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Ask A Genius 156 – Elements of a New Set Theory (Part 1)
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[Beginning of recorded material]

Scott Douglas Jacobsen: Set theory can be applied to the universe to some degree. But what are its implications in a non-information based universe compared to an information based universe, weaknesses and strengths?

Rick Rosner: We can apply set theory to the universe as we understand it in light of Big Bang and Many Worlds Theory. Under Big Bang, you have a universe with a finite amount of matter and a finite age governed by rules of physics. Some of which we know. Some of which we haven't discovered yet. Some of those seem conducive to a set of all possible universes. Where you can imagine, the rules of physics or a set of all the possible rules of physics or the set of all possible combinations of different rules of physics.

Then all of the universes that might exist consistent with those rules of physics plus the rules of causality. Universes that could conceivably happen over time. You could also include the sets of simulated universes that nevertheless conform to the rules of physics. If you wanted to be really inclusive, you could include simulated universes that work well enough based on sets of rules that at least a temporary universe to exist, even if you can't get a full cosmology.

You can imagine putting people in a world with all sorts of weird rules that could not originate naturally, but could exist in a simulation. All of those things are based on rules of what can and can't exist. It is possible to imagine a set that contains all of these possible universes. It is a crazy big set, but it is possible because it is possible to have infinite sets and you're talking about a bunch of elements are definite things, definite universes.

And if you wanted to limit yourself, so these things become—for some reason, if you think that you like working with finite sets instead of infinite sets, then you limit the size of the universe and the variations in rules that you'll tolerate. It can't be a simulated universe that could not have arisen over time. It is the set of all possible universes with $10\text{^}80^{th}$ or less particles. If that is too daunting, then $10\text{^}6^{th}$ particles. That seems like something you can work with.

You can use that kind of thinking for the things that set is good at. Maybe, you come up with theorems that every universe based on these rules and every member of the set has an origin in time. Maybe, every member of the set has a finite lifespan. An origin in time seems reasonable based on the rules we know or think we know, or can apply to the Big Bang. That seems like it might be a way to define elements in the set.

Or if not to define all elements in a set, then to define a subset or subsets in a set.

[End of recorded material]

Authors[1,2]

[1] Four format points for the session article:

1. Bold text following "Scott Douglas Jacobsen:" or "SDJ:" is Scott Douglas Jacobsen & non-bold text following "Rick Rosner:" or "RR:" is Rick Rosner.
2. Session article conducted, transcribed, edited, formatted, and published by Scott.
3. Footnotes & in-text citations in the interview & references after the interview.
4. This session article has been edited for clarity and readability.

For further information on the formatting guidelines incorporated into this document, please see the following documents:

1. American Psychological Association. (2010). Citation Guide: APA. Retrieved from http://www.lib.sfu.ca/system/files/28281/APA6CitationGuideSFUv3.pdf.
2. Humble, A. (n.d.). Guide to Transcribing. Retrieved from http://www.msvu.ca/site/media/msvu/Transcription%20Guide.pdf.

[2] These sessions and the correspondence are different expressions of the same ideas. In correspondence, we discussed this:

> ***SDJ: With the ICST explained before (I trust), the distinctions in time seem tenuous. Even as an emergent property in the universe, the range of the emergence of time depends on velocity with the minima, v=0, and the maxima, v=c. The velocity in this range determines time. Where time in an ICST framework, time is probabilistic, finite, and dynamic. It's an "as needed" emergence of time in an "as if" universe with a "good enough" ethic.***
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> ***RR:*** *Don't exactly understand the question. However, assuming apparent age of universe is proportional to the amount of information in the universe (but it might be age^3), then adding a million years of added history = 1 million/13.8 billion = 1/13,800 more information has been added to universe's total. But this isn't your question.*
>
> ***SDJ: …Not the question, but an interesting thought to consider.***
>
> ***RR:*** *Explain further please…*
>
> ***SDJ: …It seems in the right path to me. It goes to one of the more basic distinctions in an IC universe: outskirts and center. The outskirts are frozen information, relatively speaking. The data will be used later. The center is active because of time. But why time there, and nearly no time or no time in the outskirts? It seems to be, in theory, because of velocity. Something with minimal Brownian motion and velocity freezes in time, more extreme versions of the neutron-rich/burned-out galaxies.***
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> ***That leads to a questions, or a few. That is, the ratio of collapsing of space and freezing of an object in time to its speed. They're interdependent variables in IC. If you slow something down, its space shrinks, then it travels in time slower. If you speed something up, like proton-rich galaxies in full burn, the local space expands and time moves faster. So changing one dial affects the other, what is that ratio? That's an important ratio.***
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> ***From the why view, moving from the how view, in IC, the object or the information representation is speeding up, expanding space, and in turn creating some time. In that act of creation, its relevance is made. It is relevant to something being processed in the active center because it is an older galaxy flooded with new fuel, so it becomes relevant again, or a galaxy coming alive from the outskirts. That ratio is not only an expansion-contraction of space, speed up-speed down dial on time.***
>
> ***It can probably be considered a metric of meaning, of relevance to the universe. It can loosely put a number on a how, and more importantly a why. But taking any volume of space over a time range, the information contained in it is probabilistic, finite, and dynamic. QM is clear on the probabilistic nature of micro objects. Effective theories are clear on the probabilistic nature of macro objects. The universe is***

incompletely defined. Our knowledge as agents in the universe is limited, about ourselves and the universe.

Both imply finite information. All of this is dynamic because things are always works-in-progress. So that's why I feel ICST can emphasise those three traits: probability, finitude, and dynamism.

RR: *...Age of universe might = I^(4/3), where I is amount of information. Radius of universe might = I^2/3.*

SDJ: With apparent age of universe proportional to the universe's data, then one million years more history at 1/138,000 more information made. With age, we have time, t. t = I^(4/3). With volume, V, as 4/3pi(r3), and radius, r, as I^2/3, and t = I^(4/3). We have the variables for the larger reference number. (4/3pi((I^2/3)3))*(I^(4/3)) = V. I might have that wrong. Anyhow, another thought experiment. Rather than 1/1.38*10^4 more information from adding 1,000,000 years to the universe.

What about an average 1/1.38*10^4 part of the universe over 1.38*10^10 years? Same amount of information added to it. It is equal to a million years of the net data processing of the universe. That second thought experiment is more to the ICST point. The formula can go either way, but the second imaginary situation can section off a part of the universe. Then say, "This part over this range of time." That new set is not certain because it is emergent on chance.

It is not infinite in definition because it is not infinitely precise or defined. It is not static because it bubbles, things interact, and the apparent order has an apparent chaos too, at the same time. It is probabilistic or uncertain because it is emergent on the odds. It is finite in definition because it is not infinitely precise or defined. It is dynamic because there's constant rejiggering as the chaotically ordered mess of information processing in the new set is ongoing, expanding-contracting, creating its own time and micro-speeding up-speeding down, and representing something real, vivid, and partial in the mind of some higher-order information processor…

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