

Ask A Genius 38 - Informational Cosmology 14

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Scott: When I think about structures like the Sun or the shell, the very hot shell, of things being sucked in or rotated around the black hole, or even the radiation that it has, in a way, over long periods of time, it is like having a heater in your room. It is keeping things at a certain relevant temperature for some balance between order and disorder that might be necessary for certain types of information processing that are more efficiently done, from our perspective, temperatures or, from the universe's perspective, kinds of information processing. It could be the speed of processing. It could be the complexity of processing. It could be the precision of processing.

Rick: It's like you're asking, "What might be the information processing nature of the universe as seen in solar systems, and other places, that has consistent long-term inputs of energy?"

Scott: Yea, big, definite, durable structures - solar systems, suns, planets, galaxies, upwards to filaments - big stuff relative to us. Some of them, like the Sun, are keeping heat. They're keeping things - things are still cold - relatively warm. Like emotional values, they aren't precise. They are fuzzy. There might be a helpfulness in fuzziness in some informational valuations rather than high levels of precision.

Rick: In terms of solar systems and the development of increasing levels of order in the creation of life, you need an energy gradient. You need an energy source. Energy needs to flow through a system to generate order. It can't stay in the system. Energy has to enter the system, do work that increases order which also creates waste energy, which has to leave the system before it swamps the system with disorderly waste energy.

One way of looking at it is Maxwell's Demon. It is imaginary. He is like the less well-known version of Schrodinger's Cat. He is an imaginary being you use to discuss a scientific idea.

Maxwell's Demon works to reverse entropy. Let's say you have a coffee cup, your coffee cup is divided between the outside and inside. Put in a barrier to divide the coffee, and say your coffee is lukewarm, you hire Maxwell's Demon that is able to grab hot coffee molecules, dump them on one side, and cold ones and dump them on the other. He does a bunch of work and after he does a special amount of work. You have warm molecules on one side and hot molecules on another side and you can enjoy your coffee.

The deal is, if you can do the math on that and can imagine Maxwell's Demon doing that, if you're in a closed system, say there's a dome over the coffee cup, by the work the demon does separating the cold and the hot molecules generates so much waste heat that everything heats up and when you're done you don't have a cold side and a hot side. You've got everything hot because the demon has created so much waste heat separating the molecules.

The deal is, the work it takes to increase order and separate hot from cold itself generates disorder. You need to attach a vacuum hose to the demon's suit, say space suit, that sucks away

waste heat. Otherwise, that waste heat contaminates the work you've done and in fact negates it. It is part of the deal that in a closed system disorder can only increase. If you have a demon that only increases order, the work he does by increasing order actually creates waste heat that destroys the work, you need an open system, which we have and solar systems are.

Heat comes from the Sun, is absorbed by plants, is stored in chemical bonds via chlorophyll. Photons from the Sun build energy storing molecules that can be tapped later to release energy to do other stuff, for movement and thought and for plants to be able to build the plants bigger to be able to store more energy, but when you build the molecules via absorbing photons there's waste energy from doing that.

You got to get rid of it, which the Earth does by radiating waste heat out into space. So, when you have climate change, schmutz in the air, CO₂, blocks a lot of the waste heat from escaping. You have problems on Earth if you can't dump waste energy. The Earth, the Solar System, are open systems that can dump energy into space. Space itself can dump energy by photons traversing space and it too can be considered an open and entropic system.

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