated. If a photon were able to experience the world, it would leave one atom and arrive at another atom a blink of nothingness. It wouldn't be traversing any space or any time.

SDJ: But relative to space, the time it takes for exchange for photon contact with whatever the thing is proportional to the relevance of the information. So the farther away something is in the universe, then the less relevant something is, mutually.

RR: Say you've got a bag that has $10^{\wedge}140^{th}$ photon exchanges. You're trying to arrange those things in an efficient way. They're all the same. They are a photon leaving one atom and hitting another atom. The bag is your universe, even $10^{\wedge}160^{th}$ interactions. You build a universe. Build a universe that makes sense. All of these interactions are basically the same.

[End of recorded material]

Born to do Math 48 - Metaprimes (Part 14)

Scott Douglas Jacobsen & Rick Rosner
April 24, 2017

[Beginning of recorded material]

Rick Rosner: They're all just little Tinker Toy parts. It is a handshake between atom A and atom B. There are 10^{160}th of these handshakes. How are you going to arrange them sensibly? Well, you can start grouping them by – you may notice that as you shuffle the contents of the bag – certain pairs of atoms. They may have exchanged 10^{7}th photons. You find that many handshakes between two particular atoms.

You find a bunch. Then you find a bunch of other interactions where they've had only 1 handshake in your bag between A and B. You set all of the sets of handshakes. You set all of the combinations of 10 million handshakes with each other into one pile. These are ones that are heavily related to each other or associated with each other. On top of that, you decide in our universe that the more interactions that two particular atoms have with each other, then the closer we'll put them.

It minimizes something. It minimizes the distance that photons have to travel in the space that we're constructing because the more associated things are then the closer we'll put them together and that's an efficiency. You can build something out of that association.

[End of recorded material]

Born to do Math 49 – Metaprimes (Part 15)

Scott Douglas Jacobsen & Rick Rosner

April 25, 2017

[Beginning of recorded material]

Rick Rosner: You can start to build a time out of association. Where you've got atom A and atom B interacting a lot, we also see that atom B and atom C interact a lot. But as you look the different interactors, that you can further order things so that you can make further efficiencies because A and B may interact a lot at a given time and A and C may interact a lot at a different time.

I don't know how you pull time out of it. Anyway, the universe is built on space and time, and space and time are built on efficient arrangements of association, of highly associated particles.

Scott Douglas Jacobsen: So they're aren't maximally then, as a closing statement, but they are optimally efficient given various constraints.

RR: They are sloppily efficient. You've got these interactions. You have these informational efficiencies and rules for informational efficiency, or for the efficient structuring of space based on the interactions – space and time based on associative interactions. Based on interactions, which are themselves associative, those—you can assume that there's going to be some of those principles of ordering space and time are going to be efficient without being maximally efficient.

Because they probably depend on local efficiencies. But there is a multi-model approach here too. You can represent the information here in various ways. There's that underlying efficiency.

SDJ: There are the higher-order efficiencies too.

RR: There's the "Travelling Salesman Problem" or the salesperson problem. You have to figure out the order of cities that minimizes the overall distance the salesperson has to travel. It turns out to be a problem that blows up computationally the more cities that you have. There's not an algorithm that can find you the overall shortest distance without doing a huge amount of calculation.

Let's say, and I don't know the math exactly, this is probably not the case, but computationally it is similar to the case that you have to look at all 11 factorial paths. 12 factorial path, among the cities to find the shortest one, that is a number that blows up hugely when you go to 20 cities and 100 cities. To find the absolute shortest path would eat up a lot of computer time.

But there are some algorithms that find you some good paths based on just comparing a few cities at a time, like 3 or 4 and building the shortest path among those 4 proximate cities, then the next 4 proximate cities until you've established a locally minimal path among each set.

[End of recorded material]

Born to do Math 50 - Metaprimes (Part 16)

Scott Douglas Jacobsen & Rick Rosner

April 26, 2017

[Beginning of recorded material]

Rick Rosner: By working locally, you can achieve a lot of efficiency without achieving optimal efficiency.

Scott Douglas Jacobsen: That's funny. Maybe, that's the reason for segmentation into relatively definite structures at various scales in the universe.

RR: Yea, I mean, the interactions among particles have highly local aspects. Where you can envision two atoms, you have two atoms. They are a centimeter apart. You can picture on atom emits photon and the absorbs it. You can draw a line between the atoms based on the photon exchange. Feynman says or anyone good at quantum mechanics says you can draw the line, but it takes place across all of space and time.

So optimization in space and time reflected in the structure of space and time is mostly local, but that the optimization is good but imperfect, which makes sense in that it reflects a sloppy universe that we live in.

[End of recorded material]

Born to do Math 51 - Metaprimes (Part 17)

Scott Douglas Jacobsen & Rick Rosner
April 27, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: Why elements, or heavy elements, in an IC universe?

Rick Rosner: If IC is true-ish, you have to answer "Why heavy elements"? from two perspectives. You have to answer it under the Big Bang and the IC perspectives. Some elements formed from protons smashing together in the early history of the universe. You know, the first few seconds, where you have a ratio of 12 Hydrogen atoms to every Helium atom to small percentages of Lithium and Beryllium.

Everything else has to form within the interior of a star, where things cook down under huge pressure. Stars run from fusion. Fusion is protons being fused together into heavier and heavier nuclei. When two protons are fused together into heavier nuclei, into Deuterium, one of the protons flips into a neutron, which is basically what happens in all of fusion. When you have proton-rich matter that gets smushed into heavier and heavier nuclei, and more and more protons get flipped into neutrons, there is energy released from each act of fusion.

Because it takes, naively, energy to pull a nucleus apart, which means that when you put a nucleus together you release energy. It is in a lower energy state than when its contents were separate. You mush two protons or you mush two nuclei together into a bigger nuclei. You generally release energy because that combined thing is in a lower energy state. That's what power stars.

[End of recorded material]

Born to do Math 52 - Metaprimes (Part 18)

Scott Douglas Jacobsen & Rick Rosner

April 28, 2017

[Beginning of recorded material]

Rick Rosner: Stars, it is easy to fuse raw protons, which are Hydrogen nuclei, together. The easiest thing to do in a star is to fuse Hydrogen into Deuterium, Tritium, and then Helium. Mostly. That takes the least amount of pressure. It takes more pressure to turn Helium into stuff. As stars cook down, they do a lot of stuff. They cool down, expand, and sometimes blow off the outer shell. Depending on how much the various elements are in the star depending on the size of the star, some stars can hang up to the point where they are almost entirely Oxygen and Carbon.

That's a smaller star. A bigger star, the one the size of our Sun can keep cooking until it is almost entirely Iron. But at some point, there's no more energy to be gained from being further cooked down and smushed down. Most stars stop, but some bigger stars can keep going to become neutron stars, and can be mushed down – probably not the right thing to say – and they are kind of one big nucleus.

Other stars can keep going from that point until they are a blackish hole. Iron is the last element that you can produce as a huge percentage of the mass of a star. The elements beyond Iron are kind of produced in like artisanal batches by supernova explosives, where the pressure wave pushes through heavy nuclei and smushes them further together, but the curve of binding energy. It is the curve of how much energy it takes per nucleon – per proton and neutron—

It is the binding energy there is released for each nucleon in that nucleus. It reaches a peak at Iron. To get any heavier elements, you will not be creating energy. There will not be any large scale burning. That's how heavier elements are formed, in the interior of stars as they boil themselves down and then explode.

[End of recorded material]

Born to do Math 53 – Metaprimes (Part 19)

Scott Douglas Jacobsen & Rick Rosner

April 29, 2017

[Beginning of recorded material]

Rick Rosner: The alternate IC interpretation is all of that stuff still happens, but protons represent some nugget of information – say a variable that contains its own axis. Loose protons out in the universe or ionized protons out in a cloud out with ionized electrons, so it's an energetic cloud.

They are only loosely linked via proximity to the other ionized particles in the cloud, but a lot of gravitational energy has yet to be released. These axes are each represented by a proton. These variables are free to vary in the same way as if you had two things not strongly correlated. It is statistics.

N-dimensional information spaces, say you have the n-variables that might predict how well a kid can succeed in college. You can probably come up with 20 variables that might have an impact, SAT scores, GPA, parental income, age within the school year – whether December or April being born, extra-curriculars and what ones.

[End of recorded material]

Born to do Math 54 - Metaprimes (Part 20)

Scott Douglas Jacobsen & Rick Rosner

April 30, 2017

[Beginning of recorded material]

Rick Rosner: You can set up an information space to see how these variables correlate with each other and the dependent variable that you're trying to suss out, which is success in college. Some variables are going to be less correlated with each other in this N-space than others. Let's say geographic location or latitude – or longitude—say longitude and college grade point, it will be all over the place.

If any correlated at all, it will depend on if the kid grows up in a city or a rural area. Cities and rural areas are not randomly scattered, but scattered throughout the country, so longitude will not be any indicator of academic success. You can reduce the dimension of your N-variable because that is a crap predictor. Ideally, what you'd want to do is boil down the complicated N-space into a more compact thing in N-space.

[End of recorded material]

Born to do Math 55 - Metaprimes (Part 21)

Scott Douglas Jacobsen & Rick Rosner

May 1, 2017

[Beginning of recorded material]

Rick Rosner: Another thing you can do by correlating variables that by combining variables that are strongly correlated with one another. There is as it turns out a strong correlated between parental income and SAT scores. Alright, so, how about a correlation between grade point using AP scores – giving a bonus point for taking AP classes – and grade point not taking AP classes? Those are probably correlated.

So you throw out AP grade point, no AP grade point. You take the two highly correlated variables and then combine them. In a universe, in an IC universe, some variables should be highly correlated. If we're looking at protons as representing some kind of variable, highly correlated variables should be spatially proximate. They should be close together. If they are super close together, then they pretty much act as one thing in the information space.

They should be locked together, say in a nucleus – or at least in a molecule. A molecule is a looser aggregation of protons, neutrons and electrons than a nucleus is, but they both represent a locking together. If we're right about matter representing information in variables, then it is a locking together of correlated variables.

[End of recorded material]

Born to do Math 56 - Metaprimes (Part 22)

Scott Douglas Jacobsen & Rick Rosner

May 2, 2017

[Beginning of recorded material]

Rick Rosner: Through that perspective, we can talk more about that later. But roughly, you'd expect more examples of just a couple of variables correlated together, or just a few correlated variables, say in a Helium atom rather than in a complicated system of correlated variables that you might find in a Tungsten atom, or a Gold atom, or a Lead atom, or Plutonium atom – which has 240 (?) or some protons or neutrons locked together.

It is in some kind of informationally covarying thing. That's where I want to stop before I get too much into the weeds.

[End of recorded material]

Born to do Math 57 - Hows, then Whys (Part 1)

Scott Douglas Jacobsen & Rick Rosner
May 3, 2017

[Beginning of recorded material]

Rick Rosner: You wanted to talk about the whys of informational cosmology. We have covered the hows. We have covered the whys to some extent. We can try to cover them more systematically. This will be pretty hand wavey and flailily. We can start with the principle that things exist. The principle that things exist. The obvious—if you start with the statement, "things exist." It is because we experience things exist.

Things may not exist in the way we think they exist, which is kind of the Matrix Principle. That what we're experiencing is not necessarily reality. There is no permanent existence. That is, when we die, our experience of the world goes away and everything may eventually wink out of existence, but within the frame of existence that we seem to exist in a world that exists. We can talk about that apparent existence as something.

Whether it is true or not rather than pure nothingness because we don't experience pure nothingness, we experience the world and ourselves, regardless of the deep reality of that experience of existence. Then you can get into existences of "Why can it exist?" versus "Why must it exist?" Those questions you'd hope would boil down to the same question. That when you have the things that can exist, that leads to further questions.

"Why this world among all of the possible worlds that exist?" That leads to things like the Many Worlds Theory. It says, "Any world that can exist does exist. We only see the world that we're in. Why can we see this world and not other worlds?" Because we're made of an informational relationship between this world. We have a history of interaction with this world. This is the world we're in and interacting with.

It has a tautological stink to it. But if we were in another of these possible worlds, we'd be other people who would exist within the context of having a history with those other worlds. So it goes back to the question that kids ask, "Why am I me and not somebody else?" It is because you are defined by your memories, tendencies that have been set up in your brain for how you process information.

Your history as yourself. All of which constitute your identity. If you were somebody else, you'd be that other person because all of your information pertains to you, which has the stink of tautology. So trying to sort out why this world must be our world versus other possible worlds, there are arguments to be made that the other possible worlds are not possible for various reasons such as that we have a history with this world that precludes a bunch of other worlds.

[End of recorded material]

Born to do Math 58 – Hows, then Whys (Part 2)

Scott Douglas Jacobsen & Rick Rosner

May 4, 2017

[Beginning of recorded material]

Rick Rosner: We have the principle that you can only be in one world at a time, or that at least macro objects that you interact with are unitary and not shapeshifting. They are consistent and not shapeshifting from being—your phone isn't shapeshifting as if it changing places with phones across alternate worlds. Macro objects embedded in history don't behave that way, embedded in our worldline.

There are processes going on that keep us confined to a world that is shifting and non-existent, except for the natural processes of physics, biology, and chemistry, and everything. The only allowed changes among the allowed things in our environment are based on physics and causality and random shifting among many worlds is precluded. That's a good first step for talking about the whys.

[End of recorded material]

Born to do Math 59 – Many Worlds

Scott Douglas Jacobsen & Rick Rosner

May 5, 2017

[Beginning of recorded material]

Rick Rosner: Perspectives like the Many Worlds perspective. I have a feeling that when we understand things better. There will be optional perspectives, optional ways to frame existence that may or may not be provable. I feel like Many Worlds is possibly an unprovable proposition, but is convenient for talking about certain aspects of the world. There are some aspects of Many Worlds theory that are definitely woven into the universe.

Quantum indeterminacy, Schrodinger's Cat kind of deal but with subatomic particles, those are definitely real kind of alternate versions of the world that can be presented via some very precise quantum math. If you want to talk about Many Worlds that way, that's not just acceptable. That's pretty much undeniable, but if you want to talk about Many Worlds across some abstract space like the set of all worlds where Kennedy didn't get assassinated and so on.

Those things may have some mathematical legitimacy because you could describe some quantum wave signature. If you had world enough and time, you could describe a universe like ours, except Kennedy didn't get assassinated. But does that mean that that world has some kind of existence? You could probably argue it either way and it probably doesn't matter except as something that is fun to think about and is a convenient framing device.

[End of recorded material]

Born to do Math 60 – Many Worlds, Again

Scott Douglas Jacobsen & Rick Rosner

May 8, 2017

[Beginning of recorded material]

Rick Rosner: Perspective like the Many World perspectives helps understand things better. There will be optional ways to frame existence that may or may not be provable. But are convenient for things. I feel that Many Worlds is a possibly unprovable proposition, but is convenient for talking about certain aspects of the world. There are some aspects of Many Worlds theory that are woven into the universe. Quantum Indeterminacy, Schrödinger's Cat deals, except subatomic particles, those are real alternate versions of the world that can be presented via some very precise quantum math.

[End of recorded material]

Born to do Math 61 – Many Worlds, JFK

Scott Douglas Jacobsen & Rick Rosner

May 15, 2017

[Beginning of recorded material]

Rick Rosner: But you want to talk about the Many Worlds in that way, that is not just acceptable, that is pretty much undeniable but when I talk about Many Worlds like some thing across an abstract space like the set of all worlds in which you're able to see JFK assassinated. Those things may have some mathematical legitimacy. In that, you might be able to itch some quantum wave signature that could have another world and another time in a quantum wave that describes a universe like ours, but JFK didn't get assassinated. But whether that means that that world has a kind of existence, you could probably argue it either way.

And probably it doesn't matter, except as something that is fun to think about and is a convenient framing device. And it is something that you can also do physics without. You can't do quantum physics without quantum indeterminacy, without addressing big systems where there is not enough information to assign one definite state to some aspects of that system.

[End of recorded material]

Born to do Math 62 – Feynman, Sum Above All

Scott Douglas Jacobsen & Rick Rosner

May 22, 2017

[Beginning of recorded material]

Rick Rosner: But that doesn't mean that you have to see everything through the lens of multi-worlds theory. There are probably other theories that have a similar deal. String Theory may become a more powerful tool for describing the world, but, right now, it hasn't delivered enough specific predictions to be very useful.

But at some point in the future, String Theory could be worked out so that it might be a framework that is helpful in certain instances. Feynman, there's a Sum Over Histories principle that says particles take very possible path between point A and point B.

That is a helpful framework for doing certain quantum tasks. But it is not something—if you're sufficiently trained in quantum mechanics, you may have this in the back of your mind, but you don't need the Sum Over Histories principle to do quantum mechanics.

None of which gets to the question of why we exist rather than not, and the reason for the ways we exist. That is, 3 spatial dimensions, roughly with an asterisk and that asterisk being quantum effects at small scales, and the curvature of space at huge scales.
One temporal dimension too.

[End of recorded material]

Born to do Math 63 – More on the Reasons

Scott Douglas Jacobsen & Rick Rosner
June 1, 2017

[Beginning of recorded material]

Rick Rosner: If the universe - if particles are made of - is made of information, then why? Why do we have to think that? Particles can be made of anything, at least in naive first glance. Why information?

Without going into some rock bottom foundation philosophical thinking, one why is particles must be made of information because that is what they appear to be made out of. That there are a lot of fundamental particles or elementary particles or subatomic particles.

That are nakedly just information. that don't have any moving parts. That aren't anything but the mathematical description of what they are: photons, electrons - don't have, as far as we know or all evidence, smaller constituent elements.

Protons and neutrons have been found to be not fundamental. Protons and neutrons have been shown to consist of quarks plus the particles that hold the quarks together. So they are kind of complicated, but electrons appear to be just point-wise particles.

That exist in the form of probability clouds.

[End of recorded material]

Born to do Math 64 – IC Narratives

Scott Douglas Jacobsen & Rick Rosner

June 8, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: One thing from IC are narratives or stories that describes things relevant to your informational framework.

Rick Rosner: That may just be a general idea from philosophy. If you want to explain something, then you want to explain something that is most appropriate to the context, where people expect that all of biology and all of chemistry will eventually be able to be boiled down or eventually built up from physics.

That includes that we as natural humans do. So, physics would not only include the hard sciences but the soft sciences like psychology. You can run this back to how atoms behave. That kind of idea that everything would boil down to physics probably inspires some people to be fearful that biology and chemistry would go away.

That probably wouldn't be the case. You mentioned – off-tape – a universe of discourse, which probably means everything gets its own context.

[End of recorded material]

Born to do Math 65 – Errol Morris

Scott Douglas Jacobsen & Rick Rosner

June 15, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: Do you remember when we were talking about Errol Morris a little while ago?

Rick Rosner: Yup.

Jacobsen: So, his idea of the framing of a photo. Usually, when talking about a universe of discourse, it is a well-defined set of parameters for discussion on a topic within traditionally well-defined fields. IC lenses are fuzzy lenses, it is continually keeping in mind what is outside of the frame in a fuzzy way.

If it is biology, you understand, at the end of the day, that this has an underlying root in physics. It is just that this is a more convenient way to talk about this scale of organization. So, you use these scales and these stories.

Rosner: Yea, you talk about couples falling in love with mating behaviours rather than the biology or chemistry of it with the release of serotonin. You could go farther with out serotonin and dopamine work to regulate synaptic whatever, and then you can take it further and further down into the constituent molecules, but at that point you've gone way too far.

You are way out of the context of couples forming for most discussions. Some people's jobs are to talk about the chemistry and biology and feelings of falling in love, but you don't need to go that far when you're talking about falling in love – within a…

If you're asking someone for help about how to write a romantic comedy, the chemistry and biology may not come up.

[End of recorded material]

Born to do Math 66 – Helen Fisher

Scott Douglas Jacobsen & Rick Rosner

June 22, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: The frames can be mixed up too. There's a biological anthropologist named Helen Fisher. She studies love. She studies long-term love with three separate concepts, but then ties this to different personalities and different dominant neural circuits, and the neurotransmitters, associated with it.

She has this nice scaling up. She applies this to statistical models. O believe she has been an advisor for Match.com. There are cool things that you can do. But I think it also helps separate the "wheat from the chaff." You can differentiate that kind of anthropological work and biological work from pseudo-work like the Law of Attraction.

That appear to be popular in America and are bogus.

Rosner: You mean Oprah's *The Secret*. You think positive thoughts and so on. Yea, that's just bullshit. There are actual mechanisms for making it happen. There are all sorts of ways of talking about falling in love. You can talk abut evolutionary theory and sociobiology.

There is shorthand stuff, like for middle school or high school. Hot people will hook up with each other. IN 8th grade and 9th grade, the pioneers in hooking up are, for the most part, the very coolest kids. They have the highest demonstrated value.

[End of recorded material]

Born to do Math 67a – Looks

Scott Douglas Jacobsen & Rick Rosner

July 1, 2017

[Beginning of recorded material]

Rick Rosner: Everyone, as they're trying to feel out their place, has hot on hot as the safest bet. So, people don't know what they're doing yet. When people get older, you can call it "settling" or "becoming more sophisticated" or some combination plus some other stuff.

Where people learn to value other stuff than pure hotness or coolness, they learn the purely hot or cool may be nightmares. Also, there is also what makes being hot or being cool is something that needs to be taken back to a demonstration of reproductive health.

The more physical features that replicate reflect other features that represent reproductive fitness too. If you look at butts, and other things that look like them, then they can look like an amalgam monster of reproductive health.

There are fractal theories of patterns that are repeated in people, where those repetitions in shapes over and over on their body might be more beautiful than someone who doesn't have that, which is semi-BS.

[End of recorded material]

Born to do Math 67b – Fit with Status

Scott Douglas Jacobsen & Rick Rosner

July 8, 2017

[Beginning of recorded material]

Rick Rosner: Then there is a principle behind that, which is that people whose features are easily decoded might be more beautiful. You can view these features as valuable. Asymmetry is often a symptom of lack of sexual or reproductive fitness.

If someone has a droopy face, for instance, or something on their body, people are analysing attractiveness, but if you're writing a spec. sitcom among high school freshman. You don't need to necessarily go into the various framings of things.

It is just hot-on-hot. People have been using the football player and cheerleader shorthand forever. Now, it is totally hack, but if you want to write about that stuff – then you might do the exact same deal. Except with cheerleader and football player, it could be the modern equivalent. What would be the modern equivalent?

Scott Douglas Jacobsen: A fit person with high status.

Rosner: Something equivalent to a fit person in 1980 with status then and now. It is somebody who is physically healthy and attractive. It is not necessarily anything beyond that.

[End of recorded material]

Born to do Math 68 – XX/XY

Scott Douglas Jacobsen & Rick Rosner
July 15, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: That seems to me like one half of the signification. If people are looking for the short-term partner, depending upon the reference there, which appears to be innate.

Rick Rosner: …People are just looking for easily understood because they are babies at knowing what they want.

Jacobsen: I think that is the same, functionally. It is based on innate hardware. Over time, men statistically do not change their preferences over time. Women do. Women look for different signifiers of status, resourcefulness, emotional stability, and so on, rather than the symmetries and signifiers of health that you were mentioning before.

I think there are various aspects of that. People like to say men and women; others like to say spectrum, but it is more a bimodal distribution along XX/XY.

Rosner: You can bring this back to sociobiology with eggs expensive and sperm cheap, and knocking somebody up is expensive. In high school, most people are not much into raising a family. They don't take that into consideration.

Later, that may become, depending on how your society is structured, more important to women than to men. Also, men masturbate more than women. So, men are constantly going back to the things that help them have orgasms.

[End of recorded material]

Born to do Math 69 – Change in Mind

Scott Douglas Jacobsen & Rick Rosner
July 22, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: It is social reinforcement. It is not just that these physical characteristics are dramatically influenced by genetics. It is also that it is shaping our minds as well. So, our evaluative structures for what is attractive change over time in proportion to that physical structure change in our minds.

Rick Rosner: There are levels of explanation that are more useful or convenient depending on what you’re doing with the thing you’re analyzing and your explanations – if you’re writing a spec. sitcom script—your operative explanations are going to be different than if you’re doing a study on the neurochemistry of love.

Unless, you’re a great writer and can get jokes out of neurochemistry. With regards to IC and information cosmology, the most applicable set of explanations, if it is true, in one area that I’ll risk saying that it has a possibility of being true is whether the universe is entropic or not.

The Second law of Thermodynamics is the one that everyone talks about. It is the interesting one to the point that it is not interesting to talk about at all. It says in a closed system only disorder can increase. So, the energy you expend cleaning a messy room is greater – the heat you generate is a greater force of disorder at a thermodynamic level – than the energy you spent stacking up your crap.

You cannot win. You cannot ever increase the order of a closed system. That seems like the dominant idea of order in the universe. I’d say for most of the 20th century. Where you have local outbreaks of order on Earth, where order and complexity increase, maybe throughout the universe, but the models of the universe have it winding down one way or another back into complete disorder and chaos, or just a complete lack of useable energy by the end of time.

[End of recorded material]

Born to do Math 70 – Heat Death

Scott Douglas Jacobsen & Rick Rosner

August 1, 2017

[Beginning of recorded material]

Rick Rosner: You've got the heat death of the universe, which is a universe that keeps going and expanding. A heat death to the universe doesn't mean that the universe ends up hottish. It means that there are no available sources of energy.

That the universe is at the same temperature, which is going to be low because it is going to be trillions of years in the future. All the sources of energy have been used or burned, and then expelled as waste heat to the point where everything is the same temperature and you can't pull energy out of anything.

When everything is the same temperature, there's nothing left to burn. Everything is lukewarm.

[End of recorded material]

Born to do Math 71 – Big Crunch Theories

Scott Douglas Jacobsen & Rick Rosner

August 8, 2017

[Beginning of recorded material]

Rick Rosner: Then you have Big Crunch theories of the universe where everything collapses back in on itself, everything heats up because everything comes back together, but it is one other means of order eradicating everything. There isn't any big time 20th century Big Bang theories of the universe that support the growth or preservation of order throughout the universe indefinitely.

Which feels right to people because it basically says there's no free lunch anywhere, and you can't win, say that under IC, IC would be a good framework for talking about the negentropic universe. A universe in which order can increase.

Where the order in the universe does increase due to the gravitational clumping or the clustering of matter, and where waste heat and noise can be sequestered or absorbed, with the result being that you have a net increase in order, which means that the universe isn't a closed thermodynamic system.

You have places where waste heat is either converted into something else or is hidden, so that it is not a thermodynamically disruptive and entropic deal, one way energy can be absorbed and turned into order is the loss of energy by long-distance photons.

With the absorption by space by photons that travel billions of light years, where it is the Hubble Shift, where the farther away a photon comes from, then the less energy it has, apparently, because it is climbing up a—

[End of recorded material]

Born to do Math 72 – Photon, Photon, and Away!

Scott Douglas Jacobsen & Rick Rosner
August 15, 2017

[Beginning of recorded material]

Rick Rosner: In an expanding universe, a moving photon is moving away from – the farther and longer it travels then the more it is moving into the neighbourhoods of galaxies that are receding from its point of origin, so the longer it travels the faster the galaxies or the average expansion velocity of space is relative to where it came from.

So, it is going to be wretched. But that loss of energy—I just read that there are many more photons than there are massive particles. Particles that have rest mass. In every cubic centimetre, there are roughly 400 photons leftover from the Big Bang.

I guess from the Cosmic Microwave Background. Where the average number of massive particles is one proton for every cubic metre, so that means like 400 million times as many Big Bang photons or Cosmic Microwave photons as there are protons.

That doesn't even include all the photons that have emitted since. Another place to hide disorder might be black holes. Where depending on what the rules for black holes are, I mean, Stephen Hawking and people like him have spent their careers debating the informational rules and black holes with regards to information.

Whether information is lost when stuff falls into a black hole, whether it eventually comes back out, does it come back out with any amount of information that went in, in any way? Under IC, black holes aren't entirely black and can, maybe, be possibly seen as semi-independent information processors.

So, not only do they, they might be sources of order rather than additional information and order – rather than relentless black holes of information, constantly destroying whatever gets close enough to fall into them. So, one narrative framework for IC is that it might be good for talking about the universe in the context of the universe being an order-generating system in contrast to the random doomed-to-have-zero-information of the 20th century. That's it.

[End of recorded material]

Born to do Math 73 – Buffers, Far and Away, and Again

Scott Douglas Jacobsen & Rick Rosner

August 22, 2017

[Beginning of recorded material]

Scott Douglas Jacobsen: Two things come to mind from that. One is an older discussion, which I am recalling around "buffers" of order preservation in the universe at various scales. Another one is the utility of using an IC framework in general.

If you're using an IC framework, there are distinctions that you can make between fields that are sufficient, so that misuse of terms outside of their proper field then makes non-sense. So, you may use sociological terminology in physics.

Rick Rosner: Feynman lived in the early era of media. He was pissed at modern advertising, which was being pissed at the loose use of the word "energy." He had a precise meaning in the context of physics. He hated its use in advertising because it never referenced actual physical energy.

It always referred to some young woman because she was heavy and jumping up and down.

[End of recorded material]

Born to do Math 74 – Principia (Part 1)

Scott Douglas Jacobsen & Rick Rosner
September 1, 2017

[Beginning of recorded material]

Jacobsen: [Laughing].

Rosner: You can come up with a zillion. In the 70s, there was something about chlorophyll, which is plants absorbing light. What does toothpaste have to do about absorbing light?

Jacobsen: [Laughing] One was from Newton being a phallic representation of the universe, and the *Principia* as a rape manual [Laughing].

Rosner: You try to apply the Uncertainty Principle all over the place. The Uncertainty Principle inevitably disturbs the—you never get an undisturbed situation, but that is a purely quantum situation. You can draw analogies about it. There are certainly ways to draw analogies to things in the macro world.

[End of recorded material]

Born to do Math 75 – Principia (Part 2)

Scott Douglas Jacobsen & Rick Rosner

September 8, 2017

[Beginning of recorded material]

Rick Rosner: But it is not like the quantum world phenomena necessarily reflects the operations explicit in the macro world. I think you can draw helpful analogies, like the idea that every driver is like a black box, which is basically defensive driving. That driver is, to some extent, unpredictable.

Then you can base this on your experience of drivers in similar cars. You can assign a probability cloud to what people will do. Where a 1988 Cadillac driven by an old person will have a different probability cloud then a 2007 Audi driven by a 28-year-old guy with his satellite radio.

One is more likely to—the Audi is more likely to pull a dick move on you, to pull into your lane because your lane has fewer people in it. Whereas the 1988 Cadillac is more likely to be going under the speed limit or drifting out of lanes because the person driving the car is more careful.

There is the idea that every person having a 'probability cloud' associated with them, which is a fine analogy. But another issue can be making probability clouds too tight, at least in LA, where people can pull a dick move at any time.

[End of recorded material]

Born to do Math 76 – 180 Million Years

Scott Douglas Jacobsen & Rick Rosner

March 1, 2018

[Beginning of recorded material]

Scott Douglas Jacobsen: There has been recent experimental evidence showing the earliest discovered stars formed as early as 180 million years after the Big Bang.

Rick Rosner: There is early light from 300,000 years after the Big Bang. Any earlier and the universe was opaque because there was too much stuff going on. There were various phases in the early universe.

You enough electrons and protons to be with each other for light to get through, enough electrons orbiting protons when you have a hot soup of that not happening - which is an Ionization Era. There is no way for light to get through.

The deal is, the matter in the universe went through certain phase changes as a whole. The modern universe is inhomogeneous in a lot of ways. You have huge expanses of almost nothing, a vacuum, and then you have blips of matter and stars.

But in the universe, as it is conceived as the Big Bang in the early universe, everything was a soup. This soup went through phase changes as a whole. One of them was going from ionized matter, which is separated electrons and protons, to electrons and protons combining into hydrogen atoms.

Until that phase change happened, you can't get light escaping from the soup because it is scattered by free electrons. You get hydrogen atoms forming at a little after 400,000 years the Big Bang. That is the earliest light that we can see.

The Cosmic Microwave Background Radiation, we detect that in the form of radio waves. There is a lot of it. There might be more of the ancient free photons than from later on, There are still a lot of them. They do not affect us so much because they are so redshifted, so weak, from being so old.

But in terms of absolute numbers, there are a bunch of them. You do not get certain amounts of light until lights start forming and shining. They found using some sophisticated radiometric techniques dips in background radiation that indicates this is the part at which you start getting stars.

This was 180 million years after the Big Bang. I do not know if that is sooner than they expected it to be. But they are talking about it being the earliest that you could possibly expect stars to form after the Big Bang.

According to IC, we do not believe in one big bang. Though the universe looks very Big Bangy, if there have been any big bangs at all, it has been through a series of Big Bang-like events or just the universe rolling along in not necessarily a Big Bang way with the Big Bang appearance being a characteristic of information.

Under IC, the CMB would be noise that hasn't been filtered out because the universe isn't sufficiently defined. It doesn't have an infinity of matter or an infinity of information. So, you will have noise that isn't filtered out.

If information is arranged in a Bang Bangy way, the amount of information in the universe is proportional to the apparent age of the universe and the amount of matter in the universe and the scale of the universe - that is, the scale of a proton diameter to the diameter of the entire universe, then all of those things are consequences of the information the universe contains the apparent age of the universe being proportionate to information; you would expect the information to be arranged in a way that is temporal and causal as an apparent history with some of that history being actual history.

Some of it, though, as you get farther and farther away from the active center of the universe what looks like redshifted and younger galaxies and stuff has more and more to do with incomplete information.

The parts of the 'beginning' of the universe are where there is a lot of incompletely defined information relative to us and also relative to the other parts of what looks like the early universe. You could view the absence of complete information as at least allowing the existence of noise.

In that, if you had a universe with infinite information, it would appear to be infinitely old and any information from the apparent beginning of the universe - any light from the apparent beginning - would be redshifted down to zero information and the noise level would be zero.

We are still confused about things. We think in IC the universe is a lot older than it appears to be with the apparent age being the amount of information it contains, but one of the areas of confusion is "Does this very, very old universe have Big Bang-like events?" The answer is "probably yeah."

"What is the scale of those?" When a part of the universe becomes informationally active when it wasn't before if you're retrieving old frozen information and making it active, does that make a Big Bang looking event?

The answer is “probably yeah, but it would be incorporated into something like the apparent Big Bang, which is the way the universe appears.” One of these little bangs that meld into this apparent Big Bang.

“How big of an event is that?” Does it cover the entire visible universe? The deal is, under IC, we still need a framework that accounts for all of the apparent manifestations of a single Big Bang 14 billion years ago.

If IC is an actual thing, an information-based universe that functions a little bit like thought does, you have to have mechanisms that account for information processing over a super long period of time and also informationally do not contradict the observational evidence of the apparent Big Bang.

Every time that you get an experimental result like somebody found the light from the earliest possible stars 180 million years after the Big Bang. You have to figure out what is happening.

Somebody has to figure it out, how it works informationally. If it is not a Big Bang, then informationally, what is the deal with the first light from the first star – apparent first light from the apparent first star – showing up as some dip in radiometric observations showing up 180 million years after the Big Bang?

Based on how information is in our brains, we know there is a lot of stuff that information processing apps, modules, or modes are pretty much on whenever we are awake like spatial information processing, there is never a time unless you do LSD.

That the parts of your brain that process spatial information into a sense of 3D space around you. There is never a time when that is turned off and space is scrambled. Do not take LSD.

But if you happen to be exposed to LSD, you can really hamper a lot of those modules. When you are awake, there is never a time that those modules are not processing faces, so that a face looks like a face.

That it is readable as a human face with expressions and recognizable features, but if you happen to be on LSD then those modules get screwed up. You see incompletely processed faces, which look like CG effects.

That the faces haven't been smoothed into rounded faces. You get these lizardy badly processed faces that look like wireframe faces. The kind of faces you may see in early video games. That haven't to manage human-looking faces.

I supposed with enough LSD that you could turn off your spatial processing modules and have a really hard time navigating and figuring out where walls, routes, and doors are and their relationship to each other because the modules have been turned off.

Also, you dream in 3D and in faces. Even when you aren't working, those modules are always on. Others are only turned on as needed, whatever modules you need to be a ski racer.

I assume there is a skill set and a set of perceptions that mostly you turn on when you are racing or practicing racing. In an IC universe, you would have some parts always on and processing information.

Then you would have modules that you could turn on. An IC universe needs to have always on stuff and stuff that gets turned on and then turned off as it gets used and is no longer useful.

It falls away to the cold and frozen outskirts that look like close to T=0 and has to fit into a structure that looks Big Bangy. So, that is what we are trying to resolve or would be trying to resolve if I weren't so lazy.

The end.

[End of recorded material]

Born to do Math 77 - Renormalization in Quantum Theory and Infinities

Scott Douglas Jacobsen & Rick Rosner

March 8, 2018

[Beginning of recorded material]

Scott Douglas Jacobsen: I was watching a short *Business Insider* clip with Brian Greene from Columbia University and in it he was talking about renormalization.

Rick Rosner: Physics professor?

Jacobsen: A physics professor, specializes in string theory and some fundamental work alongside Witten and Kaku, who are some of the founders in string theory. Witten is known for being something akin to Einstein within that field, where he really blazes new trails to use that cliché.

And one of the points in that *Business Insider* clip that I was noting is his discussion of infinities. When he was talking about those infinities, he was looking into renormalization in quantum field theory.

I see there are a few types of infinities that are different than that. So, let's cover two types of things first: one on how renormalization in quantum field theory deals with one type infinity, but how I see the other type infinities having different types and forms and consequences.

Rosner: I haven't looked at the math of renormalization theory in a while, but basically the equations generate infinities at some points. You need to do tricks that aren't precisely allowed by the rules of math to cancel out infinities.

And once you do that, you end up with numbers that really accurately predict the values, the things that are being described by the equations in the real world. The equations, once you've done these forbidden tricks to them, accurately describe real physics, but you don't have to assume that this means that the universe itself is cancelling out infinities.

It's a better way of thinking to think that it doesn’t quite have the right math; it's good math, but it doesn't quite encompass all the actual processes that are happening in the world down to the nth degree.

There are all sorts of things that have hidden infinities, but not the world itself. When we've talked one of the principles, we talk about that we live in a world that has vast numbers in it, but none of those numbers reach infinity.

And the world is approximated by things that include infinity, for instance, when an object goes from point A to point B in our geometric model, our mental model of traveling from point A to point B has it hitting every single infinite point.

We've been taught in school that a number line has an infinity of points along it and not just a countable infinity, but the trans-countable infinity; not just the rational numbers on a number line, but also the irrational numbers, which are uncountable.

There's so many of them. You can't even count them using the lowest level of infinity and so you think of things moving along a line and you think they're hitting an infinite number of points. But we live in a quantum world where position in space isn't precisely defined.

Things that are happening in a physical framework that's established by quantum rules; you can't pin down an object with such precision that you can say that it travels through an infinity of points to get from one point to another. Space isn't defined that precisely.

There is another set of hidden infinities with counting numbers. The counting numbers seem as finite as you can get; 1, 2, 22, 104… those are finite numbers. But every one of those numbers has an infinite number of digits beyond the decimal place. 223.00000… and the zeros go out to infinity.

One is precisely one to an infinite degree; it's precisely defined. We just deal with objects in the world as if they are infinitely precise in their unit-ness. If you have two eggs, you have two eggs. 2.000… all the way out to infinity and there are other hidden infinities just in counting numbers, where their infinite precision is actually defined by an infinite series of relationships among each other.

That the prime numbers are distributed along the number line in such a way that they determine the infinite precision of counting numbers. But the deal is those infinities in numbers don't necessarily reflect actual infinities in the world.

You have one apple. You have 12 eggs. But the oneness of the apple and the twelve-ness of your dozen eggs don't reflect an infinite precision in the number of things that you have. The world itself is defined by the relationships among the less than infinite particles in the world.

So, objects in the world are highly precisely defined, but not infinitely precisely defined and the oneness of one apple of the dozen-ness of a dozen eggs are abstract characteristics with hidden infinities assigned to the objects that are not infinitely precisely defined because they're real and they're in a finite world.

You mentioned off tape of the infinity the ratio of the circumference of a circle, or a wheel, or a tire to its diameter because pi just keeps going for an infinite number of random feeling digits. Its pie is infinitely precise, but when dealing with real objects you can't infinitely precisely measure or define that ratio.

That ratio is an abstract thing you are assigning to this wheel or tire you're dealing with; and the wheel or tire is made of atoms and molecules that are held together by Van der Waal's forces and other electromagnetic intermolecular forces, plus their atoms are held together with nuclear forces and the more electromagnetic forces between the atom, the electrons, and the protons.

But all those particles are imprecisely defined in space. There are probability waves and because they're imprecisely defined, your tire and the ratios that you're assigning to it, the ratios can be infinitely precise, but they don't reflect an infinite precision in the position in space and the shape of the tire and the relationships among its constituent particles.

Everything's a little fuzzy and the fuzziness reflects a lack of infinity and a lack of infinite precision.

Jacobsen: And then I see that resolves the distinctions of some infinities. In the description of both, renormalizations in quantum field theory as well as infinities of things around infinite digit spans in numbers as well, but in the end that resolves an issue to deal with…

Rosner: We use the tools we have and our tools are symbols. Our mathematical systems are abstract. They contain all sorts of hidden infinities and they work really well when describing a world that is very well defined, but not infinitely precisely defined.

Our tools are not perfectly accurate, if you wanted to perfectly accurately define a tire in space you could do it using quantum mechanical description. For instance, there's a well-known principle from the beginning physics of the De Broglie matter wave as a wavelength that is inversely proportional to its math.

So, an electron is not weighing much at all. It's very fuzzy in space. You can't really pin down an electron very well.

You can pin it down, but only to a limit and the usual example that I've seen in physics textbooks is that you compare the matter wave of a baseball and the uncertainty in the space of a baseball to the uncertainty in space of an electron since a baseball weighs like 10 to the 28th or 29th, 10 to the 30th times more than electron. A baseball is 10 to the 30th times more well-defined in space.

[End of recorded material]

Born to do Math 78 - Born Not to do Math

Scott Douglas Jacobsen & Rick Rosner

March 15, 2018

[Beginning of recorded material]

Rick Rosner: So, this is more like born to not do math in the case of our president who talks about how he went off to Wharton which makes you think if you're an American that he got an MBA from Wharton. He actually doesn't have an MBA; he doesn't have an advanced degree in business, he went to Wharton as an undergrad.

Wharton is a branch of the University of Pennsylvania and unless you're trying to be deceptive you just say you went to UPenn, but he wants people to kind of think he's an MBA. So, he says he went to Wharton, so the bullshit starts right there.

And then his lack of business understanding doesn't begin with this tariffs thing that we're right in the middle of, it probably begins with him bankrupting three casinos. It's really hard to bankrupt a business where people just come and they give you their money but he did it three times though he is clever enough to have sucked out a bunch of money for himself before the casinos went bankrupt and lost 99% of investor's money.

Anyway, this tariff thing is a huge move that is going to according to anybody who's knowledgeable about business and economics will harm us and possibly the rest of the world by setting up all sorts of trade barriers and possible trade wars. Gary Cohn who's his economics adviser had threatened to quit months ago because Gary's Jewish and Trump was kind of supporting white supremacists and Nazis but he was persuaded to stay.

But now, Gary Cohn; one of the few people who knows what he's doing in the White House is now quitting because he thinks the tariffs are so stupid as does just about everybody else and some numbers.

Trump wants to impose a 10% tariff on foreign aluminum, 25% on foreign steel; he thinks this will revitalize domestic aluminum and steel industries. Everybody's saying no but those industries changed forever especially in the way of going away 30 years ago and you're not going to bring back industries that went away 30 years ago.

Currently, there are three hundred and one thousand steel and aluminum workers in America but the tariffs could raise prices for hundreds of millions of Americans and could lead to reduced sales, increased prices, and reduced business.

The last time in 2002 that we try to tariffs on I believe steel under George W Bush, it cost the U.S two hundred thousand jobs before people realized it was a terrible idea and rescinded the tariffs. This latest round of tariffs, if they go through, it's estimated that they'll cost America maybe around a hundred and eighty thousand jobs.

So, there you go; born to not be able to really do math but to be able to demagogue in the case of our president.

[End of recorded material]

Born to do Math 79 - 128+ IQs Lead to Worse Leadership

Scott Douglas Jacobsen & Rick Rosner

March 22, 2018

[Beginning of recorded material]

Scott Douglas Jacobsen: We were talking off-tape on IQ and a World Economic Forum article on the diminishing returns of intelligence on leadership. It seems interesting, where beyond 128 the leadership can be worse. Can you expound on our points a bit?

Interviewee: Yes, for one, you have to preface anything that involves IQ by saying IQ is a sucky measure of intelligence. Though, there isn't a better one. Using reasonable assumptions, 111 is in the neighborhood of the average high school graduate. It is not that high.

Also, the average IQ for people walking around is also about 100, 105, 106, because people with IQs at the low end are not walking around. They are in institutions, riding short buses. However, anyway, it is hard to tell exactly how they set up their 100.

There are points of comparison. In other words, what's the phenomena, e.g. leadership? It is crazy how low that is. 128 isn't even high enough to get into MENSA, and MENSA is the sluttiest, one of the sluttiest IQ groups.

Almost anybody, if they try can get into MENSA, the average leader who has risen to 128 and, thus, become less effective because leadership peaked at 120. The one who has already gone over the hill and down the other side still cannot get into MENSA.

However, I'll start with saying my wife worked at a bunch of companies that were mid-level companies. She worked for some big ass companies too. Until she had her current job at a school; she never had a job she liked, largely because a large percentage of the people around her were a-holes.

In fact, when you look at the stereotypical mid-level manager as presented in movies and sitcoms, there is always at least one jerk to propel the strife and the comedy. The Michael Scott character in *The Office*.

Everybody else in *The Office* was a sap in one way or other. That may reflect a certain reality that mid-levels of leadership, the people who end up in those positions maybe suck, maybe the organizations that they are leading suck.

Because they are made up of people who are them, then when you get to higher levels, where leadership skills are even worse at IQs at 128, it may be because people with IQs at 128 suck even more than people with IQs at 120.

Because I mean one they might be Aspergery or they might be conceited dickheads or over confident, pricks. Because you also said that these were mostly guys, too, right? Alright, so did this study do comparisons across gender?

They were on IQ is what you are saying. I have seen other studies that show that happiness and success and leadership, all that stuff does reach a peak, and then start declining before IQ reaches a limit.

The studies I have seen, it is more around 140. Or maybe I assumed that. There are plenty of reasons for that. The reasons we've mentioned—dickishness and overconfidence. However, there are also, as you get up above 140 and stuff, the smart people can be, or people who are good at IQ tests, which isn't necessarily the same thing, can be distracted by the butterflies of weird intellectual pursuits.

It is easier for super smart people to chase off after their curiosity about the world, which may overwhelm or their ability to figure out stuff may overwhelm their ability to stay on track. That could be the one way that society.

[End of recorded material]

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