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the rube goldberg analogy was merely one of true multi dimensional.. audio to electrice to physical to visual.

On Thu, Sep 10, 2009 at 5:38 PM, David Grosof <██████████████> wrote:

Hi,

Following up on our phone chat about multi-dimensional cryptography, I wanted to share one, perhaps obvious if essential, clarification, and to point out to you a mathematical development that is highly relevant.

Clarification.
An arbitrary Rube Goldberg machine does not necessarily communicate information in a channel, howsoever many physical subsystems and kinds of force are harnessed. The mechanism has to communicate something about a subset (usually one) from a larger set of possible messages. It's not enough to have a complicated way to build and assemble a printer that prints "The plane arrives at 7"; there has to be a way of using the mechanism(s) to communicate alternate messages as well.

I am a huge fan of Gregory Bateson's useful maxim, "Information is a difference that makes a difference" from the early, brilliant chapters of his book *Man and Nature*.

Interesting Math
Let's pursue the analogy to DNA some more. In the simple central-dogma version, the DNA sequence specifies an amino acid sequence, which, in certain physical circumstances normally prevaliing in a cell, circumstances of pH, osmolarity, ribosomes, energy in the form of ATP, and more, that when fabricated will fold up to do something amazing -- including the encoding of neuronal, immune or endocrine signals in one fashion versus another way (!). If those circumstances don't prevail, it won't fold up in a particular way and be integrated into cellular function normally.

The relevant math of programmable assembly includes an interesting, strong claim (loosely expressed herein): an edge-connected string of tetrahedra can be folded up to produce any arbitrary 3-D shape (above the resolution limit set by the size of the unit tetrahedon). I attach my company co-founder Saul Griffith's PhD thesis (MIT, adviser Joe Jacobson) where it is easy to explore and appreciate the relevance of programmable assembly to 3-D crypto: the program is the code; the 3-D structure(s) can perform operations that are the results of a program. Because of the size of the thesis, **please let me know whether it was successfully transmitted.**
The work is not all published and I'm not sure the math is where it should be but the notion of programmable assembly in 3D is one of great practical ("Smart Materials") and theoretical importance. The idea of 3-D completeness and work on ways to define the programs and systems needed for practical development would seem to merit much more attention.

Sincerely,
David

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