

Discussion of free-will choice with Brian Peterson (Faustus) (with response from Dennett) 12-2004

Hi Dan (and Brian),

I just read "Freedom Evolves" and I loved it, but I still have a small philosophical "intuition gap" that needs filling. Does the following thought experiment help to demonstrate how "mere" deterministic processes are not pre-determined (in the traditional metaphysical sense)?

Imagine a deterministic Dennettian brick ducking agent (or even a simple device) faced with a modified brick throwing machine which is triggered by the decay of a radio-nuclide (quantum randomness). In essence the brick throwing machine is simply an indeterminism amplifier. Now even if the agent is strictly determined in the Laplacian sense (that is, its future is completely determined, in principle, by non-random mechanistic processes), it seems to me that the fact that it can still avoid the bricks from the completely random indeterministic brick thrower shows that the agent's future is not "pre-determined" in any meaningful sense. As you would say, it has free-will worth having (if it is to avoid bricks anyway).

Does this example supply the necessary "intuition pumping" or is the explanation more along the lines of a combinatorial explosion of probabilistic complexity in "future creation" by deterministic agents? In other words, are small degrees of microscopic indeterminism in a macroscopic deterministic universe incidental to the issue?

John

[John,]

The first thing that occurred to me when I read it was that there must be some sort of "force field" or barrier between the randomized brick-flinger and the Laplacian brick-avoider. I thought this because it at least appeared to me at the time that each is following a different version of physics. We have quantum indeterminacy with the brick thrower, but once we deal with the reactions of the brick avoider, those effects are ruled out by the thought experiment. So tacitly, there must be different physics in each zone of the experiment. This is pretty typical of thought experiments, which rely on conceivability over plausibility.

Anyway, I don't personally see how the Laplacian avoider could be described as having a future that is entirely determined in advance, because it is reacting to events that are random, even if the randomness has to be off-loaded to a non-deterministic zone of the universe.

But this is just an argument from my own personal ignorance of the issues. I suspect that interpreting the experiment this way conceals some sort of slight-of-

hand, and I see the magician's trickery happening right the idea that we can "off-load" the quantum effects into another zone. Perhaps a higher level analysis of the physics, including the concept of "randomness," would reveal that any apparent randomness gets violated by the postulation that the brick enters a Laplacian universe from a random one. Didn't Dennett once make the comment about thought experiments that it's important to follow them through entirely, and not just waive aside tricky parts as unproblematic? It's pretty tricky, imagining an isolated island of randomness in a deterministic universe!

Metaphorically-and I do mean metaphorically-I'm reminded of the reinterpretation Hawking made of the apparent but illusory violation of entropy on the surface of black holes. And again at the metaphorical level, didn't someone show that one of the demons of physics-Maxwell's?-had been misunderstood, because the activities of the demon added energy to the system in violation of what the thought experiment the demon was invented for was supposed to prove?

I suspect that if I'm wrong in thinking your experiment is just the example you were after, it will be because I've overlooked something along these lines, but applying instead to quantum effects and randomness. I'm sure you are in a much better position than I to figure out what it might be.

[Brian]

Brian,

OK. The idea of the experiment is to contrast determinism and indeterminism. Assume that the physics is the same for both the agent and the brick thrower (in my example the brick throwing machine just amplifies these microscopic quantum random events so they can affect events on the macroscopic scale). If, as the standard model of physics indicates, it is likely we have either an essentially deterministic (but unpredictable) universe (because indeterminism gets averaged out or dwarfed by classical effects at macro scales), or we have a completely deterministic (and again unpredictable) universe (e.g., many worlds) where ALL possibilities gets realized (though some more than others), how can a deterministic agent react to indeterministic events unless it's reactions are not pre-determined?

As Dennett would ask, in what sense is the future inevitable? The future is going to happen- but **how** it happens is not determined. So if the future is not determined, how do deterministic agents interact with it probabilistically to produce the future. I suspect the answer may lie in "natural" selection type processes INSIDE the brain that find best fits to the available data.

Here is a quote from the previous link I sent that pertains to our discussion:

Q24 Does many-worlds allow free-will?

Many-Worlds, whilst deterministic on the objective universal level, is indeterministic on the subjective level so the situation is certainly no better or worse for free-will than in the Copenhagen view.

Traditional Copenhagen indeterministic quantum mechanics only slightly weakens the case for free-will. In quantum terms each neuron is an essentially classical object. Consequently quantum noise in the brain is at such a low level that it probably doesn't often alter, except very rarely, the critical mechanistic behaviour of sufficient neurons to cause a decision to be different than we might otherwise expect. The consensus view amongst experts is that free-will is the consequence of the mechanistic operation of our brains, the firing of neurons, discharging across synapses etc. and fully compatible with the determinism of classical physics. **Free-will is the inability of an intelligent, self-aware mechanism to predict its own future actions due to the logical impossibility of any mechanism containing a complete internal model of itself rather than any inherent indeterminism in the mechanism's operation.**

Nevertheless, some people find that with all possible decisions being realised in different worlds that the prima face situation for free-will looks quite difficult. Does this multiplicity of outcomes destroy free-will? If both sides of a choice are selected in different worlds why bother to spend time weighing the evidence before selecting? The answer is that whilst all decisions are realised, some are realised more often than others - or to put it more precisely each branch of a decision has its own weighting or measure which enforces the usual laws of quantum statistics.

This measure is supplied by the mathematical structure of the Hilbert spaces. Every Hilbert space has a norm, constructed from the inner product, - which we can think of as analogous to a volume - which weights each world or collection of worlds. A world of zero volume is never realised. Worlds in which the conventional statistical predictions consistently break down have zero volume and so are never realised. (See ["How do probabilities emerge within many-worlds?"](#))

Thus our actions, as expressions of our will, correlate with the weights associated with worlds. This, of course, matches our subjective experience of being able to exercise our will, form moral judgements and be held responsible for our actions.

So this guy is saying that free will is a knowledge problem as I indicated earlier.

John

Date: Fri, 17 Dec 2004 12:09:15 -0500
From: Daniel Dennett <ddennett@tufts.edu>
To: "John J. Donovan" <dovonan@darkwing.uoregon.edu>
Subject: Re: indeterministic brick avoidance

[John,]

That's a lovely little thought experiment. It does the job perfectly. Thanks. If I use it, I'll credit you--it's Donovan's Quantum Brick-Lobber, OK?

Dan

Dan,

I'd be honored if you did. (and if you do, please feel free to drop me a note where I can find it!)

john

John,

You sent Dennett the same version that was making me think you had two different sets of physics. I would have different things to say about that versus the second one you sent me. In fact, I had started to isolate what was bugging me about the first (the Dennett) version, but I realized I just wasn't getting any work done while I was writing my long response. So I'll have to send you my thoughts via my Yahoo account this weekend.

Hint: it involves Chaitin's algorithmic complexity approach to randomness.

Brian

Brian,

Now you have me curious. I'll look for your response this weekend.

It seems to me that the problem of free-will choice is manifold. First there is the necessity for the illusion of choice because no self-aware (but deterministic) creature could calculate hypotheses for survival if it didn't at least assume that it could choose between them. Second, there is the level at which we have incomplete knowledge for calculating those hypotheses. That is, we always have to make behavioral calculations without Laplacian omniscience. So depending on our functional abilities we can more or less better calculate optimal responses. Third, and relevant to this discussion, both of these behaviors would seem to be useful (and necessary) in any moderate mixture of deterministic and indeterministic physics as my little thought experiment seems to show.

John