FROM DEPENDENCIES (CORRELATION VS CAUSATION) TO FASTER THAN LIGHT COMMUNICATIONS

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The purpose of publishing this note is to ask, whether the ideas presented here are new and whether they are useful. Write to my email

Let V be an index set, we will call it a set of *variables*.

Cartesian product of a function a a from V to a set $\mathscr{P}U$ for some set U is

$$\prod a = \{z \in U^{\operatorname{dom} a} \mid \forall i \in \operatorname{dom} a : z_i \in a_i\}.$$

A *relation* between variables V is a subset of $\prod a$ for some a. (Note that most relations aren't binary.)

Let R be a relation between a set of variables V. A variable Y is *dependent* on a variable X iff the following binary relation is a function:

$$\{(x, y) \mid \exists v \in R : (v_X = x \land v_Y = y)\}.$$

1. Causation dependencies vs correlation dependencies

First, I will discuss non-stochastic dependencies:

Let the relation R on some set of variables V express some laws of physics (we can take theoretical mechanics as the example): Laws of physics are usually expressed as a few equations, that define a relation between variables.

Let the relation S on V be a set of boundary relations.

Let T be the relation of all consequences [what are consequences??] of both R and S.

Then binary relation that we call "dependent" may be different for every of R, S, T.

We will call dependency on R as *causation dependency* and on T as *correlation dependency*.

Obviously not every correlation dependency is a causation dependency, but every causation dependency is also a correlation dependency.

Adding an additional law of physics (Laws of physics like "the drone (or our electron) moves by this trajectory" are added through engineering.) to R, we can turn a correlation dependency into a causation dependency.

Now let by some machine A two electrons are set to have the opposite spin. If we manage to build two machines, that, thanks to our boundary conditions S, change the spins of the two electrons simultaneously, we can add a new law of physics T, that (during the duration of the experiment) spins of these two electrons change simultaneously, that is, T becomes our new law of physics.

In S laws, faster-than-light signaling is impossible (simultaneous change of spins is a correlation dependency, not a causation dependency). In T laws, it is a causation dependency (between of two electrons in either direction).

Because, under our assumptions, we can measure the spins and measurements can spread in remote regions of the universe, we can set two parts of the univese (such as two chrodenger cats on different planets) to share similar states (for example, two cats would share alive state). This can be considered as a faster-than-light communication: We communicated the state of the cats.

It remains to find conditions under which the laws T are stable to implement FTL communications and sending information back in time.

2. Arrow of time

For phisosophizing about time, we need a somehow more general dependency of arrow of time:

Let R be a relation between a set of variables V. A variable Y is F-*dependent* on a variable X regarding a set F of functions iff the following binary relation is a function in F:

$$\{(x, y) \mid \exists v \in R : (v_X = x \wedge v_Y = y)\}.$$

Then, in assumption of $\mathrm{P} \neq \mathrm{NP}$, future is defined dependency with functions that are quantum-calculable.

If $\mathrm{P} = \mathrm{NP}$, then it's possible to act to the past like as we act to th future, because then such functions can act to the past and thus in this case not only future is an BQP-dependency of the past, but in the opposite direction, too.

If the quantum machine with electron spins that I described, is possible, then faster-than-light communication is possible, from what special relativity theory induces ability of time travel.

3. Probability theory

In probability theory, it is well known that correlation isn't causation as determined by $P(B \mid A)$.

Define this formally: *causation* is correlation on a bigger dataset (such as the entire potential dataset of all data allowed by laws of nature).

Suppose a human proposes many conjectures that a certain correlation is a causation. Because they are many, some correlation will be found and causation (correlation on a bigger dataset) may be mistakenly admitted. Alternatively, many conjectures may be proposed by many people, even if each of them proposes just one.

Therefore, in scientific fields, we need meta-analysis of literature, considering also the apriori probability that a given author proposes a given conjecture.

If the meta research span of all conjectures in the field, it's enough. Otherwise, need to do meta-meta research, etc.