

Zairja-Thinking: A Second Virtuality for Design

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With the increased transfer of training tasks from corporate architectural practice to universities, “learning” has shifted its component parts in the direction of determinative efficiency. Many of thought’s traditional schematics, both in formal philosophy as well as cultural practices, have been put out of range on behalf of vocational aims. The Zairja is a set of linked techniques that, having stood the tests of time and diverse cultures, media, and mindsets, is now, paradoxically, the “odd man out” in comparison to cognitivist models of mind and their virtual reality counterparts. This essay argues that the commitment to “virtual reality” should yield, in the interest of studio creativity, to consideration of the Zairja’s unique access to a “second virtuality.”

REVERSE COMPUTING

Early Medieval scholars developed the Zairja (زيرجيا) as a kind of “reverse computer.” Instead of compiling data to be reduced to more determinative structures, the Zairja used celestial calculations and aleatory procedures to extend potential and sometimes fantastical relationships, specifying as many causes as possible for any one idea or effect.¹ Most historians presume that the Catalan mnemonicist–mystic Ramón Llull, whose theories were taught at the University of Paris until the 1500s, based his *Ars Magna* (1305) on the Zairja and intended his combinatorial diagrams to work in the same way, with the aim of spiritual perfection.² It would not be an exaggeration to say that a computer, albeit the Zairja’s reverse–causality computer, lies at the foundation of Western thinking!

What does the Zairja offer to the modern thinker or, more specifically, architectural educators and their students? I propose that the Zairja *idea* may be extended to bridge between the formless and form, the idea and sensible shape. The Zairja requires rigorous methodological exactitude while at the same time it resists restrictive preconceptions. The Zairja is virtually unknown in architectural education literature, even among IT enthusiasts, even though it figured prominently in the work of starchitect Daniel Libeskind, who used Jonathan Swift’s version of it as a model for his “writing machine,” submitted for exhibition at the Venice Biennale of 1985 (Fig. 2).³



Figure 1. Surviving Zairjas feature astrological charts and numerical/alphabetical matrices, but there are references to mechanical examples. Image source: Wikimedia Commons, <https://commons.wikimedia.org/wiki/File:Zairja.png>.

Amazingly, Libeskind got into the spirit of the Zairja without ever giving his readers its name or referring to its extensive provenance. His failure would, however, probably have been forgiven by Ibn Khaldūn. When the fourteenth-century Arabic scholar questioned the Zairja’s computing effectiveness, the computer itself responded: “The Holy Spirit will depart, its secret having been brought forth to Idrīs, and through it, he ascended the highest summit. (Idrīs is the “Qur’anic mythical ancestor at the absolute limit of memory.)”⁴ In other words, the Zairja is used to skeptics. The Zairja’s combinatorial logic topsy–turveys the debate about whether or not computers can think. Instead of producing ideas, in the sense of “having a good idea,” the idea is set as an origin. From this central point, the Zairja retraces the various lines of influence through numeric–alphabetic procedures, outward to find as many causes possible for any one effect. Although the central thought is voided out in the process, the reversal of the fan of converging causes *outward* reveals two combined forces: (1) a *completion* function,

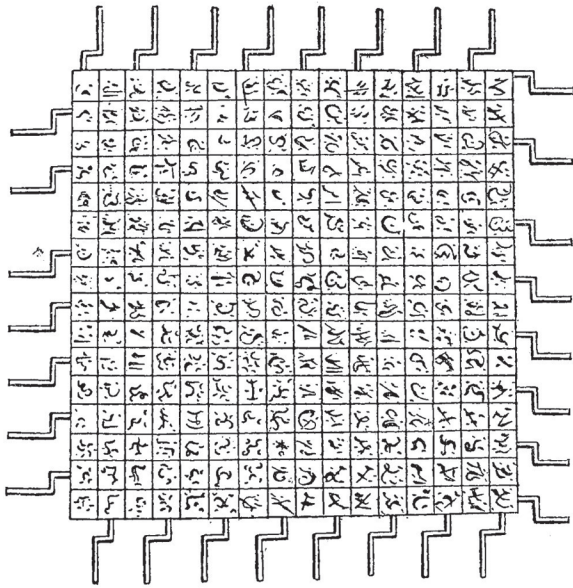


Figure 2. Swift's "engine," in *Gulliver's Travels*, 1726, was the model for Daniel Libeskind's "writing machine," Venice Biennale, 1985. Image source: https://wikivisually.com/wiki/The_Engine.

encircling the idea like a clock and compass, and (2) a *gradient* function produced by concentric zones of the idea's step-wise evolution. These overlapping fields of completion and gradation are, as the Zairja's affinity to astrological charts would suggest, analogous to Late Medieval theories about the soul's transit from an Elysian position beyond the sphere of Saturn's Golden Age through successive planetary crystals contributing positive or negative attributes to the peregrine soul. By the time of birth, the newborn has encountered an overdetermined matrix of relations whose ideal form is condensed into Fate, crystallized at the instant of birth.⁵

Like the baby, the Zairja idea is not the end but the beginning of a process that is not determin-*ed* but determinat-*ing*. The Zairja's multiplicity of causes for any single effect inverts the cognitivist model of thought as uniquely to the individual into a collective capable of "quantum" emergence. This can be illustrated by the customary psychology-class demonstration of a jar of jelly beans placed on the lecturer's podium. Students are asked to guess the number of beans the jar contains. When the results are compiled, although no one has guessed the right answer, the average is almost always correct. The Truth, both possessed-and-not-possessed by the multitude, emerges from the collective errors, the non-truths.⁶

ZAIRJA IN SPIRIT

While Ramón Llull made a comprehensive effort to follow the Zairja both as a paradigm and literal methodology, a 16c. Cistercian monk could be said to have, intentionally or otherwise, deployed the Zairja idea to accelerate a parallel endeavor. Under the sponsorship of Francis I, Giulio Camillo developed a "universal memory theater": a machine enabling a mnemonicist

to combine images, sayings, and texts within a semi-circular auditorium-turned-stage. Like the Zairja's reverse design, Camillo's 7x7 seat auditorium-stage was regulated by radial and circular lines. While Francis Yates seemed sometimes to regard Camillo's theater as a kind of Renaissance California Closets® to store thoughts, Camillo actually aimed to achieve the highest ideals of Cabalistic meditation: dissolution of thought within the Divine Absolute.⁷ In this goal, he continued Llull's ambition and confirmed the Zairja's essential spiritualization of the collective into the universal.

The coincidence of Camillo's design of a reversed theater with the Zairja's reversed planetary schematics explains how the Zairja is not just an esoteric curio of the past but an active potentiality for studios and classrooms of any age, any culture. The Zairja idea works in many forms. In Julio Cortázar's novel *Hopscotch*, for example, the reader is advised to take up the chapters in alternative orders that shake the story loose from Aristotelian unities of time and space. The point is not to show how many realities can run alongside each other, given the same "factual events," but how this "running alongside" is actually a quantum Real, a virtuality (V2) that is, from the very beginning, running alongside the pictorial virtuality (V1) we regard as objective reality. The "alongside" is both within and without, a "reality of the virtual," V2, both antagonistic and supplemental to virtual reality as V1.⁸

This is not meant to be a fringe New Age suggestion. The secularized Zairja idea never ceased, from the overdetermined texts of Góngora and combinatory rings of Camillo's memory theater, the prisons of Piranesi, Poe's "The Pulloined Letter," Lautréamont's *Les chants de Maldoror*, or the later blossoms of Dada onward to Cubism, Vorticism, and silences of John Cage. In short, because Zairja is about the human imagination's most *efficient* operation, it has and will continue to emerge from static thought operations as a permanent and radical dynamic. Each independent historical incarnation seems to have learned from its predecessors, although this could only rarely have been the case. The idea seems original (hapax) each time it is rediscovered, just as V2 is permanently radical and antagonistic to V1 in everyday life.⁹

Two examples of effective Zairja thinking without any direct reference to the Zairja illustrate this point. In Italo Calvino's novels, *The Castle of Crossed Destinies* and *Invisible Cities*, basic components become self-generating, or *auto-determinative*.¹⁰ It is important at this point to compare V1's pictorial truths in relation to V2's effects of astonishment to the difference between instruction and education. This difference mirrors perfectly the distinction between a V1 reading of Calvino's stories and the V2 reading intended by the author's design — the reading that converts both novels into Zairjas. In a V1 reading, one described event simply follows another; the reader



Figure 3. Final array of Tarot cards used to tell stories of guests robbed of their power of speech (Italo Calvino, *Castle of Crossed Destinies*, 1973). The reuse of cards to work in multiple stories, running vertically, horizontally, diagonally, or in the same row with additions or subtractions, folds the array to reveal a meta-literary set of fracture lines or medians. This define literature's fractal quality, its status as a quantum field. Image credit: "The Castle of Crossed Destinies, by Italo Calvino," Ex Libris: Architecture and World Literature, <http://blogs.cornell.edu/exlibris/2014/05/19/the-castle-of-crossed-destinies-by-italo-calvino>.

finishes the story without ever getting the point or grasping the wit of the text. For the reader who "gets it," the stories constitute an idea that the reader can finish in her head without the author's assistance.¹¹ The story *idea* is in fact transferred from artist to audience. The *moment* and *work* of completion is "enthymemic" — that is, ceded to the "passive reader" whose real (Zairja) activity involves suffering that follows

necessarily from the disavowal of the possibility of simplistic V1-style closure.¹²

The Castle of Crossed Destinies offers a compelling case for architecture's *intrinsic* relations to this kind of Zairja narrative. Travelers passing through an enchanted forest arrive at a country inn that is a merger of temple and labyrinth. The guests cannot tell whether the inn was a castle that fell into disuse and was repurposed as a hotel (designated as "<"); or, alternatively, had gradually upgraded itself to the status of a royal residence (>"). Are the host and hostess really the former king and queen, now in reduced circumstances, or did originally humble landlords gradually acquire aspects of royalty? These < and > conditions lay the ground for the guests' discovery that the enchanted forest has robbed them of the power of speech. Unperturbed, they decide to nonetheless spend a lively social evening together using a deck of Tarot cards to share their personal stories. The deck becomes the Zairja device within the Zairja story, a plan view revealing the mechanisms of quantum generation. As cards are placed on the table, the narrator reports on what their meaning seems to be. Of course many things can be said about any Tarot card, but the running sequences compel specific readings, in combination with the storytellers' hand gestures and facial expressions.

Because of the limited number of cards, cards must be involved in multiple sequences. Rows intersect columns; diagonal sequences cut across; additions or subtractions to card sequences change stories entirely. By the end, the cards form a rectangular design whose blank spots suggest that the pack is preceded and followed by additional card possibilities. The blank central position constitutes a pivot for the rectangle's circular order, which rotates through the "meridians" of Lear, Faust, Macbeth, Hamlet, Oedipus, and so on.¹³ In terms of structure, there is very little difference between this narrative model of the Castle and the 7x7 rows and aisles of Camillo's theater auditorium. The gaze of the mnemonicist who stands on a central stage — Camillo's zero-degree position of motionless turning, the point where, as Lacan puts it, metaphor is purified as a pure function — asserts itself as thought silenced by energized effects.¹⁴

The case of *Invisible Cities* is more obviously mathematical. Cities are grouped by themes: "memory," "desire," "thin cities," etc. Two "topic-pillars" shore up the beginning and end with ten themes stacked as a triangular palindrome (1, 12, 123, 1234; 9, 98, 987, 9876). A set of sliding themes bridges the void between them. Signifiers/topics add one theme while dropping one theme, reaching a "keystone" at theme 5, which turns about itself to reverse the process at the point where Thin Cities and Cities and the Dead form the <> "Janusian" pivot. The book design is epitomized by the way "thin" and "dead" flip about a pivot of 5/5, which should be read "five 5s."¹⁶ Conventionally, this is 5x5, or 25, but 25 should be read aloud as "two 5s," a return of 55, conventionally factored as 5x11.¹⁷ The significance of one 1, the "see-and-say" version of 11 is akin to the void in the Tarot card array. This is the numerical lesson of accumulation.

Each single numeral 1 is “one 1.” It is both itself and the *name* of itself, just as in the Zairja elements are both contents and signs of contents. The Zairja’s split is its function as a *rebus*: the hieroglyphic meaning that detaches any given signifier from a linear sequence to connect the completion of a circle/cycle, where the end “responds to the beginning.”¹⁸ The linear sequence is converted into recursion, a self-referential ratio.¹⁹

A SECOND VIRTUALITY

The Slovenian critical theorist–psychoanalyst Slavoj Žižek has argued that, while interest in virtuality has been focused on the “virtual reality” that computer graphics can extend in increasingly realistic ways, there is a wholly separate virtuality defined by reversing the phrase to read “the reality of the virtual.” While virtual reality is a representation, the reality of the virtual is like the grin of the Cheshire Cat, a “detached signifier” able to float from site to site, cat to cat as it were, empowering each site with force and effectiveness. The virtuality of virtual reality, the pictorial (V1), is modeled by perspectivalism and photographic realism.²⁰ The double of this realism, invisible to it, is the “second virtuality” (V2), which operates as an exception that is both external and internal. In architecture, this second virtuality is everywhere: the flip that occurs when an inner courtyard is modeled as a public street, or the central park (Central Park is in fact the best example) where the external countryside is placed in a pivoting role, converting the city’s exterior bound into an “inside frame.”²¹ Add to this flip–flip trick the doubling of mirrored spaces and objects that is able to “reset” a portable pivoting center, whose combination of panopticism and void allows for a transfer from interior to exterior by reversing the definition of what’s inside and what’s outside. The flip–flip (Lacan’s *extimité*, the external intimate) spatially duplicates the idea of predication reversal (agent controlled by act, cause determined by effect, past retroactively revised by the future ...). In *Invisible Cities*, mirroring and flipping are accomplished by the Zairja–specific technology of “sliding signifiers.” Each chapter repeats a set of themes, dropping one theme and adding another. In more general terms, modern and early–modern cases of the Zairja idea reveal that not just the “anagogical” aim (of astonishing coincidence) but the particular mechanics of its ancient methodology constitute the most ancient, most enduring, and most continually maintained relationship between creative endeavors and artificial intelligence.

This is not an analogy or characterization; it is a rigorous and radical claim derived from AI’s most revered founding source. In a generally ignored chapter of Norbert Wiener’s classic 1946 work, the father of cybernetics observed that, when neural networks, human or non-human, reach a high extreme of development, they are continually on the verge of breakdown.²² It is as if the organism or machine aims to reach this marginal state, so that it will be *unable to distinguish between psychopathological dysfunction and the achievement of the extraordinary*. Wiener claimed that the brain, like the complex computer, is “probably already too large.” But, its limit becomes its teleology — *precisely* the stated goal of the Zairja

and Zairja–like projects.²³ By identifying limits not as forbidden but desirable, and by substituting, for the usual subjective intentions that guide everyday decisions, an *automaton* to pilot thought through contradictory and traumatic conditions, the Zairja activates the margin of thinking using methods that directly employ the known mathematical, linguistic, and ontological qualities *of that margin*. The fact that every age and every culture seems to have some kind of Zairja idea attests to the durability of this relation.

ZAIRJA NOW

The Zairja’s extensive history both as an idea and set of techniques, as established by the considerable scholarship of those who have employed it over the millennia, allows us to claim that the Zairja idea can be employed even at small scales using very simple mechanisms or techniques. This claim rests on the insistence that any desire to expand one’s thinking by embracing the contradictory and traumatic nature of its own margins is already a Zairja in essence, requiring only a plan of execution. In mathematics, the formal name for such mind expansion is the “*Ersatz–Ansatz* Conjecture.” When a seemingly unsolvable problem is encountered in mathematics, mathematicians construct an “ersatz” theorem — a speculative construct that seems to be indifferent to the demands of the issue at hand. The results are, not surprisingly, usually 99.9% error. However, the conjecture has restructured the problem. Simply the possibility of a *non–error*, a “get–lucky” residuum, provokes a second iteration, also ersatz but, this time, adjusted to both the slight change of the problem within its black box now combined with the attempt to attack it. In this sense, the *Ersatz–Ansatz* Conjecture is illustrated accurately by the numerical triangles Calvino employs to buttress his bridge of sliding signifiers (1; 1, 2/1; 1, 2/1, 3/2/1; 1, 2/1, 3/2/1, 4/3/2/1 ...) where each added number is determined from two directions, the horizontal sequence of accumulation and the vertical numbers preserved in the process of cancellation (cf. Hegel’s *Aufhebung*, “cancelling and preserving”).

The payoff of the *Ersatz–Ansatz* Conjecture is immediate: the restructuring of the seemingly unsolvable problem. Structure, which now includes the dialectic relation of the thinker with the thought, becomes a part of the study. This interactive procedure takes on the form of the “story in the story” or, in this case, the “picture in the picture.” Breaking this bad infinite regress involves assigning, to the starting point, a contronymic or radical binary value — a “pure distinction” condition. This is another way of describing *extimité*. The ancient Zairja’s concentric and radial determining lines, coincident with accounts of childbirth, offer many ways of jumping out of the confines of the original problem. Internal symmetries of the rings, and the mercuric completion of the 360° fan of values recalls the goal of, within any linear sequence, aiming to discover the *récit fort*, the “strong” narrative that is secondary and virtual within the literal primary “story.” This is analogous to finding, in any building, a key detail that “explains” the logic of the whole, in the way that

the corner of Mies' Crown Hall has been said to contain the essence of the building itself.

Zairja-like ersatz conjectures are already common practice in many architecture studios, although almost no teachers and students have ever heard of the Zairja or the *Ersatz-Ansatz* method. *Any* exercise open to altering the premises and rules of the exercise is "Zairja by default." The experiments of the Constructivists, Dadaists, Situationists, etc. all count. The aleatory music and stories of John Cage count. Readers will be able to add their own favorites. This may seem to be appropriation without permission, but the idea is to use Zairja consciously, with respect for its historical forms to extend and perfect, in art and architecture education, any exploratory gesture. The Zairja exercise I used in a Ph.D. seminar was simple. Students made a lists of topics taken from their own research and writing. Each day, they were required to combine two terms chosen at random, formulate a new possible relationship, however ersatz, and combine the fusion with another item on the list, creating a second hybrid idea. The process could be continued a third and fourth time, but twice was usually sufficient. List fusion could be done with partners who agreed to share their hybridized terms. The occasional "lucky guess" (*Ansatz*) was written up and shared with the whole group.

Because the process was open to contamination by the circumstances of the semester, ideas taken from lectures, or even random personal or social events, individual accidents became the basis for continually renewed synthetic grounds of study. Where before it was difficult to think of what questions to ask in the face of often-difficult new materials, the Zairja reconfigured the context of study on the side of the students, not the teacher; or, rather, the teacher-student binary was neutralized. The "teacher" was redefined as the best Zairja combinatorial. Even better results came about when students offered resistance, either making lists that aspired to be complete inventories, converting the coupling process into a categorization exercise or refusing to get into the ersatz spirit of fictional invention. Resistance allowed the seminar to target what was being defended; what aspect of study was used for sublation of study to an ideology of instruction rather than exploratory conjecture. Once pulled out of the shadows, such resistances could be added to the list of Zairja topics. The ersatz method counters the overvaluation of "the successful idea." Students who failed were often the most productive. The Dada rule, "take something, do something to it, then do something to it again" was apt. Ontology gave way to epistemology, which gave way to eschatology — an account of how the concept of teaching and learning must give into the idea of apotheosis. The project first conceived in terms of V1 pictorialism had to die in order to give birth to a project based on its second virtuality, the virtuality of Zairja thinking.

DANCE, DANCE, DANCE

Norbert Wiener emphasized that the brain is like a computer only when it is *moving through an operation*. Jacques Lacan said the same of signifieds, when signifiers "move through them" in

a sliding operation. Thought is thought only when it is shaken, rattled, and rolled. In this moment, like the electronic network pushed to the limit, short circuits take place. The system is defined by its limits, and its limits are embodied, materialized, *experienced*. There are models galore of this process in literature, theater, shamanistic arts, homeopathic medicine, film, and visual arts. Architecture education has borrowed freely from all of these, but often without consciousness of what the borrowings have meant. The Zairja's detailed history and precision methodology counters appropriations intended simply to "reference" other art forms and ethnographical practices to "inform" the design process. The question should be, "what is it in these sources makes them truly effective?" "How does borrowing get past the primary virtuality (pictorial aspect) of a source to discover its 'second virtuality,' its *capacity for negation/sublation*?"

The positive (= Positivistic) rhetoric of many collaborative activities in studio programs emphasizes collective efficiencies without reference to the real nature of efficient cause. This is the active effect of what has been "ruled out in advance" by the pictorialism of a framed condition. As in the work of the Belgian performance-installation artist Francis Alÿs, what is ruled out in advance is placed in the center of projects but allowed to retain its negative force. Extimity of periphery to center defines an "inside frame" of pure division.

The Zairja list I have personally employed is designed to void the site where the student defensively reports to whoever asks, "What is your project about?" The answer to this question, apart from evasions to be polite by replying conventionally with a pre-prepared statement, should follow the response given by a poet to the same question: "A poem is 'about' in the same way a cat is about the house." Meaning is not determinative; it runs in the reverse direction, centrifugally outward from a voided center to the retroactive multiple causes that have attempted, by locating it, to misrepresent it. Computers can work determinatively to extend a virtual reality of V1 pictorialism, which is easily appropriated by ideology. Or, computers can, in the Zairja tradition, run in reverse, in a quantum direction, toward astonishment. Given that the aim of science as well as art is to astonish, this direction is the right one, or else one is simply not "getting it."

ENDNOTES

- David Link, "Scrambling T-R-U-T-H: Rotating Letters as a Material Form of Thought," Siegfried Zielinski, Silvia Wagnermaier, and Gloria Custance, *Variology: on Deep Time Relations of Arts, Sciences, and Technologies* (Köln: W. König, 2005), 215–266. The characterization of the Zairja as a "reverse computer" is a broad claim. The temporal reversal of the relationship of cause and effect is "forensic" in a way familiar to detective stories. But, there is also an emphasis on the signifier as prior to the signified, a kind of idealism that allows signifiers to visit then depart their signifieds, remaining intact until the next instantiation. This notion has been developed in detail in Jacques Lacan, "Seminar on 'The Purloined Letter,'" *Écrits: The First Complete Edition in English*, trans. Bruce Fink, in collaboration with Héloïse Fink and Russell Grigg (New York and London: W. W. Norton & Co., 2006), 6–50.
- J. N. Hillgarth, *Ramon Lull and Lullism in Fourteenth-Century France* (Oxford: Oxford University Clarendon Press, 1971).
- Daniel Libeskind, "Three Lessons in Architecture: The Machines," *Libeskind*, <https://libeskind.com/work/cranbrook-machines/>: "Writing Architecture Teaches the artless and science less (sic.) making of architecture. As a fully engaged project this machine industrializes the poetic of architecture and offers it as a sacrifice to its own possibilities of making a text. Architecture, like shoemaking, becomes a problem of putting the nail in the right place. Since the Writing Machine processes both memory and reading material, it takes what is projected into an exact account. Not only the city itself (Palmanova) but all places written into the book of culture as here collected and disposed. Through an enlightened vision the random mosaic of knowledge is gathered together into seven times seven faces, each mirrored in a quadripartite realm. The totality of architecture is shattered by the foursome reciprocity of Earth, sky, mortals, and gods, and lies open to a contemporary stocktaking. The four sides of this 'Orphic' calculator, or probability computer, prognosticate the written destiny of architecture, whose oblivion is closely associated with Victor Hugo's prophecy" [emphasis mine].
- The reference to Idris comes from Michael Thompson, *Rubbish Theory: The Creation and Destruction of Value* (Oxford: Oxford University Press, 1979), 65–69. In some respects, the Zairja's enigmatic ability to respond directly to its skeptics is similar to the commentaries that evolved around the use of a similar aleatory divination device, the *I Ching*, a mainstay of Confucian thought and governance for over 2500 years. The *I Ching*, like the Zairja, employed a rebus-like use of binary numbers, seeing them both as positions and values. The Zairja, however, linked its combinatorial numbers to letters and words.
- The theory of trans-crystalline birth was most famously put forward by Macrobius in his widely circulated treatise expanding Cicero's famous essay on the dream of Scipio, invited to heaven by his famous uncle, Africanus. Ambrosius Aurelius Theodosius Macrobius, *Commentary on the Dream of Scipio*, trans. William Harris Stahl (New York: Columbia University Press, 1990). This ancient idea of subjectivity as a crystal laced through with invisible fracture lines coincides remarkably with the Freudian conception of the subject who, pushed to the limit, will fracture precisely along those invisible meridians that constituted its inner structure. See Aaron Schuster, "Is Life a Disease?" in *The Trouble with Pleasure: Deleuze and Psychoanalysis* (Cambridge and London: MIT Press, 2018), 30–37.
- Perhaps the most entertaining entry into this idea is provided by James Surowiecki, *The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economics, Societies and Nations* (London: Abacus, 2004). Surowiecki's point of departure is the accidental experiment of Francis Galton. While visiting a livestock fair in 1906, a prize ox was to be awarded to anyone who could correctly guess the animal's weight. No one guessed correctly, but Galton asked for the receipts and, when he averaged the results, he was astonished to find it to be within 0.8% of the weight determined by the judges. This "ersatz" observation has been the basis of many subsequent studies of emergence, which argue that error and collectivity are not simply coincident with truth but necessary to it. The name for knowledge that is known "by not being known" is *kenosis*, a key component in the theory of the poet's anxiety put forward by the late Harold Bloom. It could be said that *kenosis* demonstrates that the Freudian unconscious has forms that are not simply personal but artistic, ethnographical-cultural, and theological-mythical, and that these forms, far from being "beliefs," are grounded in experiences of precision and singularity. Harold Bloom, *The Anxiety of Influence: A Theory of Poetry* (New York, NY: Oxford University Press, 1997).
- See Lu Beery Wencker, "An Examination of 'L'Idée del Teatro' of Giulio Camillo, including an Annotated Translation, with Special Attention to His Influence on Emblem Literature and Iconography" (PhD diss., University of Pittsburgh, 1970). Camillo's description of the theater is in precise alignment with Ibn Kahlūdūn's metaphor of the retreat of Wisdom to the mountain peak (Wencker, 207). Francis Yates' well-known work, *The Art of Memory* (London: Routledge & Kegan Paul, 1966), failed to address the central Zairja-aspect of Camillo's project and missed the key fact of the first row's negative function as a pivot for the whole, which works as a series of circles rather than semi-circles. The intended user of the memory theater would have been directed to the segment of the "sky" visible at night; the remainder of celestial orbits would be cut off by the horizon's frame. Circular movement, allowing for retrograde, was key to Camillo's idea that the cells could be studied in combinations created by the user. The theater's central void is identified as the "Banquet of the Gods": the Olympians have *left Olympus* to attend a banquet given for them in Ethiopia.
- See Slavoj Žižek, *The Reality of the Virtual*, dir. Ben Wright, 2003, <https://zizek.uk/slavoj-zizek-the-reality-of-the-virtual-2004/>. Reversing the expression "virtual reality," Žižek demonstrates how, in each of Jacques Lacan's three realms of subjectivity — the Imaginary, Symbolic, and Real — a secondary form of virtuality serves as an efficient cause, the means by which formations of each realm become effective. A second or secondary virtuality thus becomes ontologically superior to the "primary virtuality" formed, in the West at least, respectively, pictorially. The secondary is the trickster of the primary, exploiting the gaps and inconsistencies in the boundaries and meridians that stabilize perspectivalism. In Lacan's study of Poe's "The Purloined Letter," the potentially scandalous letter is concealed by placing it in a different space than that inventoried by the secret police. Lacan explains that the word purloined conveys precisely the relationship between these two spaces and their contrasting instrumentalities. Lacan, "Seminar on the Purloined Letter," *Écrits*.
- This is the condition known as the "hapax legomenon," the appearance of a completely new word or idea that, paradoxically, seems completely familiar (the tuffet of Little Miss Muffet or Jonathan Lear's runcible spoon). The hapax demonstrates the effectiveness of "retroactive learning," triggered by an event that brings about an often-fictional memory of a prior moment of realization, the idea that one has "always known something." This retroaction is commonly felt in the appreciation of jokes.
- Italo Calvino, *The Castle of Crossed Destinies*, trans. William Weaver (New York, Harcourt Brace Jovanovich, 1973); *Invisible Cities*, trans. William Weaver (San Diego: Harcourt Brace & Co., 1972). Although the science of autopoiesis, initiated formally by Francisco Varela and Humberto Maturana with the publication of *Autopoiesis and Cognition: the Realization of the Living* (Dordrecht, Netherlands: D. Reidel, 1972), the relations to mathematics did not follow the same line of reasoning as suggested by one of their sources, George Spencer-Brown, whose Ninth Canon of his *Laws of Form* (London: Allen and Unwin, 1969) focused on the idea that any single distinction was, in a quantum sense, simultaneously a double distinction. This leads to the condition of self-inscription, or coincidence of the outer distinction with the inner-most space, what the psychoanalyst Jacques Lacan named *extimité*. See Jacques-Alain Miller, "Extimity," *The Symptom 9, Lacan Dot Com*, <https://www.lacan.com/symptom/extimity.html>. Lacan, unaware of Spencer-Brown's non-numerical calculus, would have been able to connect the "origami" and "quantum" qualities of self-coincident forms, such as the Möbius Band and Klein Bottle, to the problem of the so-called metallic numbers and, thence, to what is loosely described as "quantum conditions."
- The idea of "getting it" comes from Dan Collins, "Psychoanalysis and Education," *Lacunae*, no. 17 (December 2018): 85–104. As with those who fail to "get" a joke, education is also invested by the unconscious and its awareness of retroactive structuring. The student who "gets" a lesson is able to employ it in different circumstances and with different resources than originally presented in the learning experience. Getting it also involves understanding invention as a form of bricolage, of making do with whatever lies at hand and, hence, an understanding of the logics of metaphor (replacement) and metonymy ("sliding signification").
- See Erwin Cook, "'Active' and 'Passive' Heroics in the 'Odyssey,'" *The Classical World* 93, no. 2, Homer (November–December, 1999): 149–167. Passivity and suffering are coupled in ancient literature, with the sense of "suffer" as "to allow" surviving in modern language. This coupling becomes key in the case of the hero's desire for knowledge, coupled in literature with the descent theme (*katabasis*) and domesticated in the traditions of liminal passage during initiation rituals. Willing submission to suffering involves direct references to the margin, especially to the margin as a "too much" condition. The figuration of the margin as a labyrinth couples with the image of the temple as the place of the extreme knowledge awarded successful passage. Combined, the labyrinth and temple form the architectural composite, the *mons delectus* or "mountain of choices," described in a widely distributed polyglot text, *Cebes' Table* (Κέβης Ὀρθάσιος), often illustrated with the image of a circuitous path centered or topped by a Paradise. Cebes, Francis Poyntz, Plutarch, and Desiderius Erasmus, *The Table of Cebes the Philosopher* (London: T. Berthelet, 1530). Alternate translation by Franco Scalenigo, *The Table of Cebes*, <http://www.epitteto.com/TABLE%20OF%20CEBES%20TESTO.html>.
- The stories are collected into a larger narrative, what Roland Barthes called a *récit fort*. This "story-in-a-story" effect is concentric, but at any point one story in the collection can itself contain a new concentric set, suggesting the relationship to fractal geometry. Roland Barthes, "Deux Femmes," in *Éric Marty, ed., Œuvres complètes III* (Paris: Seuil, 1995), 1052–1054.
- As Lacan puts it in *Écrits*, 292, the pure function of metaphor and metonymy are enjoyed by children who first apply the rules to create nonsense constructions: the cat goes bow-wow and the dog goes meow. The position of nonsense as a purifying filter has been recognized by Gilles Deleuze, Roland Barthes, and the Marx Brothers, to name a few.
- By "triangular palindrome," I mean that each additional theme is preceded horizontally to the left and met, vertically, from below. Each theme participates in both a vertical logic of replacement and a horizontal logic of succession. Semiotic triangulation was noted first by Jan Mukařovský (1891–1975), a member of the Prague Linguistic Circle. Each element has two "values," one as content, another as position.
- This reading connects with the "Conway Constant," a stochastically determined number based on an iterative sequence produced by saying a number that is seen. The number 1 becomes "one 1," or 11. This in turn becomes what one literally sees, "two 1's." Then 21 becomes "one 2 and one 1," or 1211, and so on. See Wolfram, Stephen, "Conway's Constant," *Wolfram MathWorld*. Accessed September 21, 2019. As with all of my mathematical references, and also the idea of "Ersatz-Ansatz" method in theoretical mathematics, I am indebted to Alireza Moharrer, an engineer currently managing energy distribution networks in the Bay Area, California.
- If this seems inappropriately mathematical, one should be reminded that Calvino was an enthusiastic member of the OULIPO group of authors, artists, and mathematicians dedicated to the idea that numerics and numerology

- were universal in creativity. This returns to the Zairja's original blend of letters and numbers in combinatorial procedures. The "ambigram" of OULIPO was, tellingly, a graphic palindrome.
18. This is the definition of the *récit fort*, the "strong narrative," that can be revealed in a single story or series of stories or even collection of stories by the same or diverse authors. See Dan Collins, "Stealing Money from Offices," *Lacunæ* 16 (2018): 105–124, 113. Lacan would call the "theme" that detaches from any particular appearance to float freely a "partial object." This floater reverses the position of the signifier and signified, or predicate and predicated. It is the grin of the Cheshire cat, about which Alice remarks, "Well! I've often seen a cat without a grin," thought Alice "but a grin without a cat! It's the most curious thing I ever saw in my life!" The "grin without a cat" is the animating spirit, the disembodied element that arrives to "contaminate" the biological organism, giving it a "second life" that, from the point of view of the first life, appears to be a death.
 19. This refers to the way that intervals created by the sequencing of natural numbers (1, 1, 2, 3, 5, 8 ... the Fibonacci series.) reveal "metallic" numbers that optimize rules of placement, as in the "perfect packing" of the Golden Rectangle or the double spiral of seeds on the head of a sunflower. The metallic numbers involve recursion, as shown by the second-degree equation, $x = 1 + 1/x$. But, more significantly, the cube root of 2 is involved. Such equations cannot be solved with straight-edge and compass, but all such equations can be solved using origami, where the paper of calculation is folded on itself. This in fact provides a solution to the famous problem of the Delian Oracle: the command to double the size of the altar to Apollo at Delos. See Zsuzsanna Dancso, "Euclid's Big Problem," *Numberphile*, Mathematical Sciences Research Institute, <https://www.youtube.com/watch?v=6Lm9EHhBJAY>.
 20. Every culture has its methods and practices of pictorialism. Where the right angle does not dominate as it does in cultures that privilege linear logic, the circle's circumference and radius take over, as demonstrated in Claude Lévi-Strauss's survey of villagers who alternatively represented their settlement either as a series of concentric enclosures or internally divided pie slices. Claude Lévi-Strauss, *Structural Anthropology*, trans. Claire Jacobson and Brooke Grundfest Schoepf (New York: Basic Books, 1963), 132–185.
 21. Žižek: "One of the minimal definitions of a modernist painting concerns the function of its frame. The frame of the painting in front of us is not its true frame; there is another, invisible, frame, the frame implied by the structure of the painting, the frame that enframes our perception of the painting, and these two frames by definition never overlap — there is an invisible gap separating them. The pivotal content of the painting is not rendered in its visible part, but is located in this dis-location of the two frames, in the gap that separates them." Slavoj Žižek, "The Birth of (the Hegelian) Concrete Universality Out of the Spirit of (Kantian) Antinomies," *The Parallax View*, <https://www.lacan.com/zizparallax2.htm>.
 22. I am grateful to Aaron Schuster for noting this valuable connection between (Freudian/Lacanian) definitions of subjectivity and cybernetics. See "Virtual Extinction" in Schuster, *The Trouble with Pleasure*, 37–42. Norbert Wiener's significant chapter on cybernetics' "dark vision at the origins of cognitive science" is "Cybernetics and Psychopathology," *Cybernetics; or Control and Communication in the Animal and the Machine* (Cambridge, MA: MIT Press, 1948), 144–154. It is not surprising that Gilles Deleuze and Félix Guattari's *Anti-Œdipus: Capitalism and Schizophrenia* (Minneapolis: University of Minnesota Press, 1972) makes much the same case: that the emancipation of the mind resembles, if not actually instantiates, a condition of schizophrenia. Wiener's comment in an earlier chapter is germane: "Thus, the brain, under normal circumstances, is not the complete analog of the computing machine but rather the analog of a single run on such a machine" [emphasis mine]; Wiener, *Cybernetics*, 121. The shift from static neural structures to dynamic neural flows focuses on the potentiality for breakdown, and the risks of inhabiting a stark and threatening borderlands reminiscent of Tarkovsky's film, *Stalker*, dir. Andrei Tarkovsky (Moscow: Mosfilm, 1979). The mind is not a computer. Rather, it becomes a computer when it seeks its own potential destruction at the limits of operation. This is nothing more or less than the definition of the Zairja. Wiener has retroactively confirmed the Zairja's status as not just a computer but a computer taken to the essence of the notion of automated thought.
 23. In this light, it is possible to look back at the traditional stories told of rogue computers, whose ghosts-in-machines, once they develop the *stated design goal* of autonomous thought, turn that thought to evil ends. Thus, the fake-calm voice of HAL, the computer in Stanley Kubrick's *2001, A Space Odyssey*, exhibits a clinically correct version of the sociopathic killer. The aim of achieving "true thinking capacity" is cast as a marginal pathology: "like man, like machine." *2001, A Space Odyssey*, dir. Stanley Kubrick and Arthur C. Clarke (Beverly Hills, CA: Stanley Kubrick Productions and Metro-Goldwyn-Meyer, 1968).
 24. Jacques Lacan, "Essay on 'The Purloined Letter,'" *Écrits*, 21. For Lacan, the reality of the unconscious is "out there," in the physical world, present not as visibility but as a second virtuality. This is of course not the literalist's substitution of static matter but, rather, the fully objective Thing that resists subjective penetration. What makes the object into a Thing (*das Ding*) and not a thing (*une chose*) is the cathexis by which it is drawn (unsuccessfully) into a net of symbolic relationships, potential or actual. In this way the perceiving subject is not so much looking at as being looked at; not so much speaking language as being spoken by language; not so much possessing or not possessing (Poe's purloined letter, for example) as *being possessed by* the (missing/invisible) letter. This last reversed prediction shows how second virtuality operates as an Aristotelian Efficient Cause, and how perception's dependence on emergence makes it evident that "the world is a computer" without reducing this claim to a mere characterization.
 25. Francis Alÿs, *When Faith Moves Mountains*, Lima, Peru, 2002, <https://francisalys.com/when-faith-moves-mountains/>.