Visitors to Nova Scotia and Newfoundland are immediately and inevitably struck by the combination of two cultural facts: the apparent invisibility of contemporary art, whatever this term may mean, and the no-less visible ubiquity of kitsch, mostly in the form of Sunday painters and photographers, landscape paintings and pictures for sale in hotel lobbies and countless little galleries around the tourist venues. This colorful, naïve and relatively affordable mass production may be charming, at least in foreigners’ eyes, and it undoubtedly reinforces the marketable perception of these regions as untouched by certain excesses of urban and modern civilization, but what do these superficial observations on the art production and allegedly authentic taste of the common people actually mean? The challenging study by Erin Morton, professor of history at the University of New Brunswick, not only shows how deceiving these impressions are but also demonstrates that a better understanding of what really happens when folk art comes so much to the fore has much to tell about art, culture and politics in general. Morton’s book is indeed a meticulous examination of the larger framework and network that helps elucidate the many hidden aspects of the emergence of certain forms of popular culture as folk art. The theoretical basis of Morton’s book relies on two pillars. First of all, the author’s approach to art and culture is strongly determined by the idea of presentism, that is, the fact that present-day perspectives inform and thus change the representation and the interpretation of the past; this is a kind of bias that prevents us from seeing the past as something that is radically different from the present. In this case, the contact with folk art in today’s culture becomes part of a larger phenomenon of cultural nostalgia and its projection of modern longing and desires on cultural artifacts and practices that are misread and misunderstood. Second, Morton’s interpretation of folk art is systematically put in relationship with the history of capitalism, in this case the two most recent phases in the transformation of capitalism, which are “late capitalism” (well known in cultural interpretations thanks to Frederic Jameson’s work on postmodernism) and “neoliberalism,” the former characterized by the dismantling of classic hierarchies, the latter by the increasing privatization of the public domain. In light of this double theoretical framework, economical on the one hand, historical on the other hand, Morton advances—and brilliantly illustrates—her main thesis that the emergence of folk art in Nova Scotia, long a very rural province, was not something that happened spontaneously but was the result of a complex set of converging historical, political and institutional changes that reshaped art and culture in the decade 1967–1977. These changes had to do with the growing entanglement of culture and tourism, the sudden public intervention in the field of art, the rapid modernization and technologicalization of all aspects of life in Nova Scotia, the unforeseen but highly
influential appearance of cultural entrepreneurs in the area, and finally the crisis of modern art in the rest of Canada and the Western world, which not only made room for folk art as well as the production of “contemporary” folk art, explicitly made to cater to new audiences belonging to completely different worlds, but made the “folk art turn” almost a necessity, at least from a commercial and economic point of view. The close reading of all these aspects offers a complex yet always very cautious and nuanced approach to the work of mainly woodcarvings and paintings by well-known and obscure self-taught makers. It displays a subtle understanding of how this “art” was suddenly positioned and redefined as “folk art.” On the one hand, Morton also gives an extremely well-thought contextual analysis of the artists and artifacts that she studies: The personal history of the people who suddenly appear in the no-longer-anonymous field of folk art is scrupulously interrogated by re-placing it in the larger context of a wide range of institutions, public as well as private, for profit as well as for nonprofit, local as well as national and international, cultural as well as economic. On the other hand, Morton’s book has a strong sense of the historical transformations of works, practices and discourses on folk art, and her study testifies to great archival research qualities. Most artists, authors, critics, curators, politicians, journalists, buyers, collectors, institutions, museums, schools, etc. mentioned in this book are probably totally unknown outside the little or big world of folk art under scrutiny in this book—and there may be a good chance that this will always remain the case. But the mechanisms that Morton studies have an almost universal value—including the relationship between art and cultural policies, the shifting transformations of the discourse and appreciation of art over time, the semantic and ideological complexity of a notion such as value, the convergent as well as divergent interests of all actors in the field, the importance of power relationships in the cultural field, in short the impossibility to accept that art, be it the special type of art that is folk art, can exist just “for art’s sake”—all these questions are carefully discussed in this passionately committed book that deserves a wide readership.

**A MIND AT PLAY: HOW CLAUDE SHANNON INVENTED THE INFORMATION AGE**


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As a fan of biographies, I was excited to learn about *A Mind at Play: How Claude Shannon Invented the Information Age*. Not only is it a timely biography, this well-researched and easy-to-read book also captures the imagination. Because Jimmy Soni and Rob Goodman take care to situate Shannon’s contributions in their cultural context, the volume encourages the reader to explore their broader implications. Claude Shannon’s legacy is no doubt of particular interest to Leonardo readers due to the range of his work. If Shannon’s training and conception of Information Theory brings the current elevation of STEM disciplines to mind, many of his lesser known projects clearly align with projects associated with the STE(A)M (with the inclusion of Art) community, although the authors never speak of STEAM per se. These include the playful spirit evident in his ongoing tinkering with electronic toys, his multifaceted studies of juggling and his unicycle experiments.

So who was Claude Shannon? Born in 1916 in Michigan, by all accounts Shannon had an ordinary childhood. Noteworthy traits included a love of math and science, a dislike of facts and mechanical inclinations. These proclivities led him to pursue a dual degree in mathematics and engineering at the University of Michigan. After Michigan, Shannon was hired by the well-connected Vannevar Bush, then at MIT and later founder of the National Science Foundation (NSF), to help with his differential analyzer. This was a mechanical analog computer that depended on combinations of equivalent equations, using a wheel-and-disc mechanism for computation. A major problem was that the equations needed to be reconstructed for every problem, in effect annihilating the very efficiency the machine was meant to add to problem-solving. The resounding question was, how could it resemble itself on the fly? Shannon, who was conversant with both symbolic logic and electrical circuitry, produced a landmark master’s thesis with an innovative solution, titled “A Symbolic Analysis of Relay and Switching Circuits.” In it the young Shannon tied Boolean Logic and circuitry together, conceptualizing a path where 1’s and 0’s could represent logical operators of Boole’s (AND, OR, NOT) system, with an on switch standing for “true” and an off switch for “false.”

After a brief stint at the Institute for Advanced Study (Princeton, New Jersey), Shannon joined Bell Labs to work on World War II projects. Here he found an environment that fostered cutting-edge discovery and even met a visiting Alan Turing, another key figure of the Information Age. The sections discussing the shared interests of Shannon and Turing are among the book’s high points, particularly in light of the role of computers...
in contemporary life. Both probed machine intelligence, feedback and programming commands and cryptology. The authors tell us that, according to Shannon, much was also left unsaid between them. He did discuss his notions about Information Theory with Turing, but they needed to avoid cryptography because of security concerns.

Shannon published his path-breaking two-part article, “A Mathematical Theory of Communication,” “the Magna Carta of the Information Age,” in 1948, in the Bell Labs journal, at the age of 32 [1]. In it he showed that no matter the source, the sender, the recipient, or the meaning, information could be efficiently represented by a sequence of bits—information’s fundamental unit and a term Shannon introduced in the paper as an abbreviation for “binary digits.” (One bit is the amount of information that results from a choice between two options.) Key here is that Shannon did not devise a theory about the meaning of communications but about the optimal means of quantifying the transmission of information and a new approach to the problem of noisy channels. In other words, Shannon’s theory is not about what we communicate but rather about the transmission of information regardless of what it contains.

Shannon began to grapple with the noise problem when the communication debate centered on the movement of electricity, and communication per se was seen as a war against noise. Building on nineteenth-century experimentation in this area and the work of Bell Labs researchers (e.g. Harry Nyquist and Ralph Hartley), he reconfigured the problem. His new unit of measurement, the bit, added a form for quantification that was capable of accommodating the idea that information is stochastic. “It is neither fully unpredictable nor fully determined.”

As I read, I admittedly began to think that Shannon’s work with the communication of information was sometimes oddly paradoxical in terms of human experience. If Information Theory removes the semantic component of information, cryptology turns in a quite different direction, grappling with how to conceal meaningful information within a transmission. Despite their opposite goals, they are closely connected. It is intriguing to think that Shannon was able to bridge these two areas through recognizing their similarities. In other words, he saw that language is a symbol system or a code, enabling him to work with information as an engineering problem. If Information Theory offers a universally applicable model that removes meaning from the problem space, cryptology, by contrast, works with communication codes invested with meaning. Noise comes into play for both, but because signals intelligence is as much about code-making as it is about code-breaking, it is invested in separating the meaning from the “noise” for some and not others.

At Bell Labs Shannon also worked on a number of projects that anticipate current work in artificial intelligence. His maze-solving mouse was a wonderful example. It has a mechanical brain programmed both to solve the problems the maze posed by trial and error and then to remember the solutions once solved. A short Bell Labs film of Shannon with the mouse [2] is worth viewing, particularly in light of how the Lab used it to craft an infomercial. Shannon also worked with computerized chess programming, still a mainstay in artificial intelligence investigation and grist for the debates about the degree to which computational games and computers can fully simulate our humanness.

In 1956 Shannon left his position at Bell Labs for a professorship at MIT. He liked teaching, although he remained an outlier there much as he had been within the Bell Labs culture. Many of his projects of this period, particularly the whimsical ones, are along the lines of his tinkering work while at Bell Labs. These kinds of products have correlates within the ArtScience genre. Indeed, his home, Entropy House, served as in-house laboratory and office and contained an all-purpose “toy room” to store and display his gadgets.

The most refreshing element of the book is that the authors do not rely on boilerplate tropes. The Shannon we meet appears fresh rather than packaged. The explanations are clear and because the text does not talk down to the reader it is easy to develop a dialogue with it. One of the most intriguing facets of the work is how the authors puzzled out Shannon himself. Despite their conclusion that he played throughout his life, I in turn was puzzled at times by the authors’ tendency to elevate engineering and applications-based creativity, even as they clearly liked the playful nature of his whimsical creations. This wasn’t a flaw so much as a reminder that I have spent my life searching for conjunctions between art and science, and this perhaps gives me a different sense of the terrain. Indeed, it initially seemed that the authors were elevating science over art due to the use of phrases like “turning art into science would be the hallmark of Shannon’s career” (p. 41) and “In banishing art and ambiguity, in finding the ways in which human artifacts merely stood for mathematics” (p. 46). As I read, it became more apparent that they were asking if we can translate qualities of Shannon’s playfulness and genius—a word they use quite a bit that I tend to dislike—into our lives generally. All in all, Shannon offered them a means to pose good questions and to think about what makes creative thinkers more than technicians.

At the end, the authors sum up Shannon as a man who “tackled some of the most significant scientific questions of his era and worked at the boundaries of math, computer science, and engineering” (p. 277). Then they ask if the push for STEM studies allows for the kind of innovative, creative thinking that defined his life. They also note that “Shannon’s admirers are just as quick to compare him to M.C. Escher or Lewis Carroll as they are to put him in the company of Albert Einstein or Isaac Newton. He turned arid and technical sciences into vast and captivating puzzles, the solving of which was play of the adult kind” (pp. 278–279).
There is a lot to unpack here in terms of STEM, the comparisons they make and problem-solving. First, I liked the comparison with Lewis Carroll, who was a mathematician professionally and had a fascination for math puzzles throughout his life [3]. Shannon's first publication as a young student mirrored this fascination. It was a solution to a math puzzle that was published in The American Mathematical Monthly. Since Shannon was "a born tinkerer" and gravitated to making things throughout his life, I admittedly see him more in terms of the inventive, cross-disciplinary and hands-on Leonardo da Vinci than of someone like M.C. Escher, who, while a creative thinker, worked within a more limited framework. Not only was Leonardo an engineer and a problem-solver, like Shannon he wrote code of a sort, for it is said that his mirror-writing was adopted to hide his scientific ideas from the Church, to which such ideas were blasphemy. Of course, Shannon worried Church, to which such ideas were to hide his scientific ideas from the academy. While programs that encourage cross-disciplinary approaches are a good thing, and while I support finding funding streams for projects in which artists/designers and scientists/engineers collaborate, I'm not convinced that creating institutional silos that foster these projects will in turn serve as breeding grounds for creativity. They may only normalize a particular approach to cross-disciplinary problem-solving. Whether normalization would aid STEM areas or even foster creativity is too complex a topic for a short review.

Shannon's life on its own terms shows that the relationships between the technical (normalized) and playful (creative) approaches are hard to pin down. Indeed, A Mind at Play brings to mind that throughout history we find debates among scientists, artists and humanists asking how and why excellent technicians differ from insightful, creative thinkers. STEM's entry into our thinking about this is an iteration of these kinds of debates. Rita Colwell, then the Director of the NSF, proposed the approach in the 1980s in response to how engineering and technology had changed our world. Then and now, the acronym is typically used in terms of educational policy and curriculum development. The prevailing idea contained within it is that a solid foundation in science, technology, math and engineering is good for students and good for the community, for we can build a better, more prosperous future when we give students the knowledge and skills to succeed in our highly complex global world. The question that inevitably comes up is how to reconcile the tension between skills that require some measure of rote learning and technical competency with the need to cultivate creative thinking.

As a historian, I perhaps should not be surprised that my mind turned to an even earlier iteration of this debate as I read. Eric Havelock's classic Preface to Plato [4] is the work that seemed most apropos as I searched for an analog to help me conceptualize Shannon's contributions. Havelock's research stemmed from an interest in exploring why Plato's philosophy largely rejected poetry. As he examined the cultural shift from the dominant oral tradition that preceded Plato to one that elevated written communication, Havelock saw the move from an oral to a literate form as a technological shift. This earlier technological communication shift, like Information Theory, altered human communication behaviorally. Havelock explains that within a nonliterate, oral culture, stability requires the transmission of experience through memorization or mnemonic learning. Thus one function of early oral poetry was to use patterns and repetition to educate citizens by transmitting moral and technical information in easily remembered forms. This form of coding was one of Plato's concerns because its repetitive patterning encouraged a form of rote learning and an almost hypnotic response as listeners came to emotionally identify with the repetitive content and images within the narrative. Plato thus urged a reasonable and rational approach to educating the populace so that people did not succumb to emotional inputs. The code or symbols of a written technology work well with rational and logical ideas but have some difficulty in accommodating other ways of knowing, for example, emotional intelligence. Or, to oversimplify, several threads within A Mind at Play brought to mind that the logic of engineering and mathematical solutions falls into the kind of paradigm that is built upon a logical foundation. Shannon's conceptualization of Information Theory does not, nor is it intended to, accommodate the complexity of what humans communicate. It may have bred our digital age but as challenges like fake news and encryption breakdowns remind us, there are many ways to use our tools.

Unfortunately, a short review cannot detail all of the amazing details the book includes. Readers will have to find these on their own. One, for example, is that Shannon landed at
Bell Labs a few times before he was finally hired full-time as a research mathematician there. Indeed, the lab’s records omit the fact that Shannon was a summer intern there in 1937. Another detail that interested me was that he did a PhD in genetics, largely prodded toward this topic by Vannevar Bush. As it turned out, his passion was not in that area. Suffice it to say that in the end, the richness of Shannon’s accomplishments show how difficult it is to come up with any one-size-fits-all characterization of our humanness. While he was somewhat of a loner, Shannon’s proclivities nonetheless anticipated the kinds of collaborative projects often found in our world today. Yet he “was the sort of person for whom the concept of ‘networking’ was distasteful when applied to anything other than telephone lines” (p. 107). He is nonetheless a figure who deserves more attention, particularly from individuals who favor a broadening transdisciplinary approach.

Finally, what can we learn from Claude Shannon? According to the authors: Acknowledging his creative body of work and how it defies characterization offers a useful corrective to the urge to applaud specialization in our time. I agree with this. I’m less enthusiastic about Shannon’s view of the human mind. In an interview with John Horgan he said: “I’m a machine and you’re a machine, and we both think, don’t we?” (p. 199). Clearly his interest in artificial intelligence was evident in many of his pursuits and in the machines he built. Yet, sadly, Shannon’s life reminds us that while our equations may soar to godly levels and we can craft objects that contain a machine-like precision, our human biological components and consciousness are not reducible to equations. Although Shannon believed that artificial brains would in time surpass organic ones, the book ends by reminding us that his aspiration to surpass the biological is not a part of his personal legacy. Tragically, and perhaps ironically, Shannon developed Alzheimer’s disease. There were indications in the 1980s, and he entered a nursing home in 1993. Even as his body degraded, he continued tinkering. Ultimately he lost his personal communications bandwidth entirely before he died in 2001. His dementia meant that he was not able to see the digital revolution advance during his waning years, characterized by the launch of the Internet and other communication tools far beyond what twentieth-century minds conceptualized. Even so, as books like The Mind at Play remind us, Shannon’s signal lives on in what he added to our communal communications repository. He was instrumental in creating the technologies of our digital age even though his inability to fathom this demonstrates that life itself is not an engineering problem, or at least not yet. . . . As the authors write:

In 1948, Shannon’s theoretical work posed as many questions as it answered. But the value of that challenge shouldn’t be underestimated. . . . The striking feature of his paper is the reverberation, the way in which it inaugurated an entire field of study, a body of dialogue and deliberation that would long outlive its author. . . . Few papers can claim an impact so enduring (it has more than 91,000 citations and counting!), and it’s no exaggeration to say that, though information theory has important antecedents prior to Shannon, the formal study of information begins in earnest with his work (p. 274).

References
2 The short film is available at <www.youtube.com/watch?v=vPkKXbQXGA>.

FROM LIGHT TO DARK: DAYLIGHT, ILLUMINATION, AND GLOOM
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Light is a key dimension of our interaction with the environment, and it is at the crossroads of a wide range of apparently diverging if not antagonistic notions and concepts such as subject and object, individual and collective, time and space, here and now, but also then and there, natural and cultural, physical and symbolic, human and nonhuman, unconscious and self-reflexive, to name just a few. Light is not something that “is” there or not or that we “see” as an autonomous object; it is a complex process that involves the creative encounter of all these dimensions in a never-ending process of experience, appropriation and interpretation. The aim of Tim Edensor’s book is to pay justice to light as a fundamental
parameter of our visual environment and to disclose the multilayeredness of light as process—a process that human and other actors both shape and are shaped by. The focus is on the urban landscape, yet not in an exclusive manner, since the progress of artificial light has also penetrated nonurban areas. This urban landscape is then studied in a global way, with examples borrowed from very different contexts, geographically as well as chronologically. Moreover, the book contains very illuminating and poetic notes on natural landscapes as well—a logical choice for an author who is a specialist in human geography and tourism. The chosen methodology is a mix of literature study and ethnographical fieldwork based on the author’s personal notebooks and personal research biography on the one hand and an extensive literature study on the other hand. The ethnographical approach is embedded in a broad, culturally informed phenomenological approach (hence the huge presence of someone like Tim Ingold in the opening chapter of the book), while the literature study testifies to an excellent knowledge of very different types of documents and research (there is a lot of room in the work by Wolfgang Schivelbusch and David Nye, for instance, both authors of classic studies on light and dark, but one finds also an in-depth discussion of policy documents, fieldwork reports and philosophical analyses—yes, the inevitable Jacques Rancière and his “distribution of the sensible,” this today’s shibboleth of the well-integrated scholar, is quoted various times. Finally, although this is not really made explicit in the book, Edensor is also working toward the framing of his material in the cultural studies context of Raymond Williams’s “structures of feeling,” which allows him not only to stress the historically and culturally changing interpretations of light and dark but also to examine the growing dissatisfaction with the ubiquity of light and the possible strategies of a rediscovery of darkness as a positive value. As this review makes clear, Tim Edensor’s book gives a welcome and very useful overview of what one might call “light studies.” The author brings together important material from a variegated set of disciplines, and his discussion of this material is always clear and well balanced. It comes therefore as a big surprise that throughout the whole book Edensor emphasizes the fact that light is a neglected phenomenon in our (scholarly) experience of the real. This may be the case in the author’s own field (urban geography, tourism studies), but the claim is difficult to maintain in the broader field of the humanities, where light has for many years been a central concern of many researchers. I am thinking for instance of semiotics (the new French school of post-Greimassian semiotics has produced wonderful studies on the importance of light for the reading of the landscape; these “thymic” analyses, which foreground the positive or negative value of information and perception, are among the most robust scientific descriptions of the light and dark experience we have today) and also of literature and film studies, where one finds countless phenomenologically oriented interpretations of the embodied perception of visual stimuli).

The wealth of information and sources gathered by Edensor is such that the repeated claim of the neglect of light and dark does not sound very convincing. Indeed, the wealth of sources and documents one finds in From Light to Dark is one of the great merits of the book. Another one would be the author’s fundamental honesty and the desire to respect as much as possible the ideas and intentions of the authors and artists (in the field of urban design) he is discussing. Edensor puts himself at the service of his sources, but he tends to do so at the expense of his own take on the material. True, the author extensively quotes from his own notebooks and experiences, which are always rich and interesting, but the reader might have expected a stronger personal vision, something that goes beyond the general claims on the cultural embedding of light, the relationship between light and power, and the increasing dissatisfaction with the vanishing of dark. The author is at his best when he tackles certain issues from a more concrete and politically situated perspective, as in the sections where he discusses the class structure of our reactions to light and the judgments of good and bad taste that go along. These analyses are excellent, and it makes the reader regret that Edensor has not always opted for this more direct and “local” approach.

WORDS ON SCREEN


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The word Rosebud disappears in flames. A book of matches with identifying initials lands near Eve, a signal that Roger is nearby. Jack’s stack of typewritten pages, repeating the same phrase over and over again, terrifies his wife Wendy. These and many other moments of textuality in cinema history are collected in Michel Chion’s Words on Screen. The center of the book contains 256 black-and-white images of evidence: words floating, dissolving, hiding, standing up straight and otherwise battling for presence in the physical world of light and shadow. One of Chion’s stated aims is to “shower the reader with examples,” as if the sheer quantity and plurality makes the argument that cinema can’t escape written language. As Chion points out in the last chapter, reviewing these illustrations for his book, cinema asserts itself as a writing surface or “immaterial paper” where language appears and disappears over the continuous image. Compared to the contingent world captured on film, words on a screen seem flat, two-dimensional and even “child-like.”

The book is divided into three sections. In Part 1, The Infinite Inventory,
Chion chooses to complicate rather than simplify his system. Text within cinema space sometimes requires the invention of terms. "Athorybos," for example, is an aspect of an image that should or might produce a sound but does not. Diegetic writing in a sound film that is not accompanied by a voice or utterance is an athorybal message, a "mute call that asks us to no more than simplify his system. Text within cinema space sometimes requires the invention of terms. "Athorybos," for example, is an aspect of an image that should or might produce a sound but does not. Diegetic writing in a sound film that is not accompanied by a voice or utterance is an athorybal message, a "mute call that asks us to lend it our own voice.”

Part 2, Writing, Reading, “aims to problematize cinema’s representation of these two activities.” Here Chion examines the affect and materiality of writing/reading on the screen: the sensuality of ink and paper, the mechanical clacking of a typewriter, the darkened screen space of early computers. Cinema’s ability to jump scales, from long shot to close-up, integrates the intimate spaces of reading or writing—the flatness, abstraction and linearity of a page, for example—with the multidimensionality and simultaneity of the larger world captured by the camera. The challenge of depicting text-messaging in contemporary movies is in the integration of these two visual orders.

In some successful experiments, text exchanges between characters hover over the cinema space like overlays, but they are also point-of-view shots of what the characters are reading and writing, silently, as they stare at their devices and type with their thumbs.

The final part, Writing in Film Space, gets to the heart of Chion’s project: How do two-dimensional text spaces integrate into three-dimensional cinema spaces? Writing usually exists in a controlled environment with conventions and rules for navigation. The directionality of reading, for example, is in contrast to the multi-directionality of cinema space, where a pan in any direction can be understood. The camera may faithfully track the reader’s eyes gliding along the reading surface, but at any moment it can also break free from the restrictions of writing space and reenter the three-dimensional flux of cinema space. Chion asks why there are so many instances of writing’s destruction in cinema history. He uses the term “excription” for an inscription that does not ‘hang on to’ the world, doesn’t incorporate into it.” The typed words of an author dissolve into the scene being depicted. Important messages are erased, rubbed out, deleted. Teardrops and rain dissolve ink on love notes. Letters are torn and tossed to the wind or sea. Books (and inscribed sleds) turn black in the furnace. Chion’s intuition is that cinema wants to escape the flatness of writing and yet needs writing to enact its disappearance into image, again and again. Words are erased in cinema “not to make room for more writing but for the writing that has disappeared from the screen to be inscribed, or rather excribed, in us.”

Words on Screen is not about finding tidy answers but about uncovering new riddles in the relationship between text and image. Chion’s research into these questions feels new and is of immense value to scholars and artists working through the entanglements of words on screens in the post-digital age, where all surfaces have the potential of being cinematic interfaces.

THE EDGE OF OBJECTIVITY:
AN ESSAY IN THE HISTORY OF SCIENTIFIC IDEAS


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“Non semel quaedam sacra traduntur” [1]—Lucius Anneus Seneca wrote this quote in his Naturales Quaestiones (65 AD), one of the few works that in ancient times dealt with “scientific” matters, collecting facts of nature from contemporary sources. The Roman philosopher and politician always had an eye for possible moral advancements based on objective observations; the intent of his encyclopedia was, in fact, to discover a foundation for ethics in the knowledge of nature. A similar outlook is shown two thousand years later in The Edge of Objectivity, the masterwork of Charles Coulston Gillispie, published in 1960 (with the second edition and a new preface presented here issued in 1990) and originating from lectures the author gave at Princeton University. Although he was a chemist and not a historian—as his critics harshly remarked—Gillispie had previously tackled science’s history with Genesis and Geology (Harvard, 1951), a ponderous volume on scientific thought in Great Britain 1790–1850. He would pursue further historical research, with Lazare Carnot, Savant (Princeton, 1971), the biography Pierre-Simon Laplace (1978), and two other works: Science and Polity in France at the End of the Old Regime (Princeton, 1980) and The Montgolfier Brothers and the Invention of Aviation, 1783–1784 (Princeton, 1983). However, none of them reached the popularity then attained by The Edge of Objectivity.

People can see science as a continuous refinement of inductive thoughts emerging from the “objective” observation of separated facts.
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the history of classical science.

Gillispie claims that the history of science are valued as references in the final chapter, “Biblical Essay.” Here Gillispie claims he intended to narrate the structure of the history of classical science.

This book is no attempt to recount in summary the whole history of science from Galileo to Maxwell and Mendel. Instead, its purpose is to set out in narrative form what I take to be the structure of classical science. This I find in the route which the advancing edge of objectivity has in fact taken through the study of nature from one science to another! (p. 521)

The history of science, in the view of Gillispie, reflects thus the advancements of what he calls “objectivity,” which is a concept more of philosophy than science. Anyhow, although many important men and ideas are not included, the volume offers an organic whole, concentrating on the most brilliant scientific minds of all times. Galileo, Kepler, Descartes and Newton are in the earlier part, followed after the Enlightenment by Lavoisier, Cuvier, Lamarck, Darwin and Mendel; then Faraday, Maxwell and Einstein. Their major developments are recounted, assisted by quotations that convey the spirit of scientific work in different ages.

Since the text first appeared, its value for the history of science has been unquestionable. Quarrels arose on the meaning of objectivity, not for its equivalence to positive or even rational attitudes but rather for its description of a uniformitarian nature and uncinrical identification of kinds of models presupposed by fundamental science. Gillispie presents science as a collective and progressively cumulative construction. For example, the numerical representation of natural phenomena, which originated in the separation of mind and matter conceived by Descartes, found in the Cartesian method a great use for physics, marrying it to algebra and geometry, eventually giving place to the coordinate system in daily use among all branches of science.

Science has become increasingly objective in all its disciplines—the author claims—the process having begun in physics with kinematics, developed then through chemistry and biology to return ultimately to the physics of the nineteenth century—though the complexity of quantum mechanics makes it difficult to maintain an objective and uniformitarian view of nature.

This path demarcation could be satisfactory if the notion of objectivity is made clear. Usually, in science, to objectify is to quantify through measurements, and one would expect such terms as “quantification,” “consensus” or “reproducibility” as pertaining to scientific affairs.

“When you can measure what you are speaking about, and express it in numbers, you know something about it,” Lord Kelvin wrote (Popular Lectures, 1883); “when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind.” This is a questionable affirmation, as not everything that can be counted counts, and not everything that counts can be counted. At least, Kelvin provided a readily applicable understanding of objectivity. Unfortunately, Gillispie was not so clear and augmented confusion, setting out a bias in favor of atomistic theories—from Democritus to Dalton and Lavoisier—as superior paradigms supporting objectivity in science. Atomism, according to him, is a precondition of objective science and a standard mode of inference from the visible to the invisible.

Atomism [is] the subsistence of reality in ultimate particles whose motions the laws describe. . . . And it must be admitted that the atom . . . was a minute ball bearing in dynamics, a carrier for valence in chemistry, an infinitesimal concretization of energy in electricity, a population of the unobservable in statistical mechanics of gases, and everywhere the postulation as an image of reality (p. 499).

Unfortunately, the rather naïve mechanism that facilitated the objective view through atomistic paradigms in mechanics and chemistry in the seventeenth century became a hindrance to the later systematic physical theories that included the wave-particle dualism and electromagnetic forces in empty space. Furthermore, through the atomistic view Gillispie supported the idea of similar situations recurring in the history of science, whose difficulties have been resolved by strategical processes of objectification. Major trouble occurs when this ambiguous criterion of science declines as intellectual virtue and accordingly scientists are praised or blamed.

On the struggle to promote objectivity as an advanced value in successive sciences, Gillispie annotated:

The historian of science may therefore be pardoned for wondering what might have been the influence on biology had these scientists [Nägeli and Weismann] known the history of science, and whether they might then have noticed the interest of Mendel’s work? Suppose they had thought to compare the simple whole numbers of his ratios to Dalton’s, by which the chemical revolution was reduced to numerical terms. Suppose they had known of the relationship of the corpuscular philosophy of the seventeenth century to the Newtonian synthesis. Might they not have saved themselves much unprofitable reasoning, and advanced the progress of their science by several decades? (p. 335)
This approach works for a large part of earlier scientific developments: Galileo is more objective than Aristotle and Newton than Galileo; and Newton, dominant figure of the early chapters, certainly believed and was successful in assessing that the forces of nature are mathematically expressible. Francis Bacon is appreciated for “application of the inductive method, creation of a universal natural history, and the public organization of science” (p. 78), but disdained for the utilitarian view of science. The increasing objectivity of the Enlightenment is reflected in the passage from the elegant French discourse of philosophers to the British factual accomplishments of scientists, accompanied by the key change of science language. But Newton was as well aware that the accountable phenomena of nature are unknowable in terms of ultimate causation, and Bacon, who did not make any scientific discoveries, was the first to foresee that eventually science would become a business of everyday recognition of knowledge as a way of power, and not much else. Furthermore, if objectivity lies in mathematics, Lavoisier is a failure, as is Darwin’s actual objectification of biology—it is amazing that On the Origin of the Species, the most important book of science ever, does not contain a single equation.

When the emphasis is on the dawn of theoretical physics, e.g. Maxwell, Boltzmann, Einstein, and we learn that it is possible to equate abstract and mathematic thought, Gillispie is hard to follow. His book also misses the unfolding knowledge of subatomic particles. “To carry the story of fields and particles beyond Maxwell,” he argued “would require either a higher mathematical competence than this history has so far exacted of the reader (or the author), or else a wider departure from the text that has been the policy by which the book has been composed” (p. 494).

There is something fascinating in the vision of Gillispie: science is perhaps the only field in which history taught some lessons—to science itself at least—but the idea that the path paved by scientists can be dealt with as a history of glory towards the “true” knowledge is difficult to share. Most people—among them was Lev Nikolàevic Tolstoy, see Modern Science (1898)—would disagree that the grandeur of science, although objective, can tell us how to live or justify about our place on the Earth. More convenient is to assume that science advancements blend with human history along a difficult path of successes and disillusion, glory and infamy. Yet, Gillispie deserves thanks for canvassing curiosity and skepticism on scientific virtues from the undergraduates of “Humanities 304” at Princeton, 1956–1958. He wrote a superb book on the history of science, whose paradigms, whatever their interpretation, are but cruel ones: In all disciplines they cut away any human-centered attitudes to reality, while revealing the amoral even if assessable and often uncomfortable outlines of the natural world—which is highly respectable and central message of the book.

References
1 Lucius Annaeus Seneca, “Sacred mysteries cannot be understood at once,” Naturales Quaestiones (VII, 30.6).

THE SEDUCTION OF CURVES:
THE LINES OF BEAUTY THAT CONNECT MATHEMATICS, ART, AND THE NUDE

Reviewed by Phil Dyke. Email: <Phil.dyke@plymouth.ac.uk>. doi:10.1662/LEON_r.01626

In many ways this is a remarkable book. It is unquestionably on fine art, but the author is an academic engineer who is obviously very mathematically knowledgeable. The question is: Does the marriage work? That it might is to a large extent down to the writing skill of McRobie. When commenting on a topic such as the beauty of curves, one is usually firmly into opinion, not fact. When describing curves and surfaces precisely, one is in mathematical fact, not opinion. The author plays it safe in that the examples he cites certainly are beautiful, and the book can be simply seen as fine art, words largely unread. But that would be a pity. Following a general introductory chapter, the next five chapters are grounded by direct comparison between his examples and the five so-called catastrophic folds (the fold, the cusp, the swallowtail, the butterfly and the wigwam). These will certainly interest those, like this reviewer, who are mathematical or scientific. I am less sure they will captivate the fine artist, though: do they care about such classifications? Maybe they should. The book then develops a wider remit and finds mathematically relevant descriptions of surfaces and curves also described precisely through the physics of optics (reflections, rainbows, gravitational lenses); then it is back to René Thom with stability and the Russian sculptor Naum Gabo, whom Thom sadly never met. The book finishes with summaries of the mathematician Thom and the surrealist Salvador Dali. Both controversial, they did meet late in Dali’s life and got on very well.

The book is a very brave attempt to marry the precise mathematics of catastrophe theory and other related mathematics to what is meant by beauty, an attempt to link the very precise with the imprecise. This reviewer thinks it mostly successful, but credit is due to the erudition of the author plus the quality of the
production both in the illustrations used and in the general elegance of the book itself. It would grace the grandest of coffee tables and provide the basis for interesting debates.

**PLAIN TEXT: THE POETICS OF COMPUTATION**


Reviewed by Jan Baetens. Email: <jan.baetens@arts.kuleuven.ac.be>. doi:10.1162/LEON_r_01627

This book is not just about opening the black box of digital reading and writing, the devices and programs we use to do so, or the digital turn of our culture. Written by an English and comparative literature professor who is also a trained engineer and a migrant, having moved from post-Soviet Russia to the “global” Northwest, *Plain Text* is a vibrant call to rethink the two-culture debate in broad cultural and political terms. The methodological and theoretical framework that is used here to achieve such a mutual rethinking—and enrichment—of technology and humanism is twofold. First of all, Tenen’s approach can be roughly situated in the field of media archeology—and like the best representatives of this discipline, *Plain Text* is a truly interdisciplinary work, which does not refrain from addressing either highly detailed technical discussions or big philosophical issues that enable the author to revisit some key thinkers of (Western) philosophy such as Plato, Bacon and Heidegger, among many others. Second, *Plain Text* also assumes in a very radical manner the intellectual and critical heritage of two “displaced” thinkers, namely Vílém Flusser and Viktor Shklovsky, whose life and work are seen by Tenen as an illustration of the advantages of looking at things through the eyes of the outsider and trying to do so in ways that make them new, that is, strange (the central concept of Shklovsky, one of the major theoreticians of Russian Formalism, is “defamiliarization,” while Flusser’s often idiosyncratic interpretation of the history of the image does reflect his position of “third-culture” thinker).

The starting point of *Plain Text* is however not a theoretical or philosophical one. It is instead the existential as well as political fear that our current use of technology, which Tenen describes as passive and uncritical, has serious consequences for fundamental human values such as freedom, communication, solidarity—in short the building of a deeply open and shared human community we call culture. Following Flusser and Shklovsky, Tenen observes that our interaction with technological devices is defined by attitudes of comfort, habituation and security. In order to use technology in an easy way, we have to stop worrying about it—and this is what Tenen claims we all do. The final result is a sharp decline of meaning, what Tenen calls “asemiosis”: we no longer understand what we are doing, and in most cases we simply no longer ask questions, a state of mind the author compares to a complete surrender to Baudrillard’s hyperreality (a state of mind in which we are no longer interested in the “object” the “sign” is supposed to refer to in traditional semiotics). Yet this asemiosis is exactly what those who control technological systems want us to do—provided of course it is still possible to identify in these traditional terms the “owner” of technology. However, the fact that it is not always easy to discover who owns technology certainly does not mean that technology is owned by its user. One of the basic political claims of this book is that the user may gain much by abandoning her possible “estrangement” in technological matters, but that this gain, which is mainly a gain in comfort, comes with a terrible loss, for if users no longer have any interest in—and thus no longer any possible knowledge of—technology, they fall prey to the rules and interests of the techniques and devices that rule their lives (e-books, for instance, may seem easy to purchase, but actually they are not really purchases; what the reader buys is no longer a text she can share but a license to access certain information under certain conditions, which nobody actually knows, and which may change without any notice). This claim of a crucial loss is made by Tenen at two levels: that of the individual, whose life is increasingly surveilled and controlled by tools and software one is no longer aware of, but also that of society, for the implications of technological devices and software have a tremendous impact on the way we communicate and live together.

The specific corpus on which Tenen elaborates these ideas is “text,” more precisely “plain text,” which he defines, quoting the Unicode Standard, in opposition the notion of “fancy text”: The former is a file format that contains nothing but a pure sequence of character codes; the latter is text representation consisting of plain text plus added information. This distinction is not purely technical; it also involves a frame of mind. In the tradition of textual criticism, plain text also refers to a method of text transcription that is both “faithful” to the text of its source and “easier to read than the original document” (Tenen quotes here the philosophy of American textual criticism as summarized by Don L. Cook). These two dimensions of the notion of “plain text” (the purely technical and the critical-philological one) are the background of Tenen’s reflection on the way technological devices,
predigital as well as digital, deeply inform, determine and shape the way we read and write, the basic assumption being that text is not just form + content but deeply rooted in technology that “formats” the medium and that doing so not only determines the medium’s content but also the possibilities we have in using it in order to think, read, write, exchange ideas and eventually build cultures and societies (given the size of the digital changes in today’s societies, a major emphasis is of course put on digitization, but Plain Text is not narrowly concerned with digital technology alone).

Plain Text investigates this broad program in various ways. Logically, Dennis Tenen pays a lot of attention to the basic features and essential characteristics of text and textuality, as an object as well as a process (reading, writing, copying, circulating, commenting, remediating, etc.), and his book has great analyses of issues such as turning the page, machine writing, or reading on screen. But in all chapters, Tenen’s aim is in the analysis of these topics is not just to unpack what is hidden in technology, modern or not. With a very sharp eye for historical debates and the relationships between older and newer forms of technology, on the one hand, and a repeatedly expressed belief in the necessity of a formal and materialist investigation of meaning and meaning-making, on the other hand, Plain Text pursues—and achieves—a double goal.

First, Tenen manages to criticize and deconstruct a certain number of stereotypes that block any serious understanding of the mutual determination of culture and technology. Some of these stereotypes are hidden in more or less catchy metaphors (such as for instance the paper-based expressions that still structure our way of using our computer screen and that do not match at all what actually happens beneath the surface). Others refer to ceaselessly repeated conventions that do not resist more careful inquiries (such as the idea that “natural” language is “analog,” that is continuous, while “machine” language would be “digital,” that is discontinuous). Hence the critical rereading of Marshall McLuhan’s maxim “the medium is the message,” which Tenen considers too deterministic and insufficiently open to questions having to do with the use, or more precisely the uses, which are always plural and different, of texts and mediums.

However, and this is the second goal of the book, the perspective of Tenen’s deconstruction is never to debunk or criticize. All analyses always tend to foreground the cultural, social and political a priori and implications of our “secure” and “comfortable” use of technology, as shown for instance in the book’s final critique of the longing for “analogy” and “oneness” as a philosophical ideal, the dream of an ideal world of transparency and direct contact, deprived of any technological and digital pollution. Such a longing is nostalgic; it tends to exclude anything and anyone alien while reinforcing the power of technological formatting we should ceaselessly question, not in order to reject it, but in order to try to make a better use of it (and the reader is invited to distinguish “better” from “smarter,” which is one of the modern metaphors that so successfully manage to blur the boundaries between comfort and surveillance).

DIVINE GOLDEN INGENIOUS:
THE GOLDEN RATIO AS A THEORY OF EVERYTHING?


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doi:10.1162/LEON_r_01628

This is a delightful publication with chapters that cover all aspects of the mysterious golden ratio. This so-called Divine Proportion is mysterious indeed, and although the book’s lofty aim is to solve the enigma, unfortunately it remains unsolved. If anything, despite the scholarly, erudite essays, the golden ratio as a Divine feature of the universe remains as enigmatic as ever.

The book is beautifully produced and graphically rich; numerous illustrations in both color and black & white lift the book above the ordinary. Perhaps this is also partly because the layout of the book is “based on the golden ratio. The proportion of 1:1.618 defines all spacing and layout rules. The typography is also set in this ratio” (p. 224). There are 24 sections (chapters), with such intriguing titles as “Two offset Fibonacci sequences”; “Proportions in music as a temporal art”; “Grids and rules”; “The golden ratio is basic vocabulary, an absolute must-have.” The chapters are followed by biographies of the contributors and a list of illustrations, but there is no index.

The quest to solve the mystery is frustrated by the amazing paradox that the answer to the question of the Divine Proportion being in fact universal, hence possibly Divine, is emphatically Yes and No! The reason the book is delightful is because it is a little like a conjuror’s performance. One chapter proves the golden ratio is divine; the next disproves it. As an example, back in 1876, Fechner, a founding father of psychology, carried out a test with different rectangles (of the same area) but different sizes. The majority of recipients preferred the rectangle of the golden ratio; the minority preferred the square. “At this point, one could close this chapter with the universal law of aesthetics confirmed. But unfortunately it is not quite that simple” (p. 150). Höge repeated the experiment exactly in 2016 with diametrically opposed results: The minority preferred the golden ratio and the majority the square. So much for a universal law?

The previous example shows the
beauty of the scientific method. The next example is more anecdotal but still illuminating:

Admittedly, the significance of the golden ratio today does not lie in real documentary evidence, but in the myth woven around this history over the last 150 years. In common with those searching for the Holy Grail or the treasure of the knights Templar, the golden ratio devotees weave together clues and allusions in history, mathematics and the natural science to create grand images which primarily prompt amazement and claim the existence of universal theory of everything (p. 24).

Further, adding weight to the myth, in type design the myth of the golden ratio abounds; however, unbiased investigation shows the “Trajan font (113 CE), the most famous and beautiful example of the capitalis monumentalis, [allegedly] designed in accordance with the golden ratio,” is in fact not based on the golden ratio at all, “but instead the square, circle and triangle” (p. 99).

In the section “Workshop Report, Golden Pythagoras Trees: Fractals and Self-Similarity” by Daniel Lordick (pp. 164–169), his concluding remarks indicate that the use of the golden ratio as a design tool is arbitrary. “No matter how surprising it is to discover frequent examples of the golden ratio in nature, exclusively using the golden ratio as a design tool clearly remains an arbitrary decision and one that is rarely successful.”

The idea, or desperate hope, that the golden ratio perhaps provides a Theory of Everything is clearly not true. However, without doubt the golden ratio may be observed often in nature. The Fibonacci series evidenced in the nautilus shell is just one example. So, we have what may be described as a Divine Paradox. Evidence in nature of the Divine Proportion is astounding, and the cultural “meme” replication myth, now growing out of all proportion (excuse pun) on the internet will keep researchers puzzled for some time to come. This proliferation on the Internet has both serious and humorous content. As an example: the very recent photos of American president Donald Trump’s hairstyle likened to, or complying with, the golden ratio!

This book full of intriguing puzzles (itself both serious and humorous) will become an important resource for future researchers and students of this illusive mystery.

**FEBRUARY 2018**


*Chinese Dance: In the Vast Land and Beyond* by Shih-Ming Li Chang and Lynne E. Frederiksen; foreword by Emily Wilcox. Reviewed by Jonathan Zilberg.


*I Got a Song: A History of the Newport Folk Festival* by Rick Massimo. Reviewed by John F. Barber.


**JANUARY 2018**

*The Beauty of Numbers in Nature: Mathematical Patterns and Principles from the Natural World* by Ian Stewart. Reviewed by Phil Dyke.


*Traces of Vermeer* by Jane Jelley. Reviewed by David G. Stork.

*Film as Philosophy* by Jane Jelley. Reviewed by Will Luers.

**DECEMBER 2017**

*Gallery Sound* by Caleb Kelly. Reviewed by John F. Barber.


*So Famous and So Gay: The Fabulous Potency of Truman Capote and Gertrude Stein* by Jeff Solomon. Reviewed by Jan Baetens.

**NOVEMBER 2017**

*BioArt and Bacteria* by Anna Dumitriu. Reviewed by Charissa N. Terranova.


*Paranomia* by Christoph Keller. Reviewed by Jan Baetens.