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David L. Neel
Seattle University

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Recommended Citation

David L. Neel, "Irruption of the New: Truth, Events, History, Parallels, Fidelity," *Journal of Humanistic Mathematics*, Volume 12 Issue 2 (July 2022), pages 411-425. DOI: 10.5642/jhummath.CPQT6604. Available at: <https://scholarship.claremont.edu/jhm/vol12/iss2/22>

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Irruption of the New: Truth, Events, History, Parallels, Fidelity

David Lewis Neel

Department of Mathematics, Seattle University, Washington, USA
neeld@seattleu.edu

Synopsis

A historical meditation on non-Euclidean geometry, three Jesuits, a radical egalitarian mathematical philosopher, and the atom bomb, structured by word-count with attention to divisors of 441 and the Fano plane.

Keywords: arrupe, badiou, lobachevsky, einstein, mateo ricci, euclid, saccheri, event, fano.

It is not that what is past casts its light on what is present, or what is present its light on what is past; rather, an image is that wherein what has been comes together in a flash with the now to form a constellation.

—Walter Benjamin, *The Arcades Project*

Instead of this, the straight line is regarded as the shortest distance between two people, as if they were points.

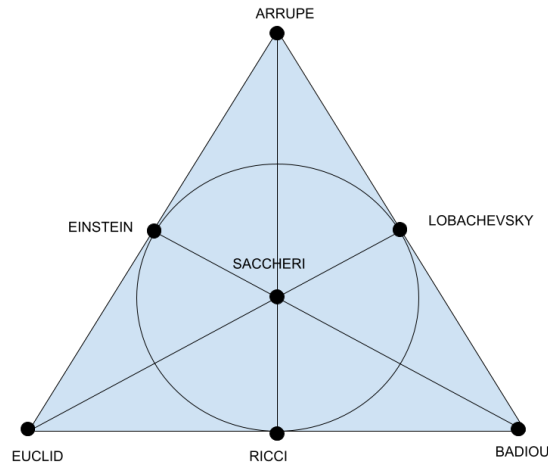
—Theodor Adorno, *Minima Moralia*, Section 20, “Struwwelpeter”

Mathematics is ontology.

—Alain Badiou, *Being and Event*

[21] Fano Plane

3 points per line, 3 lines per point. 7 points, 7 lines total. Possible nontrivial products: 9, 21, 49, 63, 441.



[49] Fano Overture

Gino Fano built a geometry, seven points and seven lines. The Fano plane, the finite projective plane of order two. Every pair of lines intersects in a single point. Every pair of points determines a line. The Fano plane is also an important matroid, which abstracts the concept: dependence.

[441] Giovanni Giralomo Saccheri (1667-1733)

In the center of the geometry (though we shall see how misleading that word “center” can be): the Italian Jesuit Girolamo Saccheri. Born in Sanremo in 1667, he lived 33 years before and 33 years after the turn of the century. He joined the Jesuits in 1685. After ordination in 1694 he specialized in theology, philosophy, logic, and mathematics. His background as a logician sparked the creative move that drove his last great intellectual project. It was mathematical. Geometric. *Euclid Vindicated from Every Blemish*.

An almost spiritual sort of title. To seek to make pure, to redeem. To bring to mathematical salvation that old Greek who would nevertheless remain always so much more famous than he. Saccheri's striving involved, among many other figurings, figures, lines of reasoning, and lines, lengthy creation and analysis of quadrilaterals that should not be able to exist. His logical mind's great innovation was this: to assume that which he believed to be false and then reason forward, carefully, from those mistrusted grounds. If only he could, by sound logical practice, derive an absurdity, some result that conflicted with some other from among *That Which Is Proven Already True*, then he would know, with the cold certainty of classical logic, that his original grounds must be rejected as false... and thus that what he hoped true must be true. Proof by contradiction we call it now. So he created quadrilaterals that must not exist, and derived then from their existence all manner of other objects (which must not exist) and conclusions (which must not be accepted).

He expected that as these absurdities multiplied then surely the desired contradiction must spring forth. Yet it remained elusive. Proliferation of strange results, wondrous new structures and arrangements of novel geometric objects and still nothing that yet contradicted that which must not be contradicted. He constructed whole new geometric worlds, and quested within them for that dearly-sought absurdity, which would bring him his satisfaction and save Euclid at last from scrutiny (though, it is true, by showing his postulate a theorem).

Tragic to be the first to frolic in the New, and yet not recognize it as the New.

And are we less blind to the New that we could have, or make?

Buried within Euclid's Fifth Postulate and these efforts to prove it: explosive potentiality. Existents not yet represented within the mathematical system, present but unrecognized. Flesh and blood misrecognized as spectral by the old Jesuit.

Lacking that which he'd sought, and now near death, he ended his text so: "Proposition 33: The hypothesis of the acute angle is absolutely false, because repugnant to the nature of a straight line."

[63] Interlude

- A line connects any two points.
- A finite line can extend continuously.
- Center and radius define a circle.
- All right angles are equal.
- If a line falling on two lines makes the interior angles on the same side less than two right angles, the two lines, if extended indefinitely, meet on that side on which the angles are less than two right angles.

[441] Euclid (c 325 BCE - c 270 BCE)

For such a well-known name we know so little of his life. His birth is sometime around 325 BCE, his death sometime around 270 BCE. Almost symmetric, himself, about the turn of a century yet to be named. Euclid may not have been producing original mathematics, yet his probably-pedagogical presentation became the standard and reference point. We believe he gathered the works of other mathematicians together into the 13 books of *The Elements*. The book's careful progression from explicitly defined grounding assumptions, through a marvelous proliferation of propositions and theorems was not the founding document of that mathematical way of thinking (we thank or blame Thales for this) but it certainly solidified the practice. Abraham Lincoln carried his copy of *The Elements* with him, always. He claimed it helped him to logically organize his thinking throughout his life.

Euclid's Fifth Postulate, shown above, is logically equivalent with the following, proffered by Playfair, often called the parallel postulate: *If a line is drawn and some point not on that line is drawn, then there exists exactly one line through that point which will never intersect the originally given line.*

It was this Fifth Postulate that attracted the attention of Saccheri 2000 years later. But he was not the first. For most of those 2000 years, one mathematician or another was bothered by it, perturbed by it, felt it gnawing away at them. It is simply too long, you see? Savor the beautiful brevity and concision of the earlier postulates! Shudder at the unwieldy bloat of the Fifth!

Even Euclid himself may have been troubled by the Fifth. True, it may merely have been a preference for parsimony that caused it, but Euclid avoids using the Fifth Postulate in any of his proofs for as long as possible. As if he suspected that it might indeed be derivable from what came before. Euclid and his predecessors are, after all, forging this new way of engaging with mathematical truth. Pythagoras and his followers, among them a fellow named Hippasus, certainly amplified the importance of mathematics, driven to it by their religious conviction that reality itself was Number. *All is Number*. Further, the Pythagoreans believed that all numbers were rational, could be expressed as a ratio of two whole numbers. Here is potential for rupture, the in-breaking of a new world. Hippasus, thinking one day about a square with sides of length one, starts thinking about the length of the diagonal of that square, which length we would call “root 2”. He proves that it cannot be a ratio of two integers. He has witnessed or even brought forth an Event!

Of Hippasus, more soon.

[63] Interlude

In the Fano Plane: Given two points, the finite line containing them extends to include a third, but extends without continuity, with no betweenness. That third, viewed in matroid terms, is dependent on the first two. As the first is on the last two. Etcetera. To be collinear can be thought as commonality. Any three non-collinear points form a basis, echoing linear algebra.

[441] Mateo Ricci (1552-1610)

Mateo Ricci, another Jesuit, is probably most famous as a missionary to China. Ricci possessed an admirable and relatively nonjudgmental pragmatism about him in his approach to the people there. Rejecting usual missionary practice of stamping out local religious practices and rituals completely, Ricci found ways to compromise with and incorporate not only the rites surrounding departed ancestors but also traditions involving Confucius.

A few libraries and galleries contain a fine metaphor for this pragmatism and openness to different viewpoints, for Ricci also created a map of the world. Its labels are in Chinese script, it renders all the world's lands and waters as they were known by European Catholics in the late 1500s. More strange even than the Chinese script on a map created by an Italian Jesuit is the center of this map, for there at the center is China. Ricci not only had this map made but insisted that China be made central. This may not seem radical, but the idea of centrality, actual geometric centrality, held real metaphysical weight. At this moment Galileo has not yet published his work supporting the Copernican heliocentric model of the universe. The Catholic Church is adamantly committed to the notion of Earth being the center of all planets and heavenly realms, for symbolic and theological reasons.

Ricci, then, has transgressed the normal mode of how one is supposed to present the reality of the arrangement of the physical reality of the world. This re-centering of the world, though, carries within it marvelous insights about the nature of Truth that would continue to be unearthed even into our own times. It foreshadows the de-centering of the Earth itself. Nor are these insights unrelated to the axiomatic approach that Euclid's *The Elements* laid out and rendered normative for geometry and number theory across millennia.

And that was Ricci's other great gift to China, along with this re-centered geography. He provided a translation of *The Elements* into Chinese. Note, if you have not before, the pleasing poetic fact that "translation" is a word we use both to describe motion-without-distortion in geometry and also to describe the transplanting of written or spoken words from one language into another, as best we can without distortion.

It is not recorded whether the Fifth Postulate was quite so disturbing to geometers once translated into Chinese.

Ricci died in Beijing in 1610, the same year that Galileo published his observations in support of the sun-centered model of the universe. It was about 100 years later that Saccheri, our logician Jesuit would embark upon his obsessive exploration of his quadrilaterals, and begin his quest to free Euclid of all flaws.

[63] Interlude

As Ricci moved Euclid's geometry primer from Latin to the language of the elite of China, back in Europe, in France, Etienne Pascal and Antoinette Begon followed their paths toward their eventual marriage which produced a son, Blaise. A triangle of numbers that Blaise would write down would be named for him, famously, despite being known in China 300 years before Ricci arrived.

[441] Pedro Arrupe

Pedro Arrupe, a Spanish Basque, was born in 1907, over 300 years after the first Jesuit foot, Francis Xavier's, touched Japan. Xavier's mission had not been a success. Japan then an isolationist island nation, resistant to irruption. Arrupe's time is different. A time of war. Japan with bloody maw, soldiers in China, then the Philippines, then all over the Pacific. Arrupe serves on the outskirts of a town in the south. Those living inside the borders of a nation at war will always have varied stances upon that nation's chosen practices of systematic violence.

Arrupe had arrived in Japan, after completing his PhD in medical ethics, in the late 1930s. His missionary work was also not successful. When the Japanese bombed Pearl Harbor in December 1941, Arrupe was arrested on suspicion of espionage. That Christmas Eve, from inside his cell, he heard motion in the corridor. Sure that his time of execution had arrived, perhaps he found himself thinking of Xavier who died in Japan in 1552, victim of a microbe. Then the sound of Christmas carols rang through the door. Later released, Arrupe was made the Jesuit superior for Japan in 1942, and in August of 1945 was living in the Jesuit residence on the edges of Hiroshima.

Around 17 years after this service Arrupe now leads the Jesuits. He takes part in the Second Vatican Council, which leads to reforms, including this: the sacrament of Eucharist is no longer required to be given in Latin, but now can be celebrated in vernacular. (Ricci smiles from the Hereafter.) Other strict centuries-old rules are relaxed. The whole council, in its way, a struggle to craft a carefully re-axiomatized system.

Arrupe can be recognized as a faithful Subject of Truth at multiple points in his life, including his emphasis on and participation in pushing the insights of Liberation Theology upon the Church during Vatican 2. Also, his steadfast leadership of the Jesuits who persisted in standing in solidarity with the poor in Central America during the 1960s. Arrupe was by then the Superior General, during a time when priests, nuns, and church workers were being murdered by US-trained, CIA-funded death squads in El Salvador and elsewhere. Arrupe had good reason to be unsurprised at the ruthless disregard for innocent life of which the US was capable. He knew the steel spine needed to stand with the poor in Central America. Arrupe said, then, attuned to the rupture with the past, “If we speak a language no longer appropriate to the hearts of people, we speak only to ourselves because no one will listen to us or try to understand what we say” [3, page 228].

Line complete: {Saccheri, Ricci, Arrupe} “Jesuit Order.”

[63] Interlude

Mathematics is ontology.

Being is multiplicity.

The One is not.

Mad wagers, bold interventions in fin-de-millenaire continental philosophy. Badiou would read as a crank if not for the reams of careful mathematics. Sets and categories poetically read as philosophical conditions. All enlisted into the radical egalitarian project.

Maybe he reads as a crank anyway, for still believing that a better world is possible.

[441] Alain Badiou (1937)

Who is Badiou? It depends who you ask. Is he the one who out of pure spite or perversity inflicts set theory upon poor unwitting students of European philosophy? Or does he infect philosophy with Maoism, as Laruelle accuses?

He does not disavow Mao. No, as one who had hopes in May '68 he remains faithful to the Event that there he recognized, and marks it, in part, by holding to that term, Maoist. Badiou is a provocateur.

Mao, the scourge of the imperialists. Mao, the father of modern China. Mao, vicious revolutionary. Difficult even now to get a clear picture, through the radioactive clouds of competing propaganda. Badiou on his Maoism: "Mao's major grievance was as follows: Stalin's vision isn't dialectical. He represents congealed, immobilized state socialism, whereas Mao, as is clear in all his great texts, thinks in an almost infinite way. [...] Mao is, for the time being, the proper name associated with the last great historical experiment, [...] the first to have thought that the state is not the communist solution, but only a new context for that revolution" [5].

So Mao exerts theory in the founding of an alternative in China, like Ricci. Mao re-centers the revolutionary subject in China, seeks to be faithful to the rupture with the past. Ricci centers the mapped world in China. Badiou centers the philosophical map on mathematics (and some mathematicians furrow their brows, as surely some living in China must have in Ricci's direction). Badiou like Ricci deploys fundamental axiomatic mathematics in radically new contexts to generate new insights and transformations, with missionary fervor.

In 1989 as the sclerotic remnants of Lenin's and Stalin's experiment toppled and China struggled toward a future beyond Mao, the Maoist Frenchman Badiou published his *Being and Event*, radical egalitarian anti-capitalist philosophy blossoming forth from rich set-theoretic soil. It's another re-centering move: if ontology, the study of being, is inherently set theory then the mathematicians have been working, unwittingly, in ontology for over a hundred years. He provokes both the mathematicians and the turf-guarding philosophers! A beautifully bonkers book, creative, poetic, brimming with bold pronouncements. He respects the mathematics, too. This is no sloppy bluff.

An Event is a rupture with the world that came before, creating Subjects who will maintain their fidelity to the Truth that that Event reveals. The potential emergence of an Event perches on the edge of the void, in a set whose members are not represented (do not count) in the system as currently structured.

Being and mathematics conjures again the Pythagoreans. *All is Number*. (And “Number” means “rational number”.) What of Hippasus who found a square whose diagonal cannot be rational?

[63] Interlude

In faithfulness to the Truth Event to which he is now Subject, Hippasus shares his insight with his fellow Pythagoreans. He is thrown into the sea. But rather than imagine his fear, let us grant him, speculatively, a more proto-Stoic attitude as he sinks, reflecting upon whether this reality-which-is-number that fills his lungs are rationals, or irrationals, or some mixture of the two.

Line complete: {Euclid, Ricci, Badiou} “China.”

[441] Nikolai Lobachevsky (1792-1856)

Over a century since Saccheri, still Euclid’s parallel postulate vexes. He’s not alone, the Russian Lobachevsky, though he does not know this. Afar, the Hungarian Janos Bolyai is learning the same things, learning what Saccheri learned but without the Jesuit’s firm refusal of the New. Neither are they apart from Carl Friedrich Gauss, in this struggle. In fact, if Gauss is to be believed (when he writes back to Janos’s father, Farkas) he derived all these strange geometries years ago but, in a rather shameful failure of courage for someone who so rarely failed in his thought, he chose not to publish his work. He felt it would be too controversial in those days of Kantian ascendance and Kantian commitment to Euclidean reality.

An interesting stance: does he view the Kantian project as something to support and thus he maintains his silence? But how would so rigorous a thinker acquiesce to a mathematical view he (and he alone, for all he knew) had proven to be flawed? But if not a supporter, then all the more he should share! Sure, the philosopher of Jena might bestride the intellectual landscape, but it isn’t as if Gauss himself is a lightweight. He is a legend.

And it isn't as if mathematical thinking is some radically different order of thought, there's already a long tradition, at this point, of mathematical thinkers being also rather philosophical and vice versa.

So a failure of courage then. Or, is it even worse, just indifference? Somehow that feels the most disappointing, that so powerful and creative a mathematical mind could simply... not think it worth pursuing.

So Nikolai and Janos toil away on it still, not knowing what is crumpled into some forgotten stack of Gauss's scribbles. But Nikolai is the most deeply alone, isolated deep inside Russia. He's not from a rich family, does not bear privilege. (Well, he is a man.) His father is not someone who could write to the Great Gauss and expect a reply. Nikolai seems, even, to have been an atheist. It is too much, probably, to draw a line between his refusal to passively accept that ultimate divine axiom of Being and his ability to abandon, as Saccheri could not, the insistence that Euclid's Fifth must be theorem rather than postulate. That is, he could abandon the belief that Euclid's geometry must be the only true geometry. Perhaps a benefit that he was so far from those lands shadowed by Kant. Regardless, his reputation was resurrected, triumphant, after the Russian Revolution, lauded by the state as an early avatar of free thinking, atheism, radical thought, and humble roots among the people.

Line complete: {Saccheri, Euclid, Lobachevsky} "Fifth Postulate."

Line complete: {Badiou, Lobachevsky, Arrupe} <<label postponed>>

[63] Interlude

Striking, always, so many men. What hidden mathematical truths now still hide only because women were blocked, through centuries and across continents, from the play and creation of mathematics? To exclude, systematically, half of humanity? Active evil. What a colossal waste of insight and thought. Beyond the waste, what alternate inflections and moods might the course of science have absorbed?

Or international struggle?

[441] **Albert Einstein (1879-1955)**

Albert Einstein's *annus mirabilis*, 1905, is also the year when the first Russian Revolution erupts, with the proletariat's revolution only truly arriving 12 years later. Einstein was born just eight years after the Paris Commune. The USSR that would emerge from the Russian Revolution would elevate Lobachevsky's reputation, even naming the Kazan University after him (at least until it was renamed for Lenin in 1925). These revolutionaries in the process of remaking the world cast their gaze back over their own Russian history and exalt Lobachevsky's refusal to accept old givens.

Einstein, in his way, exalted Nikolai too. In the four 1905 papers, Einstein revolutionized humanity's model of the physical real. A necessary step on the path to understanding that matter and energy are one is to rise free from a commitment to Euclid's Fifth Postulate as physical fact. Einstein recognized this new world, ripe, poised to burst forth. Using the non-Euclidean geometry planted by Bolyai and Lobachevsky, grown by Riemann and others, he built new models of the physical. Energy, matter, space, and time are all inextricably interrelated, not fundamentally different at all. In the language of Badiou, he identified in the nature of physical reality a new counts-as-one.

Humanity now knew it lived in a non-Euclidean universe.

40 years later, in Einstein's adopted nation, Robert Oppenheimer in turn carries forward, as part of a massive secret team, this insight on the oneness of matter and energy. Such violent destructive force unleashed in that atom-split called fission. The bomb "Little Boy" would drop from a US plane to kill around 80,000 Japanese civilians. Is this fidelity to an Event by Oppenheimer?

Certainly a new world is here ushered into being. Perhaps we should view Oppenheimer as someone who only after the fact attempted to recast his own role in this ushering forth. Famously, he quoted the *Bhagavad-Gita* upon bearing witness to the successful bomb test: "Now I am become Death, the destroyer of worlds." His own translation, he said. What is much more doubtful is whether he actually did utter these words. He only told the story many years later. No one around him at the time of the test remembers it.

Was he haunted, down through the years, by the spectres of thousands of Japanese children, charred, dead? He never ate much, not even before the war. Colleagues said he seemed mostly to survive on the cigarettes he constantly smoked. Pleasure? Mere addiction? Or perhaps we might imagine instead some poetic commitment to inflict cancers upon his own flesh like those which his bomb spread through such large swathes of Japan.

If so, in that too he succeeded.

Line complete: {Badiou, Saccheri, Einstein} “Evental Site.”

Line complete: {Ricci, Lobachevsky, Einstein} “Re-centering.”

[63] Interlude

Arrupe survives. A small hill (local maximum) is geometrically interposed between the Jesuit residence and the nearly parallel lines of force hurled out from the Little Boy dropped from the bomb-bay belly of *Enola Gay*.

Geometry protects, but only a few.

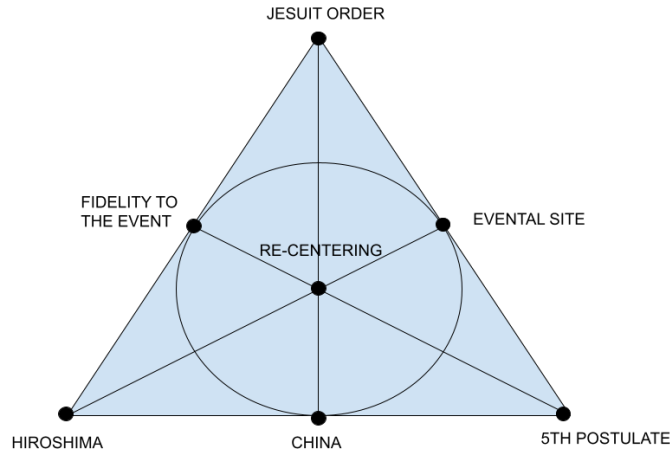
Survivor Jesuit priest, like the atheist philosopher of the Event, each faithful in solidarity with the downtrodden of this current world system.

Line complete: {Einstein, Euclid, Arrupe} “Hiroshima’s Sheltering Hill.”

Line complete: {Badiou, Lobachevsky, Arrupe} “Fidelity to the Event.”

[49] Fano Coda

Geometry with seven lines, none parallel. Each point representable by nonzero vectors with entries from the set $\{0, 1\}$. From the mind of an Italian, born the year of the Paris Commune, lifespan intersecting with Badiou, Einstein, Arrupe. Heir to the post-Euclidean freedom, subject to hidden dependencies and connections.



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And of course also the wikipedia articles for (at least) every proper noun in the text.