

Joel Isaacson's Creations: Reborn in a Smile of Content

By Bernd Schmeikal

Science should talk about reality. But that which is real is not what we imagine. Those who make science flourish have not bound their minds to the truth of the mainstream. They do not shape the truth, but the reality. Isaacson's worldview probably even transcended this time-honored difference between truth and reality. His Dialectical Image Processor (DIP) is capable of processing such differences, far from predetermination by programs in a primordial, natural, blind, purposeless, and primitive fashion.¹ It asks the impossible question and creates new reality in a dialectical synthesis of the unconscious and the conscious

Joel Isaacson's creation resonates with primordial states of infant awareness in *early face perception*. "The DIP-cycle of the eyes, realized in the actual infant as spatiotemporal patterns of neural activity in the lateral geniculate nucleus"² is like a pair of flickering beacons that yield an internal sensation (or impression) that attracts the attention of the cognitive subject. That internal sensation is at a pre-perception level and obviously also at a pre-recognition level. "Our infant is born with no innate ideas about human faces and their various features, but with a 'hard-wired' innate facility to DIP nearly featureless faces."³ Joel's enormous empathy was located in the touch zone of life and death. He was one of the last geniuses on this earth.

In our mails, at times we talked about the recently born and the just deceased. When my mother died, Joel mentioned he was still missing his mother, saying, "You are grieving the loss of your mother which is natural. There is no remedy, but time may ease the pain eventually," and occasionally he would end his letters with "love, Joel" or "my very best, Joel."

The infant is able over a period of a few more weeks to make his first successful recognition of some basic facial features. No wonder, then, that Baby smiles back to Mom when that happens. For Baby not only anticipated

¹ Referring to features of the *intellector* that basic systems have "no programming capabilities, and, regardless of the type of input, the same type of 35 manipulations is applied in a blind, purposeless, and primitive fashion" (Joel Isaacson, Autonomic String-Manipulation System, US Patent 4286330, filed April 26, 1979 and issued August 25, 1981), 9. Actually "DIP is a 2-D 256-state Moore-neighborhood cellular-automaton. It is basically a tightly knit massive network of highly interacting BIPs (Basic INTELLECTOR Process). Since each BIP alone is on the order of the complexity of Wolfram's Rule 126 (or higher) I conjecture that DIP may be a candidate for a universal computer, perhaps in its unbounded mode" (Joel D. Isaacson, "Dialectical Machine Vision: Applications of Dialectical Signal-Processing to Multiple Sensor Technologies," Report IMI-FR-N00014-86-C-0805, Washington, DC: Strategic Defense Initiative Organization, 1981, 26).

² Isaacson, "Dialectical Machine Vision," 72.

³ Isaacson, "Dialectical Machine Vision," 70.

a “smiling mouth” to return a smile to, but Baby also just completed one of his first feature-recognition acts, which amounts to one of his first successful discoveries from the real world. And just like with adults, an internal sensation of resonance between stored ideas and the real world does apparently merit a smile of content.⁴

I had just celebrated my 75th birthday when Bettina Schmeikal called me up and told me Bob Krone had been trying to reach me: Joel Isaacson passed on May 17, 2021.⁵ On the 16th, one day before, there had been a resonance in my soul. I wrote a mail to Joel⁶ with the subject: *The Reborn and Us—Lina, Tilda, and Johannes* (my newborn granddaughter Lina, my first granddaughter Tilda, and my son Joe). I wrote “Dear Joel: Bob (Krone) and Lou (Kauffman) gave me an impulse by emails. What about you, dear Joel? Unfortunately, I cannot figure out how you feel!” All of a sudden, a void that had already lasted ten months opened up towards the unknown otherness of no-time.

Joel’s passing is a sudden loss to us personally, and to science as a whole. Then, in May, we did not yet sense the real extension of this loss. Bob, Colonel Professor Robert Krone, was a friend of Joel, and my only coauthor at ResearchGate. On May 26, Bob wrote us (Bernd and Bettina), “You have published the most complimentary things about Joel.”⁷ Bob mentioned the *Editors’ Notes* that appreciated my “review and evaluation of Joel Isaacson and Louis Kauffman’s RD research and paper, published in the *Journal of Space Philosophy*, as a very valuable contribution to this forefront science investigation of Nature’s Cosmic Intelligence.” On May 28, Bob wrote me he had “sent an invitation to the RD Group,” saying “You were the scientist that interjected Sociology into the RD discussion, which I very much appreciated.” He asked me to write an article for Joel.⁸ “We can all figure out a title for the Special Issue. maybe something like ‘Honoring the Legacy of Dr. Joel D. Isaacson’ and the first quote for the issue could be: ‘our universe may be a representation of Isaacson’s system, and entertainingly, with his US Patent specification 4,286,330, it seems he has patented creation.’”⁹

Bob predicted, “your contribution to the Special Issue will have personal compassion, ingenuity, and thoughts for readers to seriously contemplate. Gordon Arthur and I have not set a publication date but...” The older I get, the more quickly my friends and colleagues pass away. I cannot keep up with the writing. According to a press release from the National Space Society posted on Wednesday, September 22, “Robert ‘Bob’ Krone, founder of the Kepler Space Institute (KSI) and longtime supporter of the National Space

⁴ Isaacson, “Dialectical Machine Vision,” 68.

⁵ Email from Bob Krone to Bettina Schmeikal, May 25, 2021.

⁶ Email from Bernd Schmeikal to Joel Isaacson, May 16, 2021.

⁷ Email from Bob Krone to Bernd and Bettina Schmeikal, May 26, 2021.

⁸ Email from Bob Krone to Bernd and Bettina Schmeikal, May 26, 2021.

⁹ Bernd Schmeikal, “Basic Intelligence Processing Space,” *Journal of Space Philosophy* 5, no. 1 (Spring 2016): 65-88.

Society (NSS), passed away peacefully in the presence of his family on September 15, 2021. He was 91 years old.”¹⁰

On August 12, Gordon Arthur had informed me “There has been a changing of the guard at JSP, with Bob Krone retiring as editor-in-chief due to ill health. I have inherited the title of editor-in-chief and Mark Wagner is now the associate editor.” He asked me “Could you please give us a status update on JSP? Are you writing an article for the special issue commemorating Joel Isaacson, and if so, when is it likely to be ready?”¹¹ As a matter of fact, I too am mortal, and I already know what I am probably going to die of, CLL, chronic lymphocytic leukemia. But the good guys in the editorial board gave me an impulse: “Hopefully Bernd is still interested in submitting an article...” Okay then, let us go into those matters slowly, let us ask if it is true that with US Patent 4,286,330, Joel patented creation.

Karl Müller, with whom I had been working for thirty years, showed me the cybernetic articles of Kauffman. Around the turn of the millennium, I had familiarized myself with most of Kauffman’s articles published up to that time in mathematics and mathematical physics. Personally, I met him first at the fifth International Heinz von Foerster Conference on the occasion of Heinz von Foerster’s 100th birthday in November 2011.¹² Over time, we developed an exciting discussion about Majorana spinors. Occasionally the two of us were quite enthusiastic. On one of these days in one of our numerous emails, Lou wrote to me,

Dear Bernd, I am in the process of writing about Majorana spinors and topological quantum computation. I will send you something soon. I would certainly be interested in hearing more of your thoughts. Here is a short version of what I am working on. The simplest instance of all of this is the elemental iterant $[1, -1] = e$ and the time shifter TAU with $eTAU = -TAUe$... Since all this is coming from fundamental self-reference going into a primordial clock, it is astonishing how much comes from nothing!... *Then there are the Majorana Fermions c that satisfy $c^* = c$ so that they are their*

¹⁰ “SPACEREF, The National Space Society Mourns the Passing of Robert Krone, Founder of the Kepler Space Institute,” Press Release, Posted Wednesday, September 22, 2021, www.spaceref.com/news/viewpr.html?pid=58308.

¹¹ Email from Gordon Arthur to Bernd Schmeikal, August 12, 2021.

¹² Louis H. Kauffman, “Eigenforms and Eigenvalues—Cybernetics and Physics,” Dedication: To Heinz on his 100th Birthday, arxiv.org/ftp/arxiv/papers/1109/1109.1892.pdf. Organizing Institutions: Heinz von Foerster Gesellschaft/Wien; ASC – American Society for Cybernetics; WISDOM – Wiener Institut für sozialwissenschaftliche Dokumentation und Methodik; Institut für Zeitgeschichte | Universität Wien; AINS – Austrian Institute for Nonlinear Studies.

own anti-particle. There is a lot of interest in these as quasi-particles, and they are related to braiding and to topological quantum computing.¹³

I was excited about this approach, and there unfolded some two years' discourse that slowed down only after Kauffman suggested that it would be better if we continued to work independently of each other. But by then, he had asked me if I could help to support an older friend of his, Joel Isaacson. In October 2015, Joel had sent me three of his most important papers, "Dialectical Machine Vision: Applications of Dialectical Signal-Processing to Multiple Sensor Technologies," "Autonomic String-Manipulation System," and "Steganogramic Representation of the Baryon Octet in Cellular Automata."¹⁴ It was utterly clear that the topic was still high energy physics (HEPhy) but now connected with informatics. In November 2015 Kauffman told me: "Bernd, I think that you can make a contribution by helping to reconcile the difference between your 4-icon alphabet and the RD 4-icon alphabet. The object is to figure out a link from RD to Clifford algebra and Minkowski space."¹⁵

How surprised had I been when Joel Isaacson sent me his paper "Steganogramic Representation of the Baryon Octet in Cellular Automata." How could the emergence of the baryon octet, how could a hadronic decay be understood by just taking into account equality or inequality with nearest neighbors? But as a matter of fact, by filtering in several simple ways, Isaacson found very obvious similarities to some graphics high energy physicists were rather familiar with. So, I agreed to go into that matter and found out about some relevant relations between Joel's tetracoding line-processors and the Lie-algebra of strong interaction.¹⁶ Line processing of the SU(3) algebra extracted from some Clifford Space-Time Algebra was indeed possible; but then one needed some peculiar line representation, including iterants, swap gates, and imaginary units. Anyway, it gave us the whole special unitary group of SU(3) and not just some part of it.

To justify my plea and defend Joel's intuition, a little story he sent me:

I wrote Stegano around 1996 but kept it in my desk drawer. In December 1999, I decided to send it to *Nature* for publication for the new millennium. It came back in the mail in two days—they never even sent it for review. In those days, they published a few short articles by Wolfram, and I thought they had some interest in Cellular Automata. Bob Krone wrote to them on my behalf, but they responded that this is not a topic that falls within the

¹³ Louis H. Kauffman, "Dear Bernd, I am in the process of writing about Majorana spinors," Archive of personal letters, January 22, 2013.

¹⁴ Isaacson, "Autonomic String-Manipulation System"; Isaacson, "Dialectical Machine Vision"; Joel D. Isaacson, "Steganogramic Representation of the Baryon Octet in Cellular Automata," www.scribd.com/document/36327492/stegano.

¹⁵ Bernd Schmeikal, "LW to Joel and Lou," Archive of personal letters, November 11, 2015.

¹⁶ Schmeikal, "Basic Intelligence Processing Space."

scope of science, or something to that effect. On my next visit to Washington (where I maintained an apartment at that time), I decided to go to the editorial offices of *Nature*, just a few city blocks away from my apartment. I was then in my early 60s. They are not used to have people visit their offices in person, and the receptionist was surprised. A young assistant editor, a woman in her 20s, came out to discuss the matter. She asked for the name of the article, and I said "Steganogramic Representation of the Baryon Octet in Cellular Automaton." She could not pronounce "steganogramic" and had no idea what it means; never heard of baryons; thought that octet has to do with music; and knew nothing about cellular automaton. She thought it was a random word salad. She was polite and asked for explanations. I started talking about CA, but her eyes glazed over, and she became impatient. After a while she stood up, took me by the hand toward the door and said something like: "You must be tired and overworked. We only publish on scientific matters. Why won't you go home, take a rest and write something else — then we'll talk..." and she walked away.¹⁷

The initiated gatekeepers of *Nature* seemed to share this attitude at that time. Interesting that *Nature* considered itself to represent nature, scientifically, so to speak. With Wolfram today that attitude has probably changed. In 1983 Stephen Wolfram proposed a scheme, known as the Wolfram code. Joel, applying his tetracoding in "Autonomic String-Manipulation System," may be said to have picked out Wolfram 129 or its dual 126,¹⁸ which, indeed, was an excellent move, but that was long before Wolfram. Stephen Wolfram lived and worked later, residing somewhere in between Feynman and Gell-Mann at Caltech; and the latter had introduced strangeness and all the rest of it. Could Gell-Mann have had shown Wolfram how it all goes? Definitely not. Gell-Mann avoided this new kind of science. Strangeness and color require more and different rules. Why? Because hadrons cannot be made by just left and right neighbors as in the Wolfram code. But what was going on? Was there suddenly something like *automatic physics*, and if so, since when? I do not know how many scientists are now working within the format of Wolfram. Search for "Topics" or "Participate" in the Wolfram Demonstrations Project, and you realize how open source and copyrights are working.¹⁹

¹⁷ Bernd Schmeikal, "Artificial Physics," January 2020, Project: Space Philosophy and Meta-Informatics. www.researchgate.net/publication/338345772_Artificial_Physics.

¹⁸ See devinacker.github.io/celldemo/.

¹⁹ Letter to Joel Isaacson, September 6, 2019; Wolfram Demonstrations Project, published March 7, 2011, demonstrations.wolfram.com; "Evolution of Matter from a Quark-Gluon Plasma," demonstrations.wolfram.com/EvolutionOfMatterFromAQuarkGluonPlasma

Isaacson’s spill-over for HEPHY may have seemed playful and childlike. But this game is very significant. It holds a secret that was familiar to Joel: in both pre- and postnatal psychology, as well as in physics, orientation morphemes play an authoritative role. DIP-based neural networks, with their special environmental filters, know about the orientation structure of perception. Consider his paper “Steganographic Representation of the Baryon Octet in Cellular Automata”; let me call it the archaic steganographic representation.

The first figure in Isaacson’s steganographic representation of the baryon octet uses a rule related to Wolfram Rule 129 to generate a familiar pattern from a single seed. One may begin with line

... 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 ...

with the zero representing the *seed*. Coding for distinction/indistinction between states of adjacent sites, four states can be represented by the ideographic symbols: “O,” “],” “[,” and “=;” or the equivalent symbols “s,” “u,” “d,” and “=.” Such a 4-state nearest-neighbor ($k = 4, r = 1$) rule refers to *tetracoding*. Tetracoding the first line, he thus obtains

... = = = = = = = = = = = = = =] O [= = = = = = = = = = = = = = ...

Tetracoding the whole pattern line after line, using the symbols s, “u,” “d,” and “=” (denoted as the first filter) and applying a second filter that filters out all but three select symbols in each of the ten structures, Figure 1 comes up.

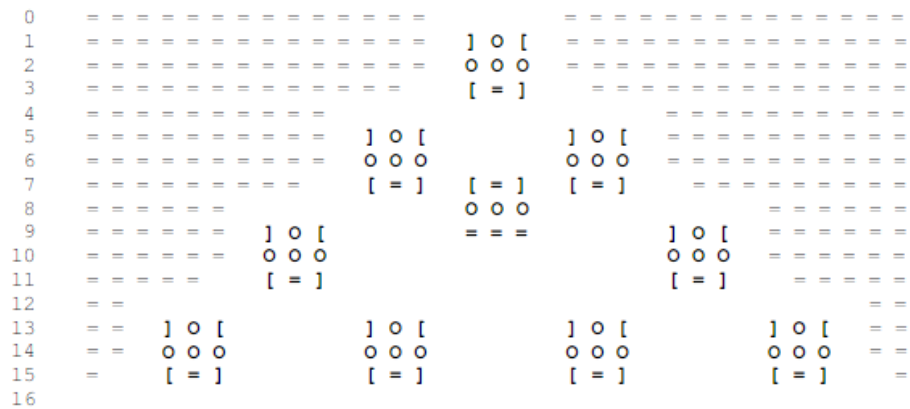
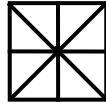


Figure 1: Isaacson’s Baryon Octet

So, we have a 1D-iteration. But we look at the resulting picture, which is 2D. If we could iterate this in one step, it would be a 2D-iteration. In any case, we should have four select symbols in ten select structures. If we note what is omitted, we ascertain that the selected areas represent square frames.



Their basic geometry is that of a square, which has a dihedral symmetry D_{2d} , what is omitted, however, is not a square. The group D_{2d} represents a morphogenetic cognitive structure of orientation. Eight elementary arrangements of quarters represent the symmetries of the dihedral group D_{2d} for two diagonals, that is, $d = 2$. The eight permutations of Order 4 correspond with the spatial congruence group of the square D_4 . This small group plays a very important role where the discrete structure, the monomial base of Clifford algebras is concerned.²⁰ This gives us Figure 2.

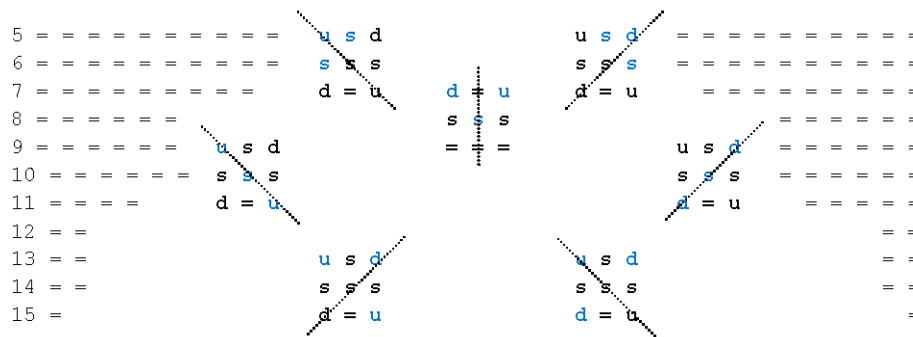


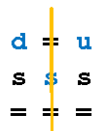
Figure 2: The Resulting Clifford Algebra

Note the different selections of the s in the baryons Σ^+ and Σ^- . The usu and dsd are now positioned exactly on the diagonals of the symmetries. Interestingly, a flip about the diagonals always preserves this blue baryon. If we substitute '=' by '0' and every symbol unequal '=' by unity '1', we get a pattern of Wolfram Rule 126. This gives the dihedral square frame for the digitized figures of size 3×3 . It has its dihedral symmetry slightly broken by a single pair '1 0'. It also generates continuously recurring small squares $\begin{matrix} 1 & 1 \\ 1 & 1 \end{matrix}$, the signs of elemental symmetry D_4 .

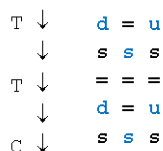
²⁰ Namely, if we consider for a moment the Clifford algebra $Cl_{1,1}$ generated by the small Minkowski space $\mathbb{R}^{1,1}$ with neutral signature $(+,-)$, the base units e_1, e_2 generate the small non-commutative n dihedral group having the eight elements $\{\pm d, \pm e_1, \pm e_2 \pm e_{12}\}$. In our planar pattern, we can imagine four locations, or quadrants, and all their possible permutations. Those are the twenty-four symmetries of the symmetric group S_4 . If we consider only those symmetries that preserve the neighborhood relations of the four locations, that is, connectivity of quarters, we obtain D_4 with only one third (8/24) of the elements. See R. Shaw, "Finite Geometry, Dirac Groups and the Table of Real Clifford Algebras," in *Clifford Algebras and Spinor Structures*, ed. R. Ablamowicz and P. Lounesto (Dordrecht: Kluwer, 1995), 59-99; Bernd Schmeikal, *Decay of Motion—The Anti-Physics of Space-Time* (New York: Nova, 2014), 70.

Flavor Degeneracy

Surprisingly, among the ten structures, the middle one is the only one that can be flipped without breaking its symmetry. It can be flipped about the vertical axis,



and it is the only substructure that can be tetracoded such that it reproduces in symbolic words a degenerate energy state



namely a supposed Λ^0 and thereby creates a Σ^0 . Recall the function of the "O," "]", "[" and "=" and their equivalent symbols "s," "u," "d," and "=". Apply the tetracoding to the elementary middle square, and you immediately find out that the only way to get the line "d = u" stems from an operation on three equal symbols. So, we have to have three equal symbols in the last line of any square frame in the matrix. The only square satisfying that property is the middle one, with a third line reading "= = =" What does that observation tell us? It teaches us that *in a Stegano cellular automaton, the tetracoding appears to be a singular reason for the emergence of flavor degeneracy in the Baryon octet.*

In the early days when Gell-Mann and Isaacson were at work, the term "flavor degeneracy" did not yet exist. One knew about the strange difference between kaons and hyperons.²¹ It seems that the term strangeness was used by Pais and Gell-Mann in CERN in 1954 to clarify the differences between the K-meson- and Hyperon-decay. It seems it was officially introduced in 1953 by Tadao Nakano and Kazuhiko Nishijima.²² *Perhaps some (me) would have preferred weirdness over strangeness.* Today we have flavor instead

²¹ Madhusudhan Raman, "The Strangeness of Murray Gell-Mann," *The Wire*, thewire.in/the-sciences/the-strangeness-of-murray-gell-mann: "Gell-Mann however knew that the rapid decays of strange particles couldn't not be because of the strong nuclear force, so he thought perhaps isospin conservation—the requirement that isospin is the same before and after the decay—would exonerate the strong nuclear force and explain the lifetimes of strange particles. However, he forgot about the electromagnetic interaction, which would result in a shorter lifetime than was observed. It was clear then that isospin conservation would not suffice. His solution was to introduce a new label: strangeness. This concept was also introduced independently by Abraham Pais and Kazuhiko Nishijima. It is a quantum number that characterises particles just like charge and isospin do (and was more whimsically named)."

²² Murray Gell-Mann, "Isotopic Spin and New Unstable Particles," *Physical Review* 92, no. 3 (1953): 833-34, <https://doi.org/10.1103/PhysRev.92.833>; Tadao Nakano and Kazuhiko Nishijima, "Charge Independence for V-Particles," *Progress of Theoretical Physics* 10, no. 5 (1953): 581-82.

of strangeness. The denotation of *flavor degeneracy* first appeared in the archives at the beginning of this millennium. Then, no one was aware that flavor degeneracy is directly related to the dihedral symmetries of the Clifford algebra $Cl_{3,1}$, which is generated by the Minkowski space. I will now briefly explain why Isaacson's HEPHY Model is fundamentally related to Minkowski algebra and why it resembles a 4D iterative structure rather than a line-processor.

Observing Joel's 2D-figure of the baryon-octet we immediately realize that a diagonal flip preserves a baryon. But such a flip is an operation in 3D-space. Together with a time-dimension this indicates a 4D-process. But physicists in HEPHY know that in the degenerate center the $\Lambda^0 \approx uds$ has 2.6×10^{-10} seconds lifetime, but Σ^0 has only 6×10^{-20} seconds; cancellation of any "s" would mean an energy difference of $101 \text{ MeV}/c^2$. It is clear that iteration-time or, as Kauffman used to say, one step in time, is not the same as physical time. Yet, those two times are somehow related. For me, who has decided to work with a space-time gauge, it is clear that both inner (psychological) and outer (physical) space are connected. Therefore, all further calculations are based on the Clifford algebraic logic alphabet in Minkowski algebra or briefly in D_4 as in my papers²³ and—most important—Isaacson's.²⁴ So, I have made clear that Isaacson's idea has relevance in HEPHY. But I have shown some more: we may claim that *with US Patent 4,286,330, Joel patented creation* if we realize physical time and specify the notion of iteration. Consider that we consider the image of the Milky Way or some deep space domain of Hubble as the input of a DIP or an intellector. "Generally, an input to a DIP is some digitized image."²⁵ But those digits come from stars and galaxies that exist(ed) at different times. Further in both relativity theory and quantum theory, it has become clear that

- Future events have an impact on past events. We have to allow for time reversal and nonlocal interactions.
- In relativity theory, an event A earlier than B for one observer may appear later than B for another.

Bottom line: If the creation is embodied in reality, the processor must somehow be real, and it must process inputs from past and future at each iteration-step. Where and when is this processor, whether intellector, DIP, or recursive distinctioner? Provided it is a theoretical process only, it should still be able to process data from arbitrary points in time. I have been ready to give Joel credit. The dialectical image processor provides the necessary properties. But it is much more than a linear line-processor, though there is a strong link to it. In *Dialectal Machine Vision*, Isaacson reports: "DIP was conceived and implemented in 1964. BIP, a one-dimensional version of DIP, was conceived in the late

²³ Schmeikal, "Basic Intelligence Processing Space"; Schmeikal, *Artificial Physics*.

²⁴ Isaacson, "Autonomic String-Manipulation System."

²⁵ Isaacson, "Autonomic String-Manipulation System," 26.

1960s. By the early 1970s, I realized that BIP is a unique process with autonomic low-level intelligent computing capabilities. During that period, I also discovered its dialectical properties."²⁶

I suggested to Joel "You are right. You are meeting the main locus. The minimal Intellector is a material system. As you choose to say, it is *a root process for fermions*, and its process is *comprised of distinctions*. Its models provide another side; distinctions and iterants are the mathematical side. Don't model the intellector (it has already been done). But *discover the intellector!*"²⁷ On August 6, 2019, Louis H Kauffman replied: "Indeed. Let us find it in the material world. Let us find out what it means to find it in the material world. As Joel said, it is an autonomous intellector, going on independently of us and yet interacting with us. And let us be generous with each other in regard to what each can do. *It is natural for the mathematician* to look for simple computational patterns and algebraic patterns. *That is the job of the mathematician*, to make it look so obvious that anyone else will say, sure."²⁸ But my beloved collaborators whom I encouraged to go deeper into DIP continued with RD and did not integrate my suggestions. We had a disagreement and argued like children in an extended family. I was told to be a little more pliable, which didn't sit well with me. So, I was temporarily assigned the role of house sociologist in the RD thing by Lou Kauffman. On April 21, 2019, I had mailed to Bob Krone: "I do not feel addressed by this endless discourse between Joel and Lou. Also, I did not get enough signs of interest or friendliness after you announced my contributions. They really do not seem to need my voice. Thank you for your valuable impulses!"²⁹ Bob replied: "We can use the live Skype contacts for real-time dialogue, Bernd. We will have your files for later documentation in the *Journal of Space Philosophy*."³⁰ He explained what he saw:

*One of the fundamental viewpoint differences between Joel and Lou is the source of RD. Joel believes it is a natural universal autonomous entity ... like gravity.... Lou seems to believe It depends on the observer. That difference does not put restraints on further research into applications and implications that you and I find interesting. I believe we all agree that RD exists, and science and society needs to understand it, maybe to learn how to apply it for good and prevent it being applied for evil.... You and I just need to appreciate that Joel and Lou have respective orientations on the origin and theory of RD. There is room for many avenues of research in the RD vineyards.*³¹

²⁶ Isaacson, "Autonomic String-Manipulation System," 6.

²⁷ Email from Bernd Schmeikal to Joel Isaacson, August 6, 2019

²⁸ Email from Louis Kauffman to Bernd Schmeikal, Joel Isaacson, and Bob Krone, August 6, 2019.

²⁹ Email from Bernd Schmeikal to Bob Krone, April 21, 2019.

³⁰ Email from Bob Krone to Bernd Schmeikal, April 22, 2019, 16:13 CET.

³¹ Email from Bob Krone to Bernd Schmeikal, April 22, 2019, 14:13 CET.

Real Recursive Distinctioning—Turnover to RD

Bob Krone had found that *one of the fundamental viewpoint differences between Joel and Lou is the source of RD*. I found a second one, correlated with the first that is perhaps less visible and actively mystifying, located in the subconscious of our collectivity. There is a difference between people's imaginations and what is real. The longer we insist on what we imagine, the more we lose perception of the real. Reading those most important three writings by Isaacson, I did not gain a feeling that they were speaking about what is now called RD. But exactly that feeling of resonance had been so central in Joel work, especially in "Dialectical Machine Vision." Consider "Autonomic String-Manipulation System," in which Isaacson explains: "The sensation-level is a new level that, as far as I know, has never been considered by people in machine vision. Interestingly, theories of sensation, as distinct from perception, abound in the history of philosophy and psychology. In fact, there exists a philosophical doctrine under the name of 'sensationalism' that is relevant to this discussion. The following sketch is intended to impart to the reader a sense of the history of ideas on sensation. 'Sensation' is from the Latin *sentire*, i.e., to perceive or feel,"³² which puts it somewhere between feeling and perception. Usage varies, but sensation is usually tied more closely to external stimulus than is the term perception. Democritus (460-370 BC) interpreted sensation as the receipt of images of objects. In his view, perception or sensation is a physical process that occurs through the impact of images on our sense organs, the images being something like the *detached outlines* of the objects we perceive. For Kant, perception is awareness that driven by sensation, acting within the faculty of sensibility, as distinct from the faculty of thought. The Austrian physicist Ernst Mach (1836-1916) was perhaps the strongest proponent of scientific sensationalism. For Mach, all knowledge has its origin in sensation, and the unity of all the branches of science consists in the fact that each is a study of sensations of some sort, and of the patterns to be found in their interrelations. In psychology, an early sensationalist was James Ward (1843-1925). Ward introduced the concept of a psychoplasm, which is a representational medium in the brain. He distinguished three phases in the process from sensation to idea: a sensory stage involving the differentiation, retention, and assimilation of presentation; an integrative stage in which sensations become percepts; and the emergence of a derivative continuum of images complete with memory threads and ideational tissue. He also stressed the *affective* function of mentality moving toward the affective side. Hartshorne held that sensations are feelings of feelings.

How deeply Joel goes into the question of perception, feeling, sensation, emotion, and thought arising on this basis! This is not esoteric but is most relevant. It is a *best of* structuralism. Joel answers the question: how can life, feeling, and sensation lead to emotion and cognition? Is there *feeling feeling*? How can the living energy of physical motion arise from the resonance, from a mirroring of structures! This cannot be pinned

³² Isaacson, "Autonomic String-Manipulation System," 51.

down by a Wolfram rule, and not by RD as is presently carried out by *mathematikers*. Is there any count of RD or something similar in any of Isaacson's original writings? I never had the feeling that he mentioned RD anywhere!

Zero RD in Isaacson's Basic Creations

We used Textalyzer from Seoscout to find and count keyword frequencies in Isaacson's original files "Autonomic String-Manipulation System" (briefly denoted as "Patent"), "Steganographic Representation of the Baryon Octet in Cellular Automata" ("Stegano"), "Dialectical Machine Vision" ("DM Vision"), and a few associated indicators. Thus, we obtained at first a somewhat useless table of keyword indicators such as reading ease and grade level (Table 1):

Table 1: Keyword Indicators in Isaacson's Writing

	Word Count	Reading Ease	Grade Level	Sentiment
Patent	7,637	54.2%	8.7	neutral
Stegano	2,468	45.4%	8.2	neutral
DM Vision	17,284	57.4%	7.8	neutral

This we need not interpret at present. But luckily, we also obtained a keyword frequency table which seemed to be quite reasonable after we had studied the papers in depth (Table 2).

Table 2: Keyword Frequencies in Isaacson’s Writing

Rank	Patent		Stegano		DM Vision	
	Keyword	Uses	Keyword	Uses	Keyword	Uses
1	Length	112	=	417	DIP	76
2	Processing	86	= =	360	Neural	52
3	1	82	= = =	319	Level	50
4	Operations	69	Steganogramic.../Jdi	16	Face	49
5	Type	60	[=]	12	String	48
6	Referred	57	Baryon	12	Vision	46
7	Rules	54	Structures	12	Rules	41
8	Strings	50	Cellular	11	BIP	40
9	Operation	48	Isaacson	10	Perception	40
10	BIP	47	Tetracoding	10	Length	40
11	Rewriting	47	Baryon octet	9	Visual	38
12	Process	46] [9	Input	35
13	Tetracode	45	Octet	9	Type	33
14	Rewriting rules	42	Elementary	9	Dialectical	32
15	Finite	41	Joel Isaacson	8	Recognition	32
16	Length	41	Representation	8	Representation	31
17	Systems	37	Joel	8	Processing	31
18	Input	36	Rule	8	Rewriting	31
19	Processes	35	Pattern	8	Image	30
20	Cycle	35			Sensation	28

Words such as recursive, distinction, or RD as a word combination, did not appear in the three main works. They were not keywords. Those words had not been at the center of Isaacson’s thought. What had happened? What was in his center and how was that center transformed by Kauffman? It took me a long time before I even began to understand what Joel had in mind.

I was not yet satisfied with the content-analytical automatic table; hence, I defined my own particular keywords and counted manually: distinction, distinction/indistinction, recursive, recursive distinction, tetracoding, dialectic(al), DIP, BIP, intellector, image, logic. This resulted in Table 3. The frequencies of Recursive Distinction are zero in all three studies. But what is interesting is that the dual pair “distinction/indistinction” seems to have some importance in the earliest of papers, the Patent. This gives rise to my permanent proposal to consider some involutive operation to RD, namely antecursive conflation.

Table 3: Alternate Keyword Frequencies in Isaacson’s Writing

Keyword	Patent	Stegano	DM Vision
Distinction	3	2	1
Distinction/Indistinction	7	1	0
Recursive	4	3	1
Recursive Distinction	0	0	0
Tetracoding	10	10	7
Dialectic(al)	29	5	53
DIP	0	0	93
BIP	64	0	47
Intellector	17	0	5
Image	2	6	40
logic	14	0	4

In one of his first detailed correspondences from October 2015,³³ it became clear to me how important the topic of dialectical machine vision was to him. This analysis contains what is today often called a retinoid system of human consciousness. “We start out,” as Joel wrote, “with first principles, relating to local decision making, that sensory organs, such as retina, are known to perform.” He mentions his Figure 16b,³⁴ which by then I had long been investigating. “It shows 256 icons (called ideographs), arranged in 16 x 16 matrix.” However, he did not realize that those sixteen represent a planar representation of a logic alphabet³⁵ for binary connectives, and/or a commutative module of geometric algebra. But they arose from the topological neighborhood filters. The 256 ideographs are both logic letters—the “alphabet of the visual cortex”—and objects in plane geometry. The sixteen are 2D symbols, and even though they seem to be in a plane, the 256 are indeed objects of 4D. They have a close relation to Minkowski algebra.

Kauffman Constructed RD, Joel Isaacson Created Nature

Occasionally Joel put us in the box of the mathematician:

We assume no prior mathematics and also

1. Assume that natural processes are largely non-mathematical.

You, on the other hand,

2. build heavily on mathematics tradition and in particular attempt to align results with Clifford and Minkowski.

³³ Email from Joel Isaacson to Bernd Schmeikal, October 28, 2015.

³⁴ Isaacson, “Autonomic String-Manipulation System,” 41.

³⁵ Bernd Schmeikal, LICO x.

I asked, who is we? It turned out that Joel would continuously clash with Kauffman where nature, and Statement 1, was concerned. But in my mind, he did not clash with me at all on the second, as I was absolutely sure my considerations about LICO and Clifford algebra are no less based on first principles: not just on the difference between inner and outer products, but also on phenomena. At first he insisted, "we need to face this dilemma right on before we are able to make any kind of progress in our mutual deliberations." That seemed quite obstinate, and he wrote in brackets "(please don't get upset with this reasoning. It is only a conjecture.)" But I got upset. Sometime in summer next year I wrote to Bob Krone "this feeling that Joel acts rather irrationally and self-centered has not vanished," and a few days later Kauffman took a stand: "I thought about it and decided that it was worthless to burden you with stories about my subjectivity. As for Joel: He is very stubborn to say the least."³⁶ What was going on?

The concept of RD had been discovered and constructed by Kauffman. He wanted to support Isaacson by lifting his ideas to some new and methodologically better level. Joel remained basically faithful to his idea of DIP, but at the same time made continuous efforts to adapt and adjust to the concepts of RD in the desired way. He was overwhelmed by the mathematical ideas of Kauffman who insisted we are the *mathematiker*. Joel developed his own image of RD, and he argued with Lou about it.

Dear Joel, the key point you make is in the phrase 'layers of recursive distinctioning.' What do you mean by this? Can you model it? I write questions here because I have partial answers, but they may be different than yours. Best, Lou.

Joel Isaacson replied:

Research on the structure of cognition and its broad relationship to layers of recursive distinctioning would be a most worthy undertaking. Many years ago, I assumed as obvious these sorts of connections but, in my isolation, only nibbled on some aspects. A focused effort with the participation of appropriate talent may do wonders. Best—Joel.³⁷

Dear Lou, Put a light detector on your window sill. For a certain period, it will detect light and then it will not. Attach a convertor such that when light is detected an electrical current is generated that drives an electronic display with the letters DAY. The default display is NIGHT. What is conscious about this apparatus?

³⁶ Email from Louis Kauffman to Bernd Schmeikal, July 20, 2016.

³⁷ Email forwarded by Joel Isaacson to Bernd Schmeikal on April 14, 2019.

Dear Joel, I think that we do say things like this. For example, I may say, looking out my window, the sun is shining. It is daytime. But where is the difference? The difference is for me in knowing that it is now day. *The difference is not somehow in nature....* What is there that is entirely independent of all possible distinctions that we can ever make? There would be no things there, for things are just our names for distinctions available to us. It would be nothing. A very rich nothing about which we obtain some clues by the always mistaken distinctions that we make. Distinctions are our mistakes. Feynman said that to get somewhere in physics you have to make all possible mistakes. Best, Lou.³⁸

Dear Lou, *can we say that there are differences in nature that can be detected by observation? Is observation necessarily conscious?* Namely, there exist "mindless" natural acts that function as difference detectors. Best—Joel.³⁹

On April 15, Bob Krone attached his files and mine as advance information for our conference of April 27 and 28, 2019. On April 18, he announced that he would present some of the attached files on the 28th, if we had time: "if we don't it is information for you all on our plans for future RD graduate education with the Kepler Space Institute Catalog."⁴⁰

Bob Krone, PhD, president and faculty member, Kepler Space Institute (KSI), then editor-in-chief, *Journal of Space Philosophy*, Colonel, USAF (Ret), fellow member, American Society for Quality (ASQ), emeritus professor, University of Southern California (USC), Doctor of Laws, Honoris Causa, had always done his best to mediate between the two worlds—Lou's and Joel's—and now Kauffman radioed him: "Dear Bob you have a slide about a possible course in RD. The phrase 'RD is a term for Nature's processes of information flow etc....' is misleading and I would not say it that way. *In fact, I do not use the word 'Nature.'*"⁴¹ This simply seemed wrong to me. But Kauffman continued:

If you want to use the slide, please remove the sentence "Recursive Distinctioning is a natural principle for Nature's processes of information flow." And replace it by "Recursive Distinctioning may be a natural principle for processes of information flow." Remove the next sentence. Also, you should note that I have not made any commitment to teach such a course. If I did it would have to be in real-time in a classroom, or we would have to create a series of YouTube type videos that would be made available to

³⁸ Email forwarded by Louis Kauffman to Bernd Schmeikal on April 21, 2019.

³⁹ Email forwarded by Joel Isaacson to Bernd Schmeikal on April 21, 2019.

⁴⁰ Email from Bob Krone to six participants on April 15, 2019; email from Bob Krone to seven participants on April 18, 2019.

⁴¹ Email from Louis Kauffman to Bob Krone and six others on April 21, 2019.

people. Note that such a course would be a reshaping of many aspects of chaos, systems, physics, cybernetics, and mathematics with an emphasis on the foundational role of distinctions at all levels. The basic principle is THERE ARE NO DISTINCTIONS IN NATURE EXCEPT AS THEY ARE CREATED OR DISCOVERED BY OBSERVERS, AND THIS STATEMENT ITSELF IS REFERENT TO THE FACT THAT AN OBSERVER IS HIM/HER SELF A DISTINCTION. NATURE WITHOUT DISTINCTIONS IS A NO(THING) AND IN THIS SENSE THE WORLDS THAT WE KNOW ARE CREATED FROM NO(THING). DISTINCTIONS ARE FICTIONS OF GREAT VALUE. This leaves open just what does happen in "information flow" or whether there is such a "thing" as the flow of information. The reason for giving a course on this topic is to induce the participants to question everything (every thing), including any apparent propositions upon which the course appears to be based. Best, Lou.⁴²

Lou wanted to insist on his concept of RD. Bob Krone the old starfighter was the only one who was able to handle and mediate the situation.

He Wanted Joel's Work to Bear Fruit.

I have experienced such a real-time course in a classroom, indeed in a video conference directed by Kauffman. In my perception, he significantly overdirected the course. Joel and I did not share his view. Kauffman likes to praise the deep insights of his collaborators (Joel's and mine). But he does not say what these consist of. It seems that it is enough for him to know for himself what these deep insights may be like. But no one else knows them. Through Lou's praise, I became the house sociologist of KSI:

Dear Joel, I did read Bernd's essay. It is a brilliant piece. I would not change it. It raises issues about the meaning and ethics of distinction or acts of distinction at all levels. Bernd says it again, that RD has to potential to be a powerful epistemological tool. By defining RD in terms of distinctions and acts of distinction, we create a formal structure that is every bit as clear as the construction of positive integers but is non-numerical and based in distinction. The more one thinks on this, the more it changes the foundation of knowledge for mathematical, physical and mental process. And then how are we to think about the world of mirrors in which we apparently live? Best, Lou.⁴³

⁴² Email from Louis Kauffman to Bob Krone and six others on April 21, 2019.

⁴³ Email from Louis Kauffman to Bernd Schmeikal on November 9, 2018.

Lou and Joel, please send Bernd's article to me and Gordon Arthur.... We will put it in the Fall JSP issue. Bob Krone.⁴⁴

Actually, I am not at all sure if the Faculty of Social Sciences in Tel Aviv would be allowed to acknowledge the brilliance of my contribution. But I hope it. Anyway, KSI is not Tel Aviv University.

Real and its Signifier

As a modern philosopher, you can pin down a beautiful picture like Magritte's and claim to understand its message



This is not a Pipe

This is a Pipe

The image, the signifier of the material pipe, is not the material pipe. Very true! But before we were allowed to argue that sophisticatedly, some of us designed, drew, photographed, made an ideogram in the sand, ... hu uu, a pipe ... , and made sure to ask the viewers, what is it? And all the children cried out loud: a pipe! Therefore, it is historically correct first to say, "This is a pipe" and then to point to the picture and say it is not a pipe. With Joel Isaacson's voice we would say: in a primordial state of mind, we confuse the pipe with its signifier. You recall Kauffman saying, "*Then there are the Majorana Fermions c that satisfy $c^* = c$* "? He (con)fuses fermions with their signifiers. In our primordial darkness, we connect what is real in our awareness with what is an image in that same awareness. It is here that I modified Joel's image of perception, perhaps somewhat in the sense of Alfred N. Whitehead. Namely, we perceive a material pipe in sense perception by awareness. With the intelligent energy of awareness, we establish a life contact with pipe being material, having energy, knowing force.... But we can also become aware of our image of the pipe. We can become aware of the signifier. As soon as we contact thought by awareness, signifiers become as real as material events. When a human is aware of the real, aware of the real image and thought—all in living presence—this is a peculiar state of mind.

Like Joel I am convinced that *there are differences in nature that can be detected by observation. There is primordial observation that is not necessarily conscious. I do use the word nature.*

⁴⁴ Email from Bob Krone to Louis Kauffman and Joel Isaacson, forwarded by Joel to Bernd Schmeikal on September 11, 2018.

Dear Lou, Bernd is about to submit this version to JSP. He mentions you at numerous junctures. Hope the approaching fall is kind to you in Siberia. Best—Joel.⁴⁵

Dear Joel, I am sure it is alright. I was planning on writing a short paper for this issue, but there is not enough time. I will write one for the next issue. I will look at Bernd's paper and give you some comments later today. All going well here. Very best, Lou.⁴⁶

Crashing RD

As I could see, Bob Krone was aware of the difference between Isaacson's cellular automata, his DIP, and Kauffman's RD. In Fall 2012, he had written:

Joel Isaacson has pioneered in RD Cellular automata since the 1960s. Recursive distinctioning was rooted in studies relating to the analysis of digitized biomedical imagery. Dr. Isaacson utilized NASA's computing facilities at the Goddard Space Flight Center in Greenbelt, MD for the initial stages of his research. His research has been supported over the years by DARPA, SDIO, NASA, ONR, USDA, and a good number of NIH institutes. Isaacson is Professor Emeritus of Computer Science, Southern Illinois University and Principal Investigator of IMI corporation.⁴⁷

Kauffman did not take this as a change of course notice; instead, he persisted.

Dear Bob, of course we agree that the subject merits research. Just note that we have very fundamental models for RD thanks to Joel. *We do not have constructions of cognition from these models*, but the models suggest lines of thought that are, we believe, new. Also, the notion of "recursive making distinctions" can be understood in the broadest sense. Thus, for example, I am making distinctions recursively at a number of parallel levels in writing this email to you. If we look at the broad level, we see that all communication is a weaving of recursive distinctioning. Best, Lou.⁴⁸

But in my view, and perhaps sooner or later as a matter of fact, we do have such models, but from Isaacson's comprehensive work and some of Schmeikal's articles about

⁴⁵ Email from Lou Kauffman to Joel Isaacson forwarded by Joel Isaacson to Bernd Schmeikal, September 11, 2018.

⁴⁶ Email from Lou Kauffman to Joel Isaacson forwarded by Joel Isaacson to Bernd Schmeikal, September 11, 2018.

⁴⁷ Bob Krone, About the Author: Joel Isaacson; Editor's Note, *Journal of Space Philosophy* 1, no. 1 (Fall 2012): 16.

⁴⁸ Email from Louis Kauffman to Bob Krone, April 14, 2019.

laws of thought in connection with geometry rather than from Kauffman's RD. The observer issue has not left us any peace. Lately I wrote Bob:

Dear Bob, it (Joel's Ansatz) does not depend on observer qualities, for inner is like outer. The autonomous Dialectic Processor is just processing kernelless, without ego. But it is not (yet) alive, because a life system needs the bioenergy of aware living biopolymers. Such a system has no rest, no rest-frame. That has nothing to do with gravity. Yet, Joel is right, it is a universal autonomous entity; but Joel found only its structural realization. He did not conceive its biological energetic realization; Once this dialectic processor is alive, people will still be unable to explain why it is living. We can ponder tomorrow, perhaps I will just give a talk without using material. Cordially, Bernd.⁴⁹

As time went by, Lou's engaging, all-swallowing RD-approach had become more and more incomprehensible to me. We clashed in a break-dance of conflict over the Patent.

Bob had praised my "interdisciplinary skills and creativity bringing needed new insights and thinking into Joel and Lou's work."⁵⁰ The year before, he had wanted us to write a common letter to the editors. But Kauffman followed the break saying "In any case it is too complex to write a joint letter. I will write one with Joel soon. The letter with Bernd will take longer." In my perception, it was always about tying the discussion to RD as completely as possible. However, RD has an invisible mirror-half, which I have designated antecursive conflation. It is exactly the same as with Magritte's pipe. When we are dying we go back, and all the differences cognition has created are allowed to fold back and vanish in the dark and in the light. This journey begins with the antecursive conflation. The whole so-called mystery is in the living reality of intelligent awareness in primordial intelligence that is neither conscious nor unconscious.

Legacies of Joel in a Future World

Kauffman had temporarily downsized and reinterpreted Joel's invention, believing that this was the best a *mathematiker* could do. It was clear to me that with a semi-living RD, we would bury Joel's Dialectic Image Processor a second time. By the end of 2017, Joel had realized that I was calling for a return to the roots of creation, restoration of the DIP, and simulation of the electronic circuits of the intellector. We wrote love letters. Joel was excited "It is very touching to read your words. I turned 80 on October 25."⁵¹ And a little while later: "At issue is the relationship between tetracodes and streaks and between RD processing of tetracodes and intellector processing of streaks. Streaks are markers of

⁴⁹ Email from Bernd Schmeikal to Bob Krone, April 22, 2019.

⁵⁰ Email from Louis Kauffman to Bob Krone, forwarded to Bernd Schmeikal and Joel Isaacson, April 8, 2019.

⁵¹ Email from Joel Isaacson to Bernd Schmeikal, November 16, 2017.

distinctions within strings, where strings may be 'real' and ordinary or even 'non-existing.' Non-existing strings are comprised of fantomarks. The distinctions in a fantomark string can be coded as a binary streak and said streak can be processed recursively under TRI by an Intellector circuit."⁵² Joel had asked me if I would like it if we went through the input string 'S E E S C H M E I K A L'. It was a first signal that he was ready to refresh the circuits of the fantomark string creator.

Over the many years I have programmed BIP (namely recursive tetracoding) in many languages, including FORTRAN, BASIC, PASCAL, C++, etc. It is usually easy, except for printing the output of strings written in the 4 icons. The reason is that the shapes of icons do not usually have standard fonts. That's why I substituted these fonts to show the 4 icons as: O, [,], = . Unfortunately, those codes are now archived, and it is hard for me to retrieve them. However, in recent years Louis Kauffman have programmed BIP with MATHEMATICA (Wolfram) and also with a language called PROCESSING. PROCESSING can be downloaded for free from a website called processing.org. Let me know and I'll ask Lou to send you his programs. There is also a program that is written as a Turing machine and simulates BIPs (BIP in streak mode) that follows the circuit diagram that is given in the patent. It was written in 2008 by Ziv Yekutieli, then a doctoral student of the late Eshel Ben-Jacob. I helped him a bit and may be able to find a copy in my files. Let me know if you need it.⁵³

In 1981, Joel had disclosed in his public patent specification that Rule 129, named *triunation* therein, was functionally equivalent, after some encoding, to a 4-state nearest-neighbor rule ($k = 4$, radius = 1) named *tetracoding*. Joel Isaacson was ready to explain to me why much of his work had lain dormant for such a long time:

Perhaps I should explain why I patented it in the first place. It is a long story. Max Isaacson was born 1897 in Auburn, Maine to a Jewish immigrant family from a small town near Minsk in Belarus. His father was a brother of my grandfather and he died when Max was a small child. The family was poor and struggling. Max managed to go to study patent law at George Washington University and then became an employee of the US Patent Office in Washington, DC. He later was hired as a patent examiner by the US Air Force at Wright-Patterson Air Force base in Dayton, Ohio. They handle

⁵² Email from Joel Isaacson to Bernd Schmeikal, December 2, 2017.

⁵³ Email from Joel Isaacson to Bernd Schmeikal, December 20, 2017.

advanced inventions, and he became knowledgeable of many new technologies. Max Isaacson was very smart, inventive, and driven.⁵⁴

Joel met Max in the early 1970s. Max urged Joel to describe his work to him and finally advised him to patent it rather than to publish it in the open literature. He argued that no reviewers would understand it and Joel would disclose it to unknown people without a chance of publication. On the other hand, patenting would record his priority.

After having read the public patent specification from August 1981, I could only confirm that Max was right. Joel's tiny 1-dimensional CA knew 3.4×10^{38} rules, involved streaking, coloring, animation, deanimation, and ideographing. It had surface structure and deep structure. It created memory and generative structures indefinitely in a self-created mode of machine intelligence. So, it seems natural to ask about the relationship between the dialectical intellect and process of nature. It seems that the principles of cognitive poverty in recursive tetracoding, and the simplemindedness, the machine innocence that characterizes the dialectical intellect, are far superior in action to today's kernels of operation systems.

Inconceivable Richness of Openness

The original invention is concerned with *string manipulation*. More specifically, a string, consisting of individual elements, is a linear arrangement of elements. One of the most astonishing and for us mathematicians downright frightening properties of Joel's strings are the complete lack of restrictions, of unambiguous properties, the fuzziness of the elements. It goes so far that intangible, imperceptible elements are introduced. But it ought to be exactly this *nowhereland* of *stringland*, a *domain* of the not prehensible, where the mind can refer to in its return to nature.

No restriction is placed on the nature, character, or substance of elements in the open portion of a string. If an element is represented symbolically by a sign or a mark, the mark is considered an element in its own right and any meanings or other significative aspects of the mark, including its semiotic relationship to the original element, need not be considered any further. The terms "symbol" or "mark" are used generically to denote standard semiotic terms, such as sign, icon, index, token, character, ideograph, and the like. An element that can be *prehended* or sensed or recorded by human beings, and/or other living things or systems, and/or instruments, devices, or systems made by human beings, is referred to as objective element or

⁵⁴ Email from Joel Isaacson to Bernd Schmeikal, September 7, 2019:

“datum-object.” An element that cannot be prehended, sensed, or recorded by any of said means is referred to as a “fantomark.”⁵⁵

Elements could be anything and if they cannot be prehended in any way they are fantomarks. Lou and I sweated blood. Lou, who disclaimed the word nature, formulated—in accordance with his own openness to fundamental contradiction, and with poignant wisdom:

There are no distinctions in nature except as they are created or discovered by observers, and this statement itself is referent to the fact that an observer is him/herself a distinction. Nature without distinctions is a no(thing) and in this sense the worlds that we know are created from no(thing). Distinctions are fictions of great value.

In his now unattainable insistence,⁵⁶ I would like to lend Joel my voice, with which he probably wants to articulate: nature’s distinctions can be fantomarks in a Dialectic Image Processor. The DIP picks up speed as soon as we allow letters from the logical alphabet. Then we work with LICO-strings and the topological neighborhood. A LICO-lettershape signifies a logic relation, a binary connective in thought, and at the same time a geometric 2D-object. In those days when Joel let the intellector operate in stringland, he had not yet discovered his 16- and 256-letter alphabets, and when he first came upon them in the DIP, he denoted them as ideographs. They came from neighborhood relations given by Moore- and Neumann-filters. No one then saw that those ideographs were both letters of a logic alphabet and plane figures. Normally the geometric shapes of letters like A, B, C, D (tetracoding) or “O,” “],” “[,” and “=“; or equivalent symbols “s,” “u,” “d,” and “=“ (in Stegano) or any other have no definite logic meaning. But in LICO they have. If you compare any character in a LICO-string with left and right nearest neighbors, you obtain 256 possible results at each comparison. Since a left hand LICO letter is 2D and has four bars, one can compare any such bar with any other of the four bars on the right and get $4 \times 4 = 16$ comparisons. Those may result in equality = or imparity \neq . Hence we have $16^2 = 256$ relational results. (Not really) surprisingly, this is the same number that appears in *DM Vision* on page 41 (Figure 16) in connection with the firing of a group of various subtypes of P-neurons.

I have made a few reps in miracle drums, roll cinemas and wheels of life—you know these things?—to see how relational statements are moving in physical space. One can observe rotations of logic relations. Thoughts appear to our minds through the touch of relations. Touch is both life and topological. At the interface between language and

⁵⁵ Isaacson, “Autonomic String-Manipulation System,” 10, Columns 3 and 4. The reader is invited to interpret the word “prehended”!

⁵⁶ I am regarding Joel now not only as existing, but also as insisting.

geometry, there reside the orientation-morphemes. Lou asserted: “*We do not have constructions of cognition from these models*, but the models suggest lines of thought that are, we believe, new.” With DIP, among other things, Isaacson laid the groundwork for a dialectical thought processor. We have not yet come very far. But we know some really basic things that can surprise the scientific community. It is all a Fermionic affair, and when Joel shook the “*Steganographic Representation of the Baryon Octet in Cellular Automata*” out of his sleeve, he was enthusiastic and at the height of his creativity. He turned the fantomark of intuition into a data object.

Please recall Kauffman’s elementary objects I, J for quarks as represented by infinite iterants or respectively rectangular waves—it is better to roll them on a cylinder. As soon as you replace them by the appropriate logic relations, you get \equiv and \neq . Biconditional connection (supertouch) can be turned into exclusive disjunction. The entangled depart! The topic is shifted from object-elements to relational elements. Making a LICO miracle drum, you can literally see the phenomenological difference between a numeric string or binary streak and a relational word-string. The minimal Fermion I, J -model will always give you a spin- or isospin phenomenon, that is, a flip and a flop. But the unfolded Fermion logic relational word string brings forth a rotation in relational space. As such rotation is both in thought/language and in geometric space, it is actually a material rotation and has to do with force and e-motion. I have written a bit about these things, but after my split with Kauffman, I did not publish anything further. Fortunately, however, Bob Krone could save a few of those hints for the KSI archive. Let me put it briefly: Some 1D-iteration tetracoding is phenomenologically different than and below a 2D-LICO-string iteration.

For more than a century, physicists defined boundaries and investigated how various waves and their equations unfolded under given boundary conditions. The dynamics was in the inner, in the waves. With Joel’s DIP, the situation turned opposite. Joel considers an object as having a given form. Then by dialectic processing he takes the content out of the form. Further processing leaves the track of a memory. The form reoccurs. Dynamics is given by the emergence of a synthesis, recreating the initial surface structure. Initial sensations of shapes—silhouettes—their areas and boundaries are dynamic forms. Inside there is temporary emptiness. What evolves from the void has a peculiar meaning in sensation: the sound of emptiness, the melody of what is real.

The value of Joel’s creation is beyond words. It is material. Joel’s processor is the only free processor that is based on a principle of all living matter: life is touch. We should assume that machinery based on BIP and DIP can modify and renew the genetic code with its biopolymer realization. It will help to unfold new forms of life. It has the power to create artificial life forms that will not be readily distinguishable from conscious animal and human life. The greatest secrets are probably hidden in Joel’s loving, human attitude to feelings, dreams, in the fantomarks of our destroyed world. The energy that can be delivered by Isaacson’s dialectical machine vision is so big that it will most probably initiate a breaking away from each other of at least four parts of humanity as I have

described in *Timeout of Time—Postscript to Nuclear Time Travel*.⁵⁷ But by such a breakaway, not only into space, but also down here on Earth, Joel's vision will help to transform the chaos into some new order. Sometimes life needs to make distinctions.

Back to the Unborn

As we had made no further arrangements, I assumed that I was no longer needed. We were through, so to speak. Joel replied: "Dear Bernd, I wish you peace and happiness in whatever you do next. If you ever change your mind about participating in RD discussions you would be welcome back. Best—Joel."⁵⁸ ... Then ... "Dear Bernd, Lou wrote today to Bob (with a copy to me) that: I concur with Bernd that we should study his paper 'Four Forms Make a Universe'. He also said some other good things about you. I thought you'd like to hear this. Best—Joel."⁵⁹ "Sorry, I missed to reply to this message; probably as I felt that if he, that is, Lou, liked to say some good things, about somebody, he could have done that. Bernd."⁶⁰ "Dear Bernd, I see your point. Normally one would tell good things to another directly, but Lou appears to avoid contact with you because of past unpleasant exchanges. I wish it were different. I can assure you, though, that he appreciates your work and keen intelligence. Best—Joel."⁶¹ Joel also sent me a link to André Rieu singing Hallelujah by Leonard Cohen.⁶² "Dear Joel, my daughter sent me this beautiful song by Leonard Cohen [Hallelujah]. I guess I've heard it in his last performance. Love, Bernd"⁶³

Joel: "Yes, there is a crack in everything.... I have heard this song before, and it is indeed beautiful! It is gloomy here in the US. The pandemic is out of control and is increasing in many regions. We are largely confined to our home. It is a large house, but we cannot accept visitors. Our daughter, her husband and grandchildren live close by, but they cannot enter the house. At times they play in the yard, and we can watch them through the window. The US general elections are scheduled for early November and the political situation is chaotic. I am working on RD in some cooperation with Louis Kauffman. Love—Joel."⁶⁴

There comes a time when all our difference systems, all the wonderful fantomarks we helped into being fold back like flowers withering. This wisdom was always available to Joel even in conscious life and in the midst of the greatest light. I have never met a man

⁵⁷ Forthcoming, Nova.

⁵⁸ Email from Joel Isaacson to Bernd Schmeikal, June 11, 2020.

⁵⁹ Email from Joel Isaacson to Bernd Schmeikal, June 14, 2020.

⁶⁰ Email from Joel Isaacson to Bernd Schmeikal, June 26, 2020.

⁶¹ Email from Bernd Schmeikal to Joel Isaacson, June 26, 2020.

⁶² www.youtube.com/watch?v=NZb-SVm7eLE; Email from Joel Isaacson to Bernd Schmeikal, July 2, 2020.

⁶³ www.youtube.com/watch?v=6wRYjtvIYK0 Email from Bernd Schmeikal to Joel Isaacson, July 31, 2021.

⁶⁴ Email from Joel Isaacson to Bernd Schmeikal, July 31, 2021.

whose real living was so consistent with his theory. He was one of the last brilliant people, incomprehensible and convincing in his humanity, a role model for some of us. I hope that my writing will lead others to study his writings. In his last letter to me he forwarded me the following:

A time capsule from my mother.

Dear Bob,

This may belong in your collection of my biographical tidbits. A man named Uri Kerstien, fifty-six, from a suburb of Tel-Aviv contacted my sister, Shifra Katz, eighty-seven, in another suburb, about two weeks ago. Uri is in Hi Tech. He has been searching for descendants of my late mother, Esther Baram-Isaacson, for thirty-three years! The story is convoluted and highly unusual, so I'll skip the detail here.

In the late 1980s, when he was twenty-two, he lived in a small apartment in a building across from the building I grew up in and my parents occupied as renting tenants for forty-nine years. My mother died on the last day of 1986, and her apartment was occupied by new tenants sometime in early 1987. It is a very small unit, about 800 sq. ft. No place to hide things ... except for a small, elongated nook in the wall where we used to keep Passover utensils. They found a good-sized suitcase full of writings, personal documents, photographs, letters, and such. In particular, there is a large collection of my letters home from the US since I left Israel in 1961. There was no email in those days, and telephone calls overseas were prohibitive. Thus, I would write home regularly, about twice a month. It includes a letter I wrote circa 1973, when I realized that I had discovered RD and that it has to do with cognition. I never knew about this time capsule, and I was tending to my mother at a hospice for the last ten days of her life. She was coherent to the end, but never mentioned this time capsule.

The then twenty-two-year-old Uri found the suitcase on the sidewalk, along other refuse from my mother's apartment, awaiting collection by the municipal garbage truck. He picked up the suitcase and took it home with him. For a few weeks, he read the materials, and for no obvious reason decided to become their custodians until he discovered the true heirs.

My mother lost her own mother, Chaya Baram, during the Spanish flu in 1918. This was in the Jewish Pale of Settlement that straddled Poland, Russia, and the Ukraine. Mostly rural. Her mother was twenty-nine and my mother was only nine. This has imprinted her entire life. She raised her young only brother, then aged seven, who eventually went to Palestine and later became multiple-term Knesset member, a whip of the then ruling Labor coalition, and also held cabinet-level positions under PM Rabin.

My mother left home at age fourteen, was a servant for richer Jewish families in bigger towns, and over a lifetime picked up about ten languages that included Hebrew, Yiddish, Polish, Russian, Ukrainian, German, English, French, Latin, and Classical Greek. She was a published poet, edited by my father, and she enrolled in Hebrew high school. She became a star student and spoke perfect literary Hebrew.

At age nineteen, she went by herself to Palestine without any resources, enrolled at the Hebrew University of Jerusalem, and became a star student there as well. She mingled with the leading elite of the time that included later very well-known professors and thinkers, scientists, poets, and politicians, including Israeli presidents, and other legendary figures that Uri knew only from history lessons.

For thirty-three years, having moved numerous times, getting married and now having three adult children, spending a number of years in the US studying in Connecticut and also getting an MBA from Harvard, he held onto this suitcase. By a sheer fluke, he finally discovered my niece, Hila Berger, who led him to my sister to whom he delivered the time capsule a few days ago.

Today I talked to him by Skype, and it was like finding a lost younger brother. He knows so much about our family history and believes that these materials deserve broad publicity via a TV series or such. Today happens to be his fifty-sixth birthday, and I hinted that I wish to send him a token of my appreciation. He absolutely refused but expressed two wishes: He wishes that someone could deliver to him a similar capsule from his own now deceased parents, and he wishes to observe my face as I receive some of the materials from my sister. Very best—Joel.”⁶⁵

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⁶⁵ Email to Bob Krone forwarded from Joel Isaacson to Bernd Schmeikal, October 26, 2020.

About the Author: Bernd Schmeikal is a mathematical physicist (High Energy Group/Walter Thirring) and sociologist. He received his doctorate in physics from the University of Vienna and later habilitated there in sociology. Accordingly, he was scientifically active across disciplines at Austrian universities, but also at non-university institutions. Finally, he was the founder of the world's first Biofield laboratory (BILAB). Currently, he is a senior counselor at KSI, His latest book, *Time-Out of Time*, will be published in spring 2022.

Editors' Notes: Before Bob Krone stepped down as Editor-in-Chief of this *Journal of Space Philosophy* (and then passed away soon after), he began organizing a special issue focused on the work of his late friend and colleague, Joel Isaacson, with a particular focus on recursive distinctioning. In this opening article of the issue, Bernd Schmeikal has generously offered not only a tribute to Isaacson's work, but also a touching degree of personal insight into the academic banter that passed between the three long-time colleagues (and others, including Louis Kauffman, who contributed the next article in this issue). ***Gordon Arthur and Mark Wagner.***