

comp.os.linux.misc: Re: Thermo–dynamic philosophy for kids; was Re: Mail Server a long time ago

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From: Paul Lutus (*nospam_at_nosite.zzz*)

Date: 08/28/04

Date: Fri, 27 Aug 2004 16:14:46 -0700

Jeroen Geilman wrote:

> *Paul Lutus wrote:*

>

>> *Jeroen Geilman wrote:*

>

>>> *What would you use, then, to describe "an opinion held by a large number of people yet impossible to verify as a generalised fact" ?*

>>

>> *Religion. You mean you didn't see that coming? :)*

>

> *Oh now you said it !*

>

> *It's only a matter of time before someone mentions Godwin...*

But not either of us, right? :)

/ ...

>>> *True, but it first *becomes* information only if and when it is*

>>> *applicable.*

>>

>> *No. Information doesn't have to be applied to be information. This is*

>> *part of information theory (as the term is used by scientists, not*

>> *philosophers) and even something as abstruse as quantum mechanics, where*

>> *information quite literally has mass/energy -- before it is exploited by*

>> *anyone.*

>

> *It has nothing to do with exploitation – or "use" in general.*

> *It's a definition – the one I learned, in computer science.*

> *I'm not sure where you'd get the idea that I had any sort of philosophic*

> *background – particularly as I'm so lousy at it ;–)*

You previously mentioned a prof in "information theory" who asserted that information is not information until it's used. This contradicts the scientific–information–theory view, where unused, dormant information has

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the same properties and must meet the same requirements as that that is exploited.

- > *No formal training of any sort, no – interested, sure.*
- >
- >>> *Every fact begins its life as a datum, becoming information*
- >>> *only when it has value to somebody.*
- >>>
- >>> *You don't want to argue with my Information Theory teacher ;–)*

There it is.

- >>
- >> *Honestly. Too bad the academics in the social sciences can't, or won't,*
- >> *talk to those in the hard sciences. It appears someone has decided that*
- >> *information theory has a different meaning in philosophy than it does in*
- >> *the "other" information theory of Shannon et. al..*
- >
- > *Shannon I'm familiar with – somewhat.*
- > *You mean you've never ever seen it expressed that way ?*

No, I limit myself to the formal information theory that arises from physics. In that field, the uses of information are not relevant, only its strict definition.

- > *What does the purely academic definition of information (Shannon's bits)*
- > *have to do with real–world knowledge, anyway ?*

They are intimately related. However people view information in an everyday sense, it still must meet the physical rules that govern information — it can't travel faster than light, more information means more mass/energy, issues of compressibility and minimal representation, that sort of thing.

This ties into the Einstein–Rosen paradox (not a paradox as it turns out), that allows two particles to stay quantum–paired at great distances. Someone (Alain Aspect in France) proved that this paradox actually could be verified in experiment, at which point someone claimed this violated the causal rules of relativity (information might be carried between the particles at $> c$). But, as it turns out, for various technical reasons, the experiment cannot be exploited for that purpose. No information can pass between the particles and causality is preserved.

In this experiment, the entire controversy revolved around whether information could be put into the system and affect both particles in such a way that causality would be violated.

- > *If I were to tell you, "I have a red car", this is a factoid – a datum.*
- > *It is not information to you /unless/ the fact that I have a red car is*
- > *actually useful to you.*

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No, not in the physics sense. I am not disagreeing with you, just pointing out that two definitions are in use here. The problem is with the term "useful". This has no physical meaning.

- > *Like, say, you need to locate it on a crowded street.*
- > *That is the distinction I'm talking about, and it's a very real one as far as I'm concerned.*

That is a very anthropocentric definition of information.

- >>>*I'm not acquainted with mr Olber, or his paradox, what did he say ?*
- >>
- >> *Happy to oblige. <http://arachnoid.com/sky/index.html>*
- >
- > *Thanks, I'll check it out.*
- >
- > *Okay, checked it.*
- > *Hey, I've read that part of your site before – just forgot all about Olber ;–)*
- >
- > *Clicked straight to his paradox, and found this:*
- >
- >
- > *The "stars," of course, are sources of energy, so they do not cool off -- they maintain their temperature even as they deliver energy to their environment.*
- >
- >
- > *I can't agree with this, from what I know of thermodynamics – heat is dissipated from hot stuff to colder stuff,*

But the stars reliably convert mass to energy, and in such a way that their temperature stays much the same for billions of years. They can therefore be looked on (first–order) as fixed–temperature energy sources, and they heat up their environments without decreasing their own temperature. In fact, as it turns out, the presently accepted model for stellar energy conversion (Bethe, 1939) predicts that our own sun will gradually heat up as it ages and as it continues to emit prodigious amounts of energy into space.

- > *so of course an energy source*
- > *cools – it just doesn't cool as much as something that's not an energy source.*

Even apart from the above, it doesn't cool significantly at all, because the fusion reaction regulates its temperature. It's not like a mass that has been heated, than abandoned by its source of energy.

- > *In fact, didn't I learn somewhere that the concept of heat and energy only has meaning when it is in motion ?*

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I don't want to comment on this until I understand your use of the terms.

> *If there is no heat or energy transfer then there is no "heat"*

No, heat can be defined as molecular motion in isolation (there are other definitions equally valid), so no, this is not a requirement.

> – *since*

> *by definition the transfer of energy doesn't stop until everything has*

> *received an amount to balance every thing's energy level – makes them*

> *the same "temperature".*

Since we're on the topic, you need to realize this never actually happens. For two physical objects (a and b) at different temperatures, and given that heat can flow between them, the differential equation form is:

$$y(t) + r c y'(t) - b = 0$$
$$y(0) = a$$

The first term means that, as time passes, the function y (the temperature of a WRT t) gradually moves to the temperature of b (and b is an infinite reservoir in this simple equation) as $r c y'(y) - b$, where $y'(t)$, I am sure you know, represents the first derivative of the function $y(t)$, e.g. the rate of energy transfer. The term " r " is the resistance to heat flow and " c " is the heat energy capacity of object " a ".

This means that the rate of heat transfer is proportional to the temperature difference, and as that difference decreases, so does the rate of transfer.

The solution to the differential form is:

$$y(t) = e^{(-t/rc)} * (a-b) + b$$

That is to say, an exponent based on e (the base of natural logarithms) is taken of $-t/rc$, and this exponent tells us what temperature has been achieved by " a " with respect to time t . This, in turn, means that " a " never gets to the temperature of " b ".

So, in short, as to "the same temperature", no.

This equation is described more fully here, in a different context:

http://arachnoid.com/alaska2003/olga_bay_tides_in_bays.html

As to Olbers' Paradox, given an infinite universe and the observed stellar density, this equation tells us that the entire universe would long since have nearly reached the temperature of the stars, were it not for universal expansion.

> *This is from my high school days – admittedly quite a while back.*

>

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>

>>>*Can you *demand* (socially, or morally) that people have the foresight*

>>>*to prevent dangerous situations ?*

>>

>> *I can only do that if they have knowledge of the consequences. This is a*

>> *legal principle as well, although not perfectly or evenly applied.*

>

> *That's my point – at what stage, and how, would you decide that they*

> **could have had* that foresight??*

A tough judgment call. Not remotely deterministic. If anything important were at stake, I would want to know that they **did** know the consequences of their actions, not "could have."

>

> *Rectify my above then, as: can you demand moral responsibility from*

> *someone if they had no way of knowing ?*

I personally do not think so, but I am speaking from a basic ethical standpoint, not at all from a legal one. Sometimes society must protect itself from those who ignorantly do harm.

>

> *Erm several people spring immediately to mind...*

Erm, yes, I concur. :)

--

Paul Lutus

<http://www.arachnoid.com>