From: "David Grosof <[redacted]> on behalf of David Grosof <[redacted]>"
To: "jeevacation@gmail.com" <jeevacation@gmail.com>
Subject: Multi-dimensional cryptography
Date: Thu, 10 Sep 2009 21:38:13 +0000
Attachments: ThesisSaul_sgphd10MB.pdf

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 [redacted] 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