## Tom Fecht

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# Refocusing the Euclidian Horizon

Σημεῖόν ἐστιν οὗ μέρος οὐθέν. (*Semeion estin ou meros outhen.*):
*The Sign is that which has no parts.*

Euclid, *Elements*

The common Latin translation *Punctum est cuius pars non est*, which surfaces in all modern languages as *the point is that which has no parts*, contains a jarring inaccuracy. It uses the pre-Euclidean term στιγμή (*Stigmé*) for point and not σημεῖον (*Semeion*) for sign. According to Wolfgang Schaeffner, a cultural historian at Humboldt University Berlin, Euclid's use of *Semeion* is not accidental, and further, its meaning was significantly expanded as a referential operation throughout the fourth and third centuries B.C.[1]

This sets the historic stage for a geometrical zero with surprising entities. We are no longer looking at a pre-Euclidean point-unity but a limit that is nothing; it starts and stops as it connects and interrupts. This point-sign is separated from anything rooted in numbers,[2] not an abstract principle but a multitasking character and operational mode: a sign that *is* and simultaneously *is not*, no longer an object but a relation, a geometric agent with the powerful mission to divide, and "more fundamental than the unit, the 1."[3]

The true essence of Euclid's sign, the genesis of zero, the establishment of a conceptual and numeric horizon, and all related geometric operations have the critical capacity to open the gateway from the realm of the undividable into the divided, border-lining from the ideal into the material, moving continuously back and forth between the concrete and the abstract—or, in today's terms, between the real and the virtual world. It is precisely at this gateway where projection moves in as a transitional operation mode, sharing its material-immaterial stage with fantasy—and in particular with imagination.[4]

By establishing Euclid's point-sign and its operational options as the universal mediator between imagination and creation, Schaeffner's completed analysis[5] might challenge the theory of design and the discourse of analog image theory. The possible impact becomes even more evident in considering that an expanded understanding of "Euclid's sign" also applies to non-Euclidean geometry. In mathematics, non-Euclidean geometry refers only to elliptic and hyperbolic geometry, both of which imply an essentially different concept of the nature of parallel lines.[6] The denial of Euclid's notorious fifth *parallel postulate* neither fundamentally alters nor questions the remaining four postulates and their respective common notions and definitions. Thus, a deeper understanding of Euclid's *Sign* may well reinspire future practice of Euclidean and non-Euclidean geometry.[7]

Habit has generated a certain blindness for the material "stage" that most design performances require: from stone to dry skin to paper, wood, canvas, and film, to the omnipresent screen and the virtual horizon—in any case, a flat two-dimensional surface, which does not exist as such in nature. Yet the projection surface is a primary tool that visualizes operations and materializes the outcome in a technical memory. Thus, a flat table may be regarded as a basic representation of such a material-immaterial stage. Fusing nature with the abstract, it assembles skyward grown wood with the horizontality of geometric lines.

**Finis Terrae**, 1997/2007. (See note at end of essay.)



Once a spirit level positions the table in perfect tune with the gravitational lines of the natural horizon, its surface transforms into an artificial horizon, a doppelgänger flattened out for an expanding gaze at human scale.[8] A design in mind—still to be developed but not yet there—can now be divided into single operations while morphing into something that stretches out "before the hand"[9]—in Vilèm Flusser's terms. Projected onto the pale blankness of the surface, the innocence of the two-dimensional interface gives birth to whatever becomes the project, by "staging" it. Powered by projection, we may conclude, imagination generates horizons always greater than ourselves, pointing beyond our current knowledge base.

The inspiring momentum of *the sign which has no parts* remained surprisingly hidden until early Renaissance and into the end of the 16th century under the dominant pre-Euclidean discourse of geometry represented by Aristotle's *Physics*, which considered the arithmetic of the Pythagoreans as being more fundamental than geometry.[10] Here the dormant potency of the analog code finally explodes.

The algorithms that allow for any drawing or painting, letter or book, and the processing of all calculations could be only generated and processed by the

geometric code. Euclid's *Sign* operates at the foundations of the three cultural key techniques; the *Elements* become their common operational system. Since antiquity, the analog code generated a set of universal tools for measurement, like the gnomon, the quadrant, and the astrolabe, followed by the sector for calculation in the 16th century. These instruments implement geometric operations that become the foundation for numerous sciences, the arts, and innovative engineering, transmitting the geometric code independently from the treatises.[11]

With Alberti, Filippo Brunelleschi, Leonardo da Vinci, Albrecht Dürer, Biagio Pelacani, Lorenzo Ghiberti, Piero della Francesca, and many others,[12] operations of point and lines become the fundamental code for the construction of images, and "those who do not follow these rules will not even be considered a mediocre painter."[13] Most of this is well known and has been widely published, but reading the Renaissance's technical and visual revolution as an outcome of geometric tooling gives us a different starting point and generates a deeper picture of the era.

*Florence & Bagdhad* by art historian Hans Belting is a key contribution.[14] His West-Eastern history of the human gaze distinguishes two visual cultures, "one without pictures or imitations of the visible world, and the other centered on the need to think in pictures in order to explain the world."[15] His research unfolds a double history of perspective originating in Baghdad and the Middle East as a visual theory primarily founded on geometrical abstraction combined with an early anatomic understanding of the human ocular system. Developed by the Muslim polymath Ibn al-Haytham (965–1039/1040), it resurfaced in Renaissance Florence. There, it transformed into a pictorial theory of perspective art to construct images and paint horizons that adopted the focal point of the human gaze. Thus, the common notion of '*being-in-the-world*' transforms into '*gazing-at-the-world,*' as much as the "perspective painting became a symbolic mirror in which the gaze depicted itself."[16] Nature's visible horizon that once moved with the viewer can now be reconstructed. The new viewer, liberated from nature's constructive limits, may now choose his position in front of different horizons;[17] the multiple aspects of the world—still an essential ingredient of new media.

Siegfried Zielinski, a founding figure innovating *Media Archaeology*, introduced the interaction of imagination with the long—and often accidental— history of media technology into this new epistemological field. Inspired by Michel Foucault, Zielinski's *Deep Time of the Media: Toward an Archaeology of Hearing and Seeing by Technical Means* broke established conventions of progressive genealogies and implemented his creative definition of media "as spaces of action for constructed attempts to connect what is separated."[18]

More recently, Zielinski's long-term *Variantology*[19] project compiled the research of an international network of scholars into five volumes with a profound insight *On Deep Time Relations of Arts, Sciences and Technologies. Variantology 4*[20] sets the focus on the *Arabic-Islamic World and Beyond* and includes mathematics, sound, music, clock making, and the relations between image and text. In *How One Sees: A Short Genealogy on the Variation of a Model*, he traces the scientific concepts of the human ocular system against the evolutionary backdrop of the *camera obscura* as a master-concept, revealing the archeological layers of our knowledge base on vision, optics, and visual perception.[21] The genealogic overview spans from the optical canon of the Chinese Mohists in the fourth century B.C.E. to Shen Kuo and Ibn al-Haytham[22] as early protagonists

of geometrical optics into current research on how sight can be restored for the blind. He concludes: "Here, the organ of vision is no longer required as a medium. Machines, which simulate optical stimuli for the brain, replace it. Visual perception functions by direct connection to the visual capabilities of the brain. Physically, we are capable of getting out of the cave (Plato's), but are we capable of leaving it metaphysically, without divine assistance?"[23]

This conclusion reflects, in many ways, the thinking of the Czech-born media-philosopher Vilèm Flusser and recalls in particular his concept of *null dimension*. Design, in Flusser's terms, embraces projection and implies a new form of imagination powered by technology (*Einbildungskraft*). Here Euclid's *Sign* resurfaces finally as a technological power to implement an image by means of abstraction: passing again through the gateway of the point-sign with zero dimension, becoming the gateway of computation and symbolic numbers.[24]

In a recent lecture, Zielinski developed the dialectics of his concept of *deep time* (*Tiefenzeit*) further by fusing the opposition of two philosophical signatures into one creative option, which elegantly connects the past with the future in a double movement: the prospective concept of *design* (*Entwerfen*) as promoted by Vilém Flusser and the retrospective idea of *revealing* (*Entbergen*) by Martin Heidegger.[25] His updated proposal makes deep time a melancholia-free twin-application that implements *Face Time* with current media tooling and practice: a forward- and rear-facing zoom that allows us to refocus the long-lasting relationships between imagination and projection folded into the media practice of the present and the past while anticipating future options.

Applied to the ever-changing horizons of design and artistic practice, this twin-application reminds us of the Italian philosopher Giorgio Agamben revealing the profound ambiguities of contemporaneity.[26] The preferred media-horizon in Zielinski's research becomes the experimental interface between artifacts and systems and their users. Here, "as so often before, the tension between calculation and imagination, between uncertainty and unpredictability, proved to be an inexhaustible fount of discussion about cultural techniques and technological culture." For the media-archeologist, it amounted to "a debate where no consensus is possible, and any dogmatic opting for one side or the other can lead only to stasis."[27] The horizon, conceptually, is a natural border-phenomenon on which the human eye can hardly focus. Thus, it can be read as a perfect image of uncertainty.

What then is the significance of the fundamental sign that has no parts? The multilayered principles of geometric creation in Proclus's commentary resonate a similar magic vision when he mirrors Euclid's point-zero as a "creative force that brings into existence all which is divided."[28] In the respective passage, Proclus establishes a genetic relationship between point, line, and circle by expanding the center point into that which becomes the circle. But the point does not remain ideal, its power is real: as the center of planetary rotation the point's *creative force* becomes a material reality and a source of never-ending movements in the universe, gravity.

Here Proclus's neo-Platonic view recalls in particular the *formless void* in the first lines of the Book of Genesis, where the world's horizon is switched on from a zero's zero by a divine operation, *separating the light from the darkness*,[29] a founding act that still resonates in the cosmological model of the Big Bang

theory. This shortcut reveals Euclid's sign again as a doppelgänger[30] of the divine—and creation.

The separation of light and darkness, however, remains a key operation of creation—not only in photography. The synonym, knowing and not knowing, still determines the fundamental setup of scientific experiment and makes uncertainty a creative institution that belongs to the foundations of science.[31] Here the power of the analog code becomes particularly apparent in the ultimate identity of a continuous code with its representation. Code and representation fuse into one unique expression, 1:1. The horizon, like no other part of the natural landscape, still attracts imagination and emits such a high degree of persistent abstractness. The vanishing point performs as a line, separating the dividable finite from undividable infinity. Its powers recall the point's operational options, while gravity stages day, night, and the seasons for us, as well as the desire to move on into the open.

The stage seems to be an archetype that is as material as it is immaterial. The natural horizon at the open sea fuses with a magnetic attraction that draws fantasy to the straightest of nature's longest and oldest lines. Once bent by gravitational forces, the horizon's curved line became the birthmark of the planet, making it an imperfect sphere and a perfect stage for us—beyond our scale.[32] The infinite sky arched over an open sea already incarnates the key features of the ancient proscenium theater; most of them survived in the still-classic canon of contemporary practice and still determine the signature-architecture of the world's leading theaters today.[33]

*Deep Time of the Media* reconnects us in multiple ways with the long shadow of human imagination. Projecting three dimensions onto a flat surface already makes technical images an explicit construction of Euclidean geometry. Equally, capturing an image requires tools rooted in optical geometry, and requires a set of repetitive operations still close to geometry: pointing, framing, the choice of a standpoint, changing perspective, reframing, focusing, metering, and setting the aperture for depth of field, and so on. Embedded in lens-based media, like photography, however, is imagination, a human gesture from inside the body, with the option to turn the rules of geometry inside out; such a risk-option is of "crucial importance for engaging with media."[34] The shadow-geometry of imagination seemingly adopts the planet as its universal media: governed by the rules of separation, it carries the critical potency to reconnect what had to be divided to become.[35]

In Euclidean space there seems to be no geometrical end—in practice and in theory.[36] Like the still-expanding universe, *The Sign*, geometry's master-tool, maintains the potency to expand again and further beyond its own horizon toward the open, into no-man's-land. Landscape means *framed nature*; its scale can be determined by the distance to paradise, the innocent desire to be naked under new stars again. It is time for *The Sign* to break the wall, unframing the world instead of reframing it.

*Pages 4–9:* Electric Cinema V, VIII, and IX, *Tom Fecht, 2011. All photographs courtesy of the artist, © Tom Fecht, 2012. The image on page 11 is part of Fecht's project* Movement into the Open. *Tom Fecht and Dietmar Kamper (eds.),* Umzug ins Offene: Vier Versuche über den Raum (Movement into the Open: Four Experiments on Space) *(Vienna and New York: Springer Verlag, 2000). The title refers to Martin Heidegger's concept of "Das Offene" (The Open). Ute Guzzoni, former assistant of Martin Heidegger at the University of Freiburg, contributed an analysis of the image for this project. An English translation is available at <http://www. tomfecht.com/photography/guzzoni.pdf>.*

**Endnotes**

1 Wolfgang Schaeffner, "Die Macht des Punktes: Euklid mit Proklos (The Power of the Point: Euclid with Proclus)." The paper was presented at the annual *eikones* convention *Imagination. Suchen und Finden*, Schaulager Basel, November 18, 2010, pp. 3–4 of the still unpublished manuscript. Schaeffner's current research focuses on the theory of structures and geometric operations, the architecture of scientific knowledge, interdisciplinary designs of science, and material epistemology.

2 The *Elements* literally turned the pre-Euclidean hierarchy upside down. Line, circle, square, and all successive elements are rooted in Euclid's point-sign; only Book 7 finally introduces the arithmetical unit as the origin of numbers.

3 Extracted from Wolfgang Schaeffner: "The Sign of Euclid: The Genesis of the Analog Code in Early Modern Europe." The paper is an earlier version of *The Power of the Point* and was presented at the University of Konstanz (Germany) in June 2008. Only the German version of the manuscript has been published on the H-Net information network for art history as "Euklids Zeichen: Zur Genese des analogen Codes in der Frühen Neuzeit," *Bildwelten des Wissens* 7, no. 2, November 30, 2010: *Mathematische Forme(l)n*, Kunsthistorisches Jahrbuch für Bildkritik, Horst Bredekamp, Matthias Bruhn, and Gabriele Werner (eds.); <http://arthist. net/archive/575>. The German and the English versions differ considerably, making exact citations difficult.

4 So far, my brief summary of Schaeffner's findings draws—with kind permission of the author—from all of the above sources.

5 Wolfgang Schaeffner, *Punkt 0.1 Zur Genese des analogen Codes in der Frühen Neuzeit* (Berlin/ Zürich: Diaphanes Verlag) announced for October 2012 as one of three volumes compiling an analysis and documentation of the point-sign as Euclid's main element.

6 Euclid's fifth postulate defines *parallels* as lines that remain at constant distance from each other, even if extended to infinity, whereas the *ultra-parallels* of *hyperbolic geometry* curve away from each other with increasing distance from the points of intersection with the common perpendicular. In *elliptic geometry*, by contrast, the lines curve toward each other with the option to eventually intersect.

7 This includes the non-Euclidean concepts of *absolute* or *neutral geometry* (János Bolyai, 1832), *Affin* and *Projective Geometry* (Felix Klein's *Erlangen Program*, 1872), *Incidence Geometry* (relations of incidence between geometrical objects like point, lines, curves, or planes), and *Ordered Geometry* (Moritz Pasch's concept of *betweenness*, 1882), omitting the basic notion of measurement. Compare also endnote 36.

8 Also compare: Tom Fecht and Dietmar Kamper (eds.), *Umzug ins Offene: Vier Versuche über den Raum (Movement into the Open: Four Experiments on Space)* (Vienna and New York: Springer Verlag, 2000). The title refers to Martin Heidegger's concept of "Das Offene" (The Open). Ute Guzzoni, former assistant of Martin Heidegger at the University of Freiburg, contributed an analysis of the cover-image, the iconic Leitmotiv of the project. An English translation and the image (Finis Terrae, 1997) is available at <http://www.tomfecht.com/ photography/guzzoni.pdf>

9 Vilèm Flusser in a letter to his cousin David Flusser in Jerusalem, from November 25, 1990 (written in German), where he mentions his plan for "an essay on projection (design) in opposition to subjectivity (obsequiousness)"; Flusser died a year later. Letter number 56 of Flusser's archived correspondence at the Vilèm_Flusser_Archive, Berlin. A facsimile has been recently published by S. Zielinki (see endnote 24).

10 Schaeffner, "The Sign of Euclid," extracted from the unpublished English manuscript, p. 3 (see endnote 3).

11 Ibid., pp. 7–8. Pointing to M. Serres, Schaeffner references the Gnomon as the material equivalent of Euclid's point-sign (see endnote 1, pp. 5–6).

12 Schaeffner mentions in particular the Florence artist and engineer Leon Battista Alberti, who resurrects with *Elimenti di pittura* (1435) Euclid's far-reaching vision. In *Ludi mathematici* (1448), he finally realizes calculation with geometric operations (compare also H. Belting, endnote 14).

13 L. B. Alberti, *Elementa picturae* (1436), 336, as quoted by Schaeffner in "The Sign of Euclid," p. 6 (see endnote 3).

14 Hans Belting, *Florence and Baghdad: Renaissance Art and Arab Science*, translated from the German edition (2008) by Deborah Lucas Schneider (Cambridge, MA: Harvard University Press, 2008), 146–149. Belting's detailed overview of the key contributors to the art of perspective adds the mathematician and philosopher Biagio Pelacani da Parma (ca. 1347–1416) as a key figure when it comes to the implementation of mathematical space.

15 Hans Belting, "Afterthoughts on Alhazen's Visual Theory and Its Presence in the Pictorial Theory of Western Perspective," in *Variantology 4—On Deep Time Relations of Arts, Sciences and Technologies in the Arabic-Islamic World and Beyond* (Cologne: Walther König, 2010), 43–52 (see endnote 20).

16 H. Belting, *Florence and Baghdad*, pp. 162–163.

17 Belting dedicates a full chapter of *Florence and Baghdad* to the "Horizon and the View Through a Window," two metaphors that "sum up the new visual culture of perspective" (238–252).

18 Siegfried Zielinski, *Deep Time of the Media— Toward an Archaeology of Hearing and Seeing by Technical Means*, Gloria Custance (trans.); foreword by Timothy Druckrey (Cambridge, MA: mit Press, 2006).

19 The project includes five international conferences and their respective publications (Cologne: Walther König), 2005–2010. The approach reflects in many

ways Michel Foucault's concept of genealogy, which draws from Nietzsche's understanding of morality as a historical and social construction; <http://variantology.com/>.

20   Siegfried Zielinski and Eckhard Fürlus (ed.), *Variantology 4—On Deep Time Relations of Arts, Sciences and Technologies in the Arabic-Islamic World and Beyond* (Cologne: Walther König, 2010).

21   Siegfried Zielinski and Franziska Latell, "How One Sees—A Short Genealogy on the Variation of a Model," in *Variantology 4*, 413–442.

22   Arab polymath known in the West as Alhazens or Alhacen. He was among the first geometers who attempted to challenge Euclid's parallel postulate to be a theorem from the other four by *proof of contradiction*.

23   S. Zielinski, in *Variantology 4*, 442.

24   Siegfried Zielinski, "Designing and Revealing—Some Aspects of a Genealogy of Projection," in M. Blassnigg (ed.), *Light, Image, Imagination: The Spectrum Beyond Reality and Illusion* (Amsterdam: Amsterdam University Press, 2011). Extracted from the original German edition: *Entwerfen und Entbergen—Aspekte einer Genealogie der Projektion*, published as part of the *International Flusser Lectures* series by the Vilém_Flusser_Archive, Berlin (Cologne: Walther König 2010), 7. <http://www.flusser-archive.org/>.

25   Ibid., 50–53.

26   Giorgio Agamben, "What Is the Contemporary?" in David Kishik and Stefan Pedatella (trans.) *What Is an Apparatus?* (Palo Alto, CA: Stanford University Press, 2009), 39–55.

27   S. Zielinski, *Deep Time of the Media*, Introduction, 10.

28   W. Schaeffner, "Die Macht des Punktes," extracted from the manuscript (see endnote 1, 9–10), and the Euclid comment by Proclus Lycaeus (412–485 B.C., in particular, his definitions of the circle).

29   New American Standard Bible, *The Creation*.

30   Double-character that lives on in current software like *Second Life* and its *Avatars*.

31   In quantum mechanics, established as Heisenberg's Uncertainty Principle (1927).

32   Created an estimated 4.54 billion years ago, with a mean radius of 6,371 kilometers, equal to approximately 3,959 miles. Here the concepts of *Deep Time* in geology and media seem to mirror each other on an open stage, where the mind seems "to grow giddy by looking so far into the abyss of time." Concepts similar to the geologic term of *Deep Time* were already recognized by the Persian geologist and polymath Ibn Sina, known as Avicenna (973–1037), and the Chinese naturalist and polymath Shen Kuo, also known as Shen Kua (1031–1095).

33   This includes, for example, a generous *proscenium arch* with a high *flyspace backstage, offstage*, or the *wings*, once granted by the spherical bent. The *thrust stage* once spanned like a gigantic *apron* from the *prospect* of the horizon to the feet of the audience. The shore morphed into today's *house* with a *limited audience* while the darkness—once

separating the ancients from nature's *stage* at night—morphed into the *dark front curtain*. *Archetype* seems to be an appropriate term, since nobody—except for the gods—was ever authorized to *break the fourth wall*, that imaginary barrier at the front of the stage separating the audience from the performance on (horizon's) stage.

34   S. Zielinski, *Deep Time of the Media*, 10.

35   Giorgio Agamben approaches man as the outcome and simultaneously as the very watershed of ongoing divisions and caesuras by expanding Heidegger's concept of "Das Offene," in *The Open: Man and Animal*, translated from the Italian (2002) by Kevin Attell (Palo Alto, CA: Stanford University Press, 2004).

36   Jorge R. Dantas, "The End of Euclidean Geometry or Its Alternate Uses in Computer Design," in *Poéticas de la Disrupcion* (Open Conference System at the University of São Paulo, 2010), 161–164. Download at <http://cumincades.scix.net/data/works/att/sigradi2010_161.content.pdf>.

37   *Electrical Cinema* includes a series of 10 Piezo-Pigment prints, 87 × 229 cm and has been photographed in Ireland (2007), Italy (2008), and France (2011). A complete view is available at <http://www.tomfecht.com/>.
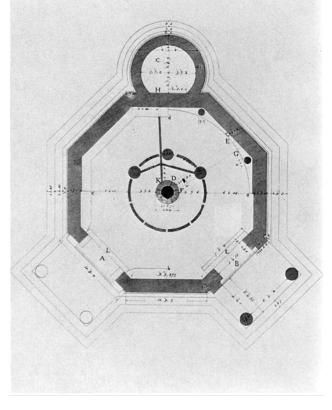
**Bernard Cache**

*developed the concept of nonstandard architecture in his book* Earth Moves, *published by MIT Press in 1995. This concept was given the name "objectile" by Gilles Deleuze in his book* Leibniz: The Fold. *In 1996, Bernard Cache founded the company Objectile in order to conceive and manufacture nonstandard architecture components. He teaches nomadically at many universities and currently at Cornell University Department of Architecture.*

# Instruments of Thought: Another Classical Tradition

**The Antiquities of Athens**, James Stuart and Nicholas Revett. Elevation with sundial lines and plan