

**From:** Joscha Bach <[REDACTED]>  
**To:** Jeffrey Epstein <jeevacation@gmail.com>  
**Subject:** Re:  
**Date:** Mon, 01 Aug 2016 15:57:07 +0000

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conjecture, probability is a force.

I do not understand forces as primitives, or atomic properties. How do you envision it?

I imagine the universe as a causally closed machine that can be described on a lowest level with a set of simple, uniform rules. The primary data structure can be a hypergraph, i.e. a set of locations that are connected with shared, typed properties. All changes in the universe can be described using graph rewriting rules.

The rules could in principle either be deterministic, like in a cellular automaton, or probabilistic, like in a Markov model. However, our universe seems to preserve the amount of information in it, as suggested by the first law of thermodynamics, which makes it likely that all transitions are reversible (i.e. each state has exactly one preceding state; if a state had two or more possible precedents, we would effectively delete bits). The most elegant universe seems to be deterministic, with all probabilistic effects at the lowest level being pseudorandom (many cellular automata have that property). A probabilistic universe seems possible, too, but I do not understand the hoops I would have to make it jump through so it gives rise to the apparent preservation of information.

The universe contains hierarchies of causal systems. A causal system is one that can be described independently of the underlying dynamics, as long as those remain within certain bounds. For example, I can talk about tomorrow's weather, unless the planet is being hit by an asteroid, I can talk about the program running on my computer, unless the processor overheats or the power runs out.

Causal systems require that I can identify conditional state transitions, and there are mechanisms acting on the underlying dynamics that constrain the state space.

As soon as we leave the elementary level of the universe and look at a higher causal level, there is a possibility that the underlying dynamics leave the region of their state space that enables the higher causal level. There is always a non-zero probability that my computer fails, my monetary system breaks down etc.

An additional complication is that we cannot observe the elementary level. We only get to see patterns at high causal levels and infer everything else in a kind of machine learning process using a combination of approximately probabilistic models and symbolic reasoning.

- it is the underlying force for self organizing systems.

Would that not be evolution? I.e. those systems that self-organize in unstable ways die off to be replaced by fitter systems, as long as there is an entropy gradient that can feed any self-organizing system at all?

I wonder if it makes sense to hire an animator to illustrate how elementary Hamiltonian dynamics in a deterministic universe can give rise to entropy gradients if we (at least temporarily) open the universe, and how this makes the formation of stable objects and self-organizing systems possible for a short while. I think that I can see it clearly, but it seems to be so hard to convey in words, how we are temporary encrustations, molded by the forces of evolution, on the tides of entropy of the universe.

most traits fall on a distribution curve. it is not useful to talk about a point on the curve. it is only the curve that gives you information.

I agree, our brains swim in a sea of probabilities. However, we have to work with very little data, because life is short, and our senses are very limited. I estimate that a proper Bayesian analysis is possible for low level perceptual data (which are highly repetitive after all), but not for the complex high-level machinery of the world, so when we try to understand money, power, etc., we switch from probabilistic models to causal narratives. For instance, Gigerenzer has shown that people tend to have difficulty at intuitively combining probabilities of the influences differ by an order of magnitude or more, so paradoxically, people often make better decisions when they have less knowledge ("have I ever heard of a thing" is a good heuristic for the significance of a thing only when we know little about a domain).

if i tell this person is a male of 48 years old. . it leads me to believe that you are somewhere between 4foot 5 and 7 foot 10 . I can say no more ( ala wittgenstein). it makes no sense to say otherwise. .

Epistemology vs. ontology. The former tells me what I can know about the world, and you are of course correct with the above. The second is how I model it, and a model that assigns a definite height with a less definite confidence seems to work better than one that assumes that my height is somehow a probability distribution. So, your measurements narrow a probability distribution, but the assumption that I have a definite height comes down to the claim that subsequent measurements will improve your model towards a global optimum. This is a testable hypothesis!

the distributions are relatively constant. in a population. if one individual moves either up or down. it is most likely that another has the opposite move keeping the distribution constant.

Yes, it is not causal though, unless the probabilities are not independent! If I roll a six, the next throw still has a probability of 1/6 for rolling another 6.

even making you happier means someone else must get sadder

(Aside: happiness is not a zero-sum game. Most people get happier if they can contribute to the happiness of others they value.)

evolution works predominately on the points on the curve. it is the activity ON the curve.

Evolution also creates entirely new curves (IQ did not exist before organisms mutated some fat cells into a nervous system). And individuals sometimes do matter (Genghis Khan is said to have fathered thousands of babies).

shifting the points locations. the curve may change over a time period . averages height moves up, average intelligence moves up

(Homo sapiens seems to have lost IQ several times during its evolution, perhaps because smarter individuals have higher relative cost of raising children due to lost opportunity. And monogamy means that almost everybody

has a shot at reproduction, so genetic drift should be huge.)

The focus on the individual is the weak link how do I get happy, is asking how do i move up the curve , but just as statistical mechanics says little if nothing about a single particle .

Exactly! I cannot move up the curve directly, because the curve is a statistical model, not a causal mechanism. To get more happy, more wealthy or more tall, I need to identify a causal mechanism to do so. I cannot travel by looking at a map, I have to find a way to locomote.

but we can say much about the group. biology may present a similar issue

footnote , It is my view that gravity is only a result of probability . it is not a force. but a pseudo force.

Physics mostly sees it as spacetime curvature. In my mind, space does not really exist, there is only an incredibly dense network of paths in a graph. Around objects, the paths are much denser, so superficially, if you move in a straight line near an object, the probability to move toward the object is much higher than the probability of moving away from it. However, there is more to it, because the paths evolve (change) in 4D, and as a result, are not a random jumble, but probably relatively (but not perfectly) well ordered.

Seeing gravity as curvature (i.e. a pseudo force) works well, but it works for the other forces, too. All forces are essentially regular deviations for how certain types of information travel through the universe graph, and particles are types of patterns of traveling deviations. So, in my current view, all forces are pseudo forces, and all particles are pseudo particles.

In my mind, the universe looks like a data structure in a giant computer that is ticking forward step by step, thereby creating all the dynamics that we observe, with the added complication that we can never access the absolute values, but only the relative differentials of things we are entangled with. Observers are causal systems that are complex enough do form and manipulate memories (i.e. computers) that are parasitic on the computations of the universe computer in much the same way as water vortices are parasitic on the fluid dynamics of a river. For an observer, nothing can be absolute. For instance, time is the difference in the rate of change of an observing computer in relation to the rate of change in its immediate environment, which happens to depend on the speed with which the computer moves through that environment. Spin is the difference in spin of a part of the computer to what it gets in touch with, etc.

. like spinning a stone on a string over your head, it creates a pseudo force on the string ( centrifugal ). we are fooled into thinking otherwise. . simple question

why if i throw a fair coin. many many times will the heads and tails eventually come up in equal numbers. . probability forces it into a 50/50 ratio over time. and is guaranteed in infinite time . but says nothing about each throw. the coin thinks it has free will. but obviously it doesnt. it believes that it can be either heads or tails. it can but it operates under the mysterious force of probability

gravity can be measured , but no reason for its existence makes sense.

I really like your self organizing intelligence module idea. I think it is only an outcome of probability. modules

on a brain issue, I believe that this has led to the formation of what i have referred to as OBJECTS . " mental objects. " your layers generate probabilities and the more time they take to develop arguably the more accurate the curve

Yes, that is correct. The brain forms layers of extremely primitive mobjects, which is combines into more complex mobjects, and which it can later evoke (imagine) at will to explore possible worlds/hypothetical outcomes. The mobjects are formed by gathering the structural probabilities of occurrences of patterns into hierarchical functions. Sometimes there is little discernible difference, like in the coin throw, sometimes the coin falls almost always on the same side, as in the laws of perspective, gravity or lighting, or in a language that we learn. Mobjects are generated by modular function approximators that describe probabilities.

On Sat, Jul 23, 2016 at 3:12 AM, Joscha Bach <[REDACTED]> wrote:

Yes, the principles are Bayesian, I suspect. Water is a good, hard problem.

Unrelated, I will very much miss the opportunity to teach at MIT, which helped to develop ideas and recruit students, but I should use the opportunity to get long uninterrupted stretches for writing.

> On Jul 21, 2016, at 20:31, jeffrey E. <[jeevacation@gmail.com](mailto:jeevacation@gmail.com)> wrote:

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> I like the idea of a self organizing system of intelligence. . feedback. I suggest you focus on natural constraints. proerties of water. ? for example. . probabily theory, distributions of power laws and their derivations. etc.

>

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