This shot of Scott Hitchcock and his art, the featured exhibit at the Creole Gallery, was taken from the top of an 8-foot ladder. These drawings are huge. And be sure to check out the 3-D drawing. Ask for the nerdy glasses and try not to drool as you stare at the drawing.

Creole Gallery features gigantic drawings by local artist Scott Hitchcock. How in the world do you do these? I asked Mr. Hitchcock on Monday. Don’t you smudge them? Yes, he said. And I erase and start over. On some pieces, you’ll see what he means. He doesn’t get down on the floor and draw as I imagined. Duh, I told myself. He built a giant easel. To hang the pieces of paper, he uses what he calls the poor man’s way of hanging artwork – basically plastic pieces that can be used for window screens. He even has one piece that is 3-D. He handed me the glasses and I almost fell over trying to figure it all out. Then Robert Busby put them on and kept putting his...
hand out, the lines just out of reach. It’s neat stuff. Hitchcock said he’s had a few shows of 3-D work that just weren’t received well. I still think these drawings are cool. Check it out.

Scott Hitchcock at Creole Jan 7-25th
Review by Ben Gaydos [1/7/2004 - 17:00]
Follow up Message from Peter Richards:


Hitchcock earns his living as a research and development physicist at the Cyclotron at MSU, but he says art is how he truly expresses himself. “I’ve never seen art as separate from science,” says Hitchcock, who is known in the scientific community – particularly in Russia where he has been invited twice – for his theories on time. While coming up with these theories, he produced the huge drawings – 7 feet by 42 inches -- on view at Creole Gallery through Jan. 25.

While intense, they are created with the most simple of tools: the fat pencils from Baby Boomers’ school days (remember the pencils engraved with “School Pal,” “Patriotic-Helpmate” and “Big Dipper”. Scott produced the drawings in the mid-1990s in his garage on a huge homemade easel. Many include personal musings in script, because Scott says they make up his diary.

He would do a drawing, roll it up and store it until it became meaningless to him. Then he would destroy the drawings by fire. Those in Creole Gallery were headed for the same fiery fate until artist David Kleis saw them and encouraged Scott to show them to gallery owner Robert Busby. Robert immediately grasped the fascinating aspects of the drawings, including a spectacular one that must be viewed with 3-D glasses.

This is truly an amazing show. At first glance, the drawings appear to be homage’s to graffiti and pure design. Closer inspection and reading of the scrawled text in the margins reveals that Scott is investigating the nature of time -- not time as a river or time as tick-tick-tick or passages of history or anything so easily grasped, but time as a substance. I had a very interesting discussion with this very animated artist, where I was taken to task for using the phrase “in time.” Scott sees time as being open to influence, not the immutable, inevitable process that most people participate in. Do not miss this show!

Massive memories
A physicist’s diary of his turmoil, -- 7 feet wide

Carla Kucinski | NOISE

Scott Hitchcock’s diary hangs on the walls of the Creole Gallery on 7-foot-wide sheets of paper.
Above, Scott Hitchcock with his pencil drawing, "My reality collapsed to something less than 3 dimensions and viewed edgewise from above (this side up)." Below, a detail from "There's more to the picture," both on display at the Creole Gallery.

See it: Scott Hitchcock, "A Maze in Time"
Creole Gallery, 1218 Turner St., Lansing 487-9549
11 a.m. to 6 p.m. Thursday to Saturday, noon to 4 p.m. Sunday, or by appointment until Jan. 25 (2004)
More information about the artist at: www.msu.edu/~hitchco4/
The diary contains tangled webs and funnels of lines drawn in pencil, representing the fury and chaos that spun in this artist's mind. That inner turmoil also is reflected in personal musings scrawled along the edges of the artwork.

Hitchcock created this diary between 1995 and 1998 while battling depression, among other issues. He never intended to show the work to anyone. Most pieces he burned. The rest he rolled up and stored, until eight years later when he met artist David Kleis, who insisted he show the pieces to Robert Busby, owner of the Creole Gallery in Old Town. Busby was fascinated.

"Some things just affect you immediately before you even have any thought process about what's going on," Busby said. "That's what happened when I first saw his drawings. I just thought they were really powerful."

The exhibit represents a psychological journey, an exploration of the frustration and anger in Hitchcock's mind. He drew with such force that he sometimes dug through the paper with his thick kindergarten-style pencils.

Oddly enough, pencil has been a part of him since third grade. A classmate stabbed him with a pencil, leaving a piece of graphite in his left arm.

"I can still see it," Hitchcock says, rolling up his sleeve. "I'd still like to get even with that guy, but maybe I should thank him."

Or maybe he should thank his parents. The son of an architect and artist, Hitchcock, 50, of Okemos, took to drawing as a boy in the home his father built in Grand Rapids, a home filled with his mother's paintings.

He went to Western Michigan University to receive a degree in art. From there, an interest in cosmology brought him to the University of Arizona where he got a bachelor's degree in physics and met his wife, Toni.

The couple eventually returned to Michigan. His wife taught special education in Munith, near Jackson. Hitchcock worked odd jobs and started producing the art that's at the Creole today. Revisiting the works now, Hitchcock sees a reflection of his mind-set during that period.

"The scary thing is that I was at one with that, and it's pretty scary looking," he says, looking at a drawing that took a year to finish. "It represents the confusion and inner turmoil of a lot of issues. They're sort of maps of my brain rewiring itself."

Once the drawings were hung, he was nervous about people reading something so personal. He had handed the drawings over to the gallery without reviewing the musings in the margins. Some he's slightly embarrassed of: "the pain of genius is the loneliness of thinking stuff no one else can comprehend."

"It's kind of like going back to reading old diaries," he said. "I don't want to go back to that place."

That place was filled with depression and a sense of failure after he had discovered that an idea he had -- a laser that creates artificial stars -- had been developed by someone else and was gaining national attention.

"I went into a tailspin depression because here are these people at M.I.T. who got Ph.D.s off this idea, and I didn't follow through on it because I didn't trust my instincts," said Hitchcock, who today works as a research and development physicist and technician at Cyclotron, a lab at Michigan State University conducting research in physics and nuclear science.
He retreated to his art, working out his anger in his garage. He approached each blank sheet not knowing what he would produce. Some drawings took five or six hours to complete. Others took days. One took a year.

As he worked through the drawings, he said ideas about time began to subconsciously emerge. His final piece, "The Structure Reveals Itself," which is viewed with 3-D glasses, contains his equation for time, he said.

Hitchcock says time is a human construction. Change occurs in the universe, but unless something or somebody is there to observe the change, it doesn't happen[1].

"Time is only a relative difference between space and continuation of things against what we call a clock," he said [2].

He says his theory contradicts most physicists' beliefs that time pre-exists [3], and "we're just matter plopped on top of it," he said.

Nonetheless, Hitchcock continues to draw in his journal and post his ideas on his web site. And like he wrote on his final drawing: "If we're lucky, we'll at least be remembered for one thing."

Maybe he will be remembered for his theory of time. Or at least for his art.

Published 2004-01-14

[1] Note: I meant to say that “time is a human construction. Change occurs in the universe, but unless something or somebody is there to observe the change and relate it to something else that changes such as a clock, then time has no meaning since it is a measure of the relative rates of change of things in the world around us” SMH-March 2, 2005

[2] Again a slight misinterpretation that needs clarification it should be something more like this; Time is the measure of re-configuration processes of things in space whose evolution is compared to standard signal generating devices such as clocks. The use of clocks (also involved in reconfigurations themselves that process energy) to create labels for observed events is how we invent time as a result of our brains information processing abilities. It is hard to simplify such abstract concepts for the general reader, but Carla did an excellent job and I thank her for taking the ‘time’ to see my artwork and talk about the ideas that are embedded in the drawings…even if only as strange visualizations paired with the more concrete efforts to find a mathematical and physical language that shows how our creation of time is the ultimate example of “endophysics”.

[3] As an “exo-physical” property of space independent of the observer and fundamental in the way that “space” is thought to exist. The key here is that both space and time as used in current physical theory are abstract tools to construct space-time maps of the vacuum and the evolving systems in it.

T-computers and the Origin of Time in the Brain
This figure illustrates how a T-Computer creates 'time' and 'arrows of time'. The T-computer has been recently identified in our brains using functional magnetic resonance imaging. The computational pathway in S. M. Hitchcock's T-computer model maps 1-to-1 to the anatomical structures involved with the creation of time in the brain. Therefore the 'problem of time' has been 'solved' showing that 'time' is actually a computational artifact originating from the 'change' we observe in the configurations of matter at all scales in the evolving Universe.

Scott M. Hitchcock's Papers

2003:

T-Computers and the Origin of Time in the Brain

Neuroquantology Article: Recent research has identified the components of the brain that appear to time label information from observed sensory events, store the labeled information in memory and then using the time labels for two or more events to compute their time differences, time intervals, elapsed times or 'lifetimes'. Time differences are the basis of the 'time' numbers we read from clocks and compute in our brains. Time is our map of change. Maps are abstractions of information and can be used to construct useful devices such as space-time. A general time
computer or T-computer model is outlined that shows how observed signals can be processed into time labeled information states infostates by our instruments or our brains. The observer can communicate the 'time' computed for observed events using consciousness and language signals to drive sound signals in the vocal cords for instance. The 'problem of time' is near a realistic solution now that the brain's T-computer has been identified. The brain is the 'local' creator of time, space, and space-time as our special maps of the reality we 'observe' and participate in.

Note: I discuss my concept of a T-computer as any system (e.g. your brain) that takes information and time labels it relative to another system, which we commonly refer to as a 'clock'. In my papers, the definition of a computer is much broader that is in common usage in computer science. The 'working' definition is as follows; a computer is any physical system that creates, modifies, transmits, or stores information regardless of the nature of the physical systems supporting these activities. This is my final 'paper and represents the end of my work on these subjects.

2002:
The Creation of Time from Substance and Space
Spacetime and Substance Article: The 'problem of time' can be 'solved' by observing that 'time' is a computational artifact originating from the 'change' in the states and configurations of substance (matter) at all scales and levels of complexity in the space of an evolving Universe. 'Change' results from instabilities in the configurations of matter, which are driven by the fundamental forces into more stable configurations. The reconfiguration processes resulting in the hierarchical forms of matter throughout the universe are the fundamental sources of 'signals', which carry 'information' from one material system to another. The process of pairing signals, from one changing system (a standard clock) to 'observed' signals from another changing system, creates 'time labeled' information states or 'infostates'. The difference between the time labels for any two infostates is defined as the 'time' elapsed between the two observed events. 'Time' does not exist a priori, but is in fact a computed measure of change. The 'logic' involved in producing time labeled infostates is illustrated using a 'T-computer' model. The construction of a 'direction' and 'dimension' for 'arrows of time' follows from the 'time differences' between labels for the time labeled 'infostates'. The set of all time labeled infostates forms the basis for conventional 'time' coordinates.

2001:
Time and Information, The Origins of 'Time' from Information Flow In Causal Networks and Complex Systems
Figure1, Figure2, Figure3, Figure4, Figure5, Figure6

The 'problem of time' can be 'solved' in principle by taking the viewpoint that information created by quantum systems or Feynman Clocks (FCs) is transferred by signals to detectors as quantum 'infostates' and then used to construct 'time' with a T-computer. This constructed quantum 'time' results from the quantum computational process of coupling observed signals to standard clock signals into time labeled infostates in an observers' T-computer. The T-computer model is used to define standard 'time coordinates' for 'events' in space-time maps. The 'direction' and 'dimension' of 'arrows of time' follow from the ordering and properties of the numbers used to label event 'times'.

'Photosynthetic' Quantum Computers?
Do quantum computers already exist in Nature? It is proposed that they do and are fundamental to our very existence. An expanded conception of what constitutes a quantum computer and computers in general (e.g. the ‘universe’ as a computer...) is proposed to replace the limitations of the ‘classical’ computer paradigm being applied to this new territory. Photosynthesis is one example in which a ‘quantum computer’ component exists in real ‘classical’ biological systems. Quantum photons are ‘computed’ into ‘classical’ chemical and biological information and energy processing structures. The building of increasingly complex information structures such as ourselves from simple chemicals originates in the transformation of energy from photons into biomolecules in photosynthetic quantum computers and the subsequent systems built upon these. The creation and propagation of high-density information structures such as DNA is traceable to fundamental quantum computing processes as well as complex macroscopic processes and various networks forming the ecosystem over geological time scales. In this sense the boundary between quantum and classical computation is not discreet but a fuzzy transition at small scales and may even occur in the classical scale (e.g. superconductivity, Bose-Einstein condensates, quantum teleportation, non-local quantum communication, black holes and the ‘surface’ of the deep energy sea of the vacuum. A ‘translation’ of the standard metabolic description of the ‘front-end’ light-harvesting complex in photosynthesis into the language of quantum computers is presented. Biological systems represent an untapped resource for thinking about the design and operation of hybrid quantum-classical computers and expanding our current conceptions of what defines a ‘quantum computer’ in Nature.

Is There a ‘Conservation of Information Law’ for the Universe?
Comments: 7 pages, no figures, minor corrections and reference added, see notes below. What are the implications if the total ‘information’ in the universe is conserved? Black holes might be ‘logic gates’ recomputing the ‘lost information’ from incoming ‘signals’ from outside their event horizons into outgoing ‘signals’ representing evaporative or radiative decay ‘products’ of the reconfiguration process of the black hole quantum logic ‘gate’. Apparent local imbalances in the information flow can be corrected by including the effects of the coupling of the vacuum ‘reservoir’ of information as part of the total information involved in any evolutionary process. In this way perhaps the ‘vacuum’ computes the future of the observable universe.

2000:

Time and Information
Comments: 11 pages, no figures, corrected equations and revised contents, transition paper between the two IHEP talks. The relationship between ‘information’ and ‘time’ is explored in order to look for a ‘solution’ to the ‘Problem of Time’. ‘Time’ is found to be the result of the conversion of energy into ‘information’. The ‘time’ number or label we assign to ‘events’ can be manufactured by processing information ‘flowing’ from a Feynman Clock (FC), via a ‘signal’, to a Feynman Detector (FD) in causal networks. Macroscopic arrows of time are built from the irreversible Quantum Arrow of Time (QAT) associated with unstable or excited states of quantum systems. The QAT is connected to the thermodynamic arrow of time. Collective Excitations, and causal networks provide a means for understanding ‘time’ in complex systems. The ordered set of the ‘time’ numbers labeling ‘events’ can be used to construct the ‘direction’ and ‘dimension’ associated with the usual conception of a ‘time’ axis or ‘time’ coordinate in quantum, classical and relativistic mechanics.

Feynman Clocks, Casual Networks, and the Origin of Hierarchical ‘Arrows of Time’ in Complex Systems from the Big Bang to the Brain
Comments: 21 pages, 6 Figures, corrected equations, revised content. This is an invited talk given at the Institute for High Energy Physics (IHEP), Protvino, Russia, 2000. A theory of ‘time’ as a form of ‘information’ is proposed. New tools such as Feynman Clocks, Collective Excitation...
Networks, Sequential Excitation Networks, Plateaus of Complexity, and Causal Networks are used to unify previously separate 'arrows of time'.

**Feynman Clocks, Causal Networks, and The Origin of Hierarchical 'Arrows of Time' in Complex Systems. Part 1: 'Conjectures'**

Comments: 53 Pages, 22 Figures, corrected equations and revised content. The original paper had too many figures to upload. They are listed below. This is a 'catalog' of raw ideas about 'time' up to this point even if they were rejected later or not used. A theory of time as 'information' is outlined using new tools such as Feynman Clocks (FCs), Collective Excitation Networks (CENs), Sequential Excitation Networks (SENs), and Plateaus of Complexity (POCs). Applications of this approach range from the Big Bang to the emergence of 'consciousness'.

1999:

**Quantum Clocks and the Origin of Time in Complex Systems**

Comments: 17 pages, revised and updated, this is my first paper on time. The origin and nature of time in complex systems is explored using quantum (or 'Feynman') clocks and the signals produced by them. Networks of these clocks provide the basis for the evolution of complex systems. The general concept of 'time' is translated into the 'lifetimes' of these unstable configurations of matter. 'Temporal phase transitions' mark the emergence of classical properties such as irreversibility, entropy, and thermodynamic arrows of time. It is proposed that the creation of the universe can be modeled as a quantum clock. Keywords: the problem of time, the arrow of time, time asymmetry, the many-body problem, cellular networks, complexity, the Wheeler-DeWitt equation, quantum cosmology, and instantons.

**DISCLAIMER**: None of my work on 'time' or the other subjects are endorsed or supported by NSCL or MSU...these papers are the result of unsupported research. All ideas in these papers are credited to their original sources to the best of my knowledge.

**DEEP CHANGE AND THE ORIGINS OF TIME**

The connection between 'time' and consciousness is explored by introduction of the concept of a T-computer in the context of neural network information processing systems such as those involved in the brain. The 'problem of time' can be solved by this approach but leaves us with a deeper 'problem of change'. This is an extension of my previous work at: http://www.msu.edu/~hitchco4/

**INFODYNAMICS**

1. **FIRST LAW: CONSERVATION OF INFORMATION**

Conservation of energy is a 'sub-law' of this since 'total' information about any system may include energy changes but more information is always available and has the potential to encompass many more observables than just energy.

2. **SECOND LAW: INFORMATION CAN CHANGE**

This law relates how conservation of information is compatible with the apparent creation of new information, loss or destruction of information, and the role of 'noise' as a form of information. All information summed together supports the first law above. Signals can be made from noise and noise is a signal in certain circumstances defined by how the observer uses it. The second law of infodynamics also is consistent with the emergence of novel physical structures during evolutionary processes. Jan Kahre's "Law of Diminishing Information" concerns only one direction of information flow in causal networks. It treats 'noise' as 'non-information' and maps the direction of information flow from a signal domain to a noise continuum. The other possible direction of information flow is from noise to signal. This
COMPLETES THE CYCLE AND IS NECESSARY FOR THE CORRECT DESCRIPTION OF POSSIBILITIES FOR THE EMERGENCE AND DECAY OF COMPLEX PHYSICAL STRUCTURES. IN ALL THIS SOURCES, SIGNALS AND DETECTORS ARE INVOLVED IN THE CREATION OR DESTRUCTION OF INFORMATION DURING ENERGY AND MASS FLOW PROCESSES. LOCAL REGIONS OF THE UNIVERSE (e.g. activities inside cell membranes) can HAVE DECREASING ENTROPY, increasing ‘order’ resulting in the generation of new information processing structures. COMPLEX INFORMATION STRUCTURES can EVOLVE FROM SIMPLER PROGENITORS. THIS IS THE BASIS FOR THE “Law of Increasing Information”. BOTH of these sub-laws together complete the 2ND LAW OF INFODYNAMICS.

Q: Is ‘time travel’ possible?
A: Yes, you can ‘travel’ to your ‘future’ only with your body via the sequence of now’s you perceive using your consciousness as your body ‘ages’. There is no ‘past’ to ‘return’ to. Time travel is a one-way trip for all of us. [See my papers for more details.]

Q: Why?
A: Process reversal is not the same as time reversal. We create ‘time’ as a measure of ‘change’. Change does not occur ‘in time’ but creates structures such as ourselves who in turn create time to quantify change. All this is relative to our choice of ‘clocks’, which are also subject to change. Space and time are human-made maps. The space-time of physics is a mathematical construction whose goal is to map the real world’s evolutionary processes via ‘laws’ that ‘explain’ the ‘past’ and attempt to predict the future based on patterns of change. The ‘real’ physical world is a ‘play’ using the vacuum as its ‘stage’, matter as its props, and us as the actors all working to create the ‘now’ of the moment. ‘Now’ is the only reality regardless of relativistic transformations that really represent slowing down or speeding up of the metabolic processes of our bodies as a function of our processing of energy to stay alive. In other words “be here now” and enjoy surfing your cosmic wave of ‘now’!
We are always part of the vacuum, surfing on ‘top’ during life, eternal otherwise...