

The System that Destroys Itself, or Greenberg's Modernism & the Liar's Paradox

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Abstract: This paper reconsiders the unraveling of modernism in the visual arts in the middle 1960s. Building on Craig Owens' observation that "eruption of language" in the visual arts signaled "the emergence of postmodernism," we here argue that the linguistic-based projects of John Baldesarri, Dan Graham and others catalyzed the rupturing of modernist aspirations to autonomy and completeness by creating the possibilities of pernicious self-reference. This argument draws from a remarkable set of parallelism from the distal domain of mathematics, in which the "modernist" aspirations to purity and self-sufficiency were similarly disrupted by the introduction of seemingly paradoxical self-referential statements, most notably Gödelian incompleteness. This is not to suggest that Baldessari *et al.* were influenced by Gödel, but rather to argue that, as in the case of Gödel's theorems, the work of these artists constitutes a clear response to a property of systematicity itself, namely that increasing denotative power can lead to the collapse of the system.

Keywords: modernism, postmodernism, Greenberg, Godel, incompleteness, art, mathematics

"Could anyone ten years ago," asked the artist and critic Mel Bochner in 1971, "have imagined that 'modern art' would become a period style?"¹ Nearly five decades after the posing of this rhetorical question, Bochner's incredulity seems to spur an incredulity of its own. The now sprawling directions of contemporary artistic practice are driven by the rapid coalescing and dissolving of so many approaches and trends, it can be difficult to imagine an art world in which the grand force of art history was still seen as a kind of actor in the world of artists, critics and dealers. That this grand force was broadly understood through the writings of a single critic—advocating for the work of a single group of older, white male abstract painters—appears almost as an ancient superstition, a Hegelianism that may be rationally documented but never truly shared.

But while the rupture of the narrow teleology of Greenbergian modernism cleared the ground for the broad, synchronic catholicism of the art world after the 1960s, both period writers and subsequent scholars have been at pains to emphasize the ways in which this rupture broke along fault lines retrospectively visible in the lineaments of modernism itself. For figures ranging from Donald Judd to Miwon

¹ Quoted in Robert Pincus-Witten, 1977, 105. Quotation reworded slightly for clarity. Bochner's question was likely a jab a pointed at Greenberg, who had characterized the work of Bochner and his peers as comprising "a style that promises—or perhaps one should say threatens—to become our period style." Bourdon, 1966, 54.

Kwon, this dissolution might be briefly rehearsed as such: as paintings became optically flatter, they drew increasing intention to their actual spatial extension as canvas stretched on supports. As these paintings became more like objects in the “real world,” they raised questions about the relationship between their own real spatiality and the physical forms of their viewers.² And as focus turned to the lived phenomenology of the viewer, the possibilities for addressing issues such as identity construction, political structure and technological upheaval all sprang to the urgent forefront of artistic investigation.

This paper, co-authored by art historian and a mathematician, takes a slightly different approach. While we accept the premise laid out by Kwon, Briony Fer and others that the collapse of modernism in the visual arts developed through a logic delineated within modernism itself, we here argue that this collapse was symptomatic of a much broader unraveling of the intellectual fabric of modernism writ large. Making this case requires a shift in our understanding of what comprises the defining feature(s) of modernism. Rather than the internal features to which Clement Greenberg insisted painting should aspire in order to entrench itself “more firmly in its areas of competence,” we posit that the development of modernist painting can be understood as an example of an attempt to produce a mutually exclusive and collectively exhaustive set of parameters, an encyclopedic system of types.³ This ambition, which Greenberg himself alluded to in “Modernist Painting,” runs in parallel to the encyclopedic impulses within the mathematical, physical, natural and social sciences, as well as humanistic and creative fields including literature and music. When framed this way, the emergence of particular features of art practice in the late 1960s can be seen to follow patterns that resonate with similar developments in other, far-flung fields of intellectual investigation. Among the farthest removed in terms of content, but among the closest of in terms of resonance of form, is the field of mathematics.

The attempt to systematize mathematics, or in technical terms produce completeness in mathematics, emerged in the late nineteenth century. Completeness is a term of art in mathematical logic, but for the purposes of this paper it can be stated as follows: a formalized mathematical theory is *complete* if given any statement *S* expressible in the theory’s language, either *S* or the negation of *S* is provable within the theory. The Vienna Circle mathematician and philosopher Rudolph Carnap

2 Judd, 1965, 809-812. Kwon, 1997, 85-110. See also “One Place after Another: Notes on Site Specificity” *October* 80 (Spring 1997): 85-110. See also Briony Fer, 2004, 198.

3 Greenberg, 1986, 85.

defined the concept this way:

[There is] the conception according to which the completeness of an AS [axiom system JK] requires that the system should encompass and deal with the totality of the theory it is intended to ground, so that each pertinent question which can be framed in terms of its basic concepts must be answerable either one way or the other by means of deductive inferences from its axioms.⁴

Different ways of capturing completeness (or something very like it) were proposed by a number of mathematicians of the time, including David Hilbert and Bertrand Russell. While we will elaborate below on the relevant aspects of these mathematical programs, especially Russell’s theory of types with its distinctly Greenbergian rhymes, the salient feature of these foundational projects was their focus on the creation of a so-called “adequate” formal system for mathematics. The system envisaged by Hilbert would be complete—it would allow all valid theorems to be derived from it—finitary, or, as it was called, *concrete*, and free from internal contradiction. A methodological necessity of what came to be known as the Hilbert Program, was that this last would be shown from within, that is to say, the system would prove its own consistency. This proof would produce, in part, a *grounding*, or at the very least it would assuage worries about the consistency of mathematics as well as other methodological concerns which had emerged in the late 19th century.

Seen in this broader light, the development of modernism in the visual arts parallels the development of foundational programs in mathematics, as another example of a program designed to produce a grounded, necessary, and finite set of laws that aimed towards a completion for their subject. While Greenberg himself offered his own famous articulation of the rules of medium-specificity of paintings to which properly modernist works should aspire, the impulse to rationalize painting as a total system runs through the work of many of the most important early 20th century abstractionists, ranging from the paintings-catalog imagined by Wassily Kandinsky to the aspirations of Piet Mondrian and Kazimir Malevich to realize an aesthetic terminus, a final style beyond which no further development would be possible. By the beginning of the 1960s, there was a collective sense among both apologists and detractors that such an endgame had been reached—the critical rhetoric around Frank Stella’s black paintings providing a

4 Quoted in Alberto Coffa and Wessels, 1993, 274.

particularly clear illustration of the sense that painting had nowhere else to go.

Synchronously with the painting-as-object *cum* real-spatial sculpture trajectory sketched above, another overlapping circle of artists was adumbrating a different way beyond the historical dead-end of painting. Rather than plying the boundary between art objects and actual objects, artists such as John Baldesarri, Mel Bochner, Dan Graham and Robert Smithson rendered porous the division between words and images. As critic Craig Owens has contended, it was this “eruption of language into the aesthetic field...[that was] coincident with, if not the definitive index of, the emergence of postmodernism.”⁵ But while Owens suggests that these approaches drew their power from the way in which they troubled the modernist medium-specificity of both painting and literature, we would contend that the “eruption of language” represents an unraveling of the project of modernism *because of the possibilities for self-reflexiveness it created*. Our contention here is that this auto-referentiality, which was of a completely different kind than the proper self-criticism cherished by Greenberg, hopelessly jumbled the threads that the modernist aspirations to completeness had hoped to fully disentangle.

In the distal domain of mathematics, this looping auto-referentiality conclusively undermined the clean linearity central to the modernist aspiration to produce a delineated catalog of everything.⁶ The key innovation was introduced by the Austrian mathematician Kurt Gödel. In essence, Gödel introduced a novel concept of numerical encoding, under which a mathematical proposition may be viewed, simply, as a number. As syntactic objects became numbers, mathematics developed an ability to “refer to itself”, to frame assertions about its own syntax. Gödel used this technique to encode a modified version of the ancient “Liar’s Paradox,” the classical version of which can be phrased: “This statement is false.”

When pressed, John Baldessari’s *This is Not to Be Looked At* (1968)

5 Owens, 1979, 126.

6 By modernism in foundations of mathematics we mean to refer to the common objective of the various foundational programs that emerged in the late 19th and early 20th centuries, to give a formal reconstruction of mathematics. In technical terms, this would mean embedding mathematics in a formal language with an exact proof concept and an exact semantics, such that the proof concept is sound and complete with respect to the associated semantics as well as syntactically complete in the sense that all propositions that can be written in the formalism are also decided. The Hilbert Program is a canonical example of mathematical modernism in our view. See Kennedy, 2013, 352. for a discussion of other senses of the term modernism in mathematics see Corry, forthcoming as well as Gray, 2008. *Plato’s Ghost: The Modernist Transformation of Mathematics* (Princeton University Press, 2008).

can be viewed as a visual embodiment of the paradox at the heart of Gödel’s refutation of the Hilbert Program (Cover Image, Figure 1). And while this is a strikingly resonant example, this strategy of visual/textual auto-reference became an important leitmotif also in the work of artists such as Dan Graham, Mel Bochner, Lucy Lippard and Adrian Piper. This is not to suggest that Baldessari *et al.* were influenced by Gödel, though there is some indication that awareness of his theories was percolating amongst conceptually-minded artists in the late 1960s.⁷ Rather, we hope to make a stronger claim. As Gödel demonstrated, a robust intellectual structure is potentially *self-undermining*, because it can use its own robustness, its own expressive power, to generate paradoxes. We are suggesting then, that just as in the case of Gödel’s incompleteness theorems, the work of these artists constitutes a clear response to a property of systematicity itself, in which a system’s increasing denotative power must eventually conflict with constraints imposed by self-description. This analogy even suggests that its terms can be reversed: the emergence of postmodernism in the visual arts might be conceptualized as retrospective evidence for a kind of “postmodern mathematics.”

To Complete Painting

In delineating an understanding of modernism that would allow us to figure the established Greenbergian trajectory as an exemplar of broader intellectual trends, it will be helpful to identify our touchstones. This paper, following from Greenberg’s own citation of Kant, will refer to a vision of modernism as animated by the attempt to produce a fully fleshed out system of knowledge, one capable of refining itself as it progressed towards a description of the world in totality. This ambition, inherited from Descartes’ self-criticism as well as Kant’s massive epistemology, seemed to many to be near a possible fulfillment in the early 20th century. Outside of philosophy, this impulse found articulation in many different ways, such as the systems of efficient rationalization that sprang up to manage workforces (Taylorist production) and populations (Foucauldian bio-politics). The drive to produce a fully systematic picture of the natural world animated attempts to produce comprehensive catalogs of the world’s natural species and racial sub-types. It was to this *telos* that Heidegger referred when defining “the fundamental event of modernity” as “the conquest of the world as picture.”⁸

7 Among the most tantalizing of these clues was is P.J. Fitzpatrick, 1973.

8 Heidegger, 2009, 221.

Though such a scientifically inflected quest for completeness may now feel foreign to the development of artistic practice, the optimism that the space of “art,” and specifically, “painting” could be fully described and ordered was a refrain which ran through the ideas of many of the pioneers of what would later be described as modernism. As historian Anthony Julius has described the advent of pictorial abstraction: “There was no turning back. Pictures made by the application of a paint-soaked brush to a canvas supported by an easel and thereafter framed are a mere sub-set of all possible painting.”⁹ For Julius, the development of painted abstraction also entailed the adoption of a rationalizing quest to fully delineate the space of “all possible painting.”¹⁰ Indeed, the emergence of this idea in artists’ writings antedates Greenberg’s theories by several decades—from Wassily Kandinsky’s totalizing system outlined in *Concerning the Spiritual in Art* (1912) to Mondrian’s postulations regarding the objective laws of aesthetics in *Plastic Art and Pure Plastic Art* (1937).

Indeed, Mondrian’s manifesto—completed in Paris the year before he fled to New York in advance of the Nazi invasion of France—marks a key turning point in which the center of gravity of the modernist project shifted from Europe to New York. Although Kandinsky’s writings had been available for decades—excerpts of *Concerning the Spiritual in Art* had been reprinted in Alfred Stieglitz’s influential *Camera Work*—it was only in the wake of World War II that American artists located themselves at the forefront of this project. As such, the writings produced by Clement Greenberg against the backdrop of the war provide a window onto modernism’s transformation into an American venture.

Greenberg cites the originary impulse for painted abstraction in the gradual flattening of the pictorial space in the late 19th century. Pace Greenberg, painting slowly “surrender[ed] to the resistance of its medium,” abandoning its age-old task of turning the canvas into a hole or window through which one could perceive a depicted world. Rather than a transparent membrane, the canvas surface began to figure precisely as itself—as a colored plane that registered only optical depth.¹¹ This reductionism lead to a further purging of outside influence, striving, as Greenberg put it, towards “a purity and a radical delimitation of their fields of activity for which there is no previous example in the history of culture.”¹² In a follow-up essay, published nearly two decades

9 Julius, 2006, 116.

10 For an additional treatment of this theme see Golding, 2000.

11 Greenberg, 1993, 34.

12 Idem, 86.

later, Greenberg would expand upon the precise outlines clarified and reinforced by this drive for purity. “The limitations that constitute the medium of painting,” such as “the flat surface, the shape of the support, the properties of the pigment” were, according to Greenberg, “treated by the old masters as negative factors. However, he maintained, “under Modernism these same limitations came to be regarded as positive factors, and were acknowledged openly.”¹³ In essence, the arc of Greenberg’s modernism has painting becoming ever more exclusively about its own status as painting.

Scholars such as Caroline Jones have offered detailed analyses of the trajectory of Greenberg’s ideas and their ascent into a kind official ideology of advanced mid-century art.¹⁴ But for the purposes of the present argument, the most significant aspect of Greenberg’s theories is the way in which they embrace a foundationalism resonant with the mathematical programs to be adumbrated in the section below. In his key “Modernist Painting” (1960), Greenberg notes that he hopes to draw out many of the features that had heretofore only implicitly structured modernist pictorial abstraction. In so doing, the program of abstract painting could aim to achieve a rigor on a par with that of modern scientific (or for our purposes, mathematical) exploration. In explicating how painting could seek to foreground its own structuring conditions, Greenberg writes:

Scientific method alone asks, or might ask, that a situation be resolved in exactly the same terms as that in which it is presented. But this kind of consistency promises nothing in the way of aesthetic quality...what their convergence does show, however, is the profound degree to which Modernist art belongs to the same specific cultural tendency as modern science, and this is of the highest significance as a historical fact.¹⁵

For Greenberg himself, modernist painting and modern scientific methodology were of a piece with one another, both being constituted within an overarching teleology of refinement towards an unknown but imaginable objectivity.

The many threads of this story—the development of rigorous methodology for modernist abstraction, the refinement of disciplinary exclusivity, the transference of its protagonists from Europe to America—

13 Idem.

14 Jones, 2006, 205-303.

15 Greenberg, 1986, 91. See also Jones, 2006,, 61,82

can be read in a telling series of review Greenberg published in early 1945. In response to an exhibition of the work of Kandinsky, Mondrian and Jackson Pollock, Greenberg maintained a high-handed dismissal of the former artists while offering a nearly unqualified embrace of the later. While for Pollock, Greenberg could not “find strong enough words of praise,” Kandinsky was overly influenced by his relationship with avant-garde music, and Mondrian was “Platonizing,” “naïve” and guilty of having “attempted to elevate as the goal of the total historical development of art what is after all only a time-circumscribed style.”¹⁶ This last charge is a curious one, one which shows Greenberg’s ambivalent attitudes towards the role that History should play in guiding art practice. While he was as convinced as any of the most diehard avant-gardists that abstract painting was impelled by the historical development of Western art, he was less certain that it entailed a historical terminus. For Greenberg, abstraction was the definitive next step. What lay beyond in the stage to follow, he emphatically did not hazard to guess.¹⁷

Painting Exhaustion, or Fighting for Stella’s Soul

Twenty years after Greenberg’s initial abstract painting apologia, and coincident with the publication of his “Modernist Painters” essay, the trajectory he had been tracing seemed to have come to a terminus in contemporary practice. As the critic and frequent Greenberg disputant Harold Rosenberg put it in 1963, “[Barnett] Newman shut the door, [Mark] Rothko drew the shade, and [Ad] Reinhardt turned out the lights.”¹⁸ Indeed, the painter Ad Reinhardt described his black near-monochromes from the early 1960s as “merely making the last painting which anyone can make.”¹⁹ The difficulty that practitioners of reductionism inevitably ran into was, predictably, the depletion of possible elements to reduce. The number of painters working in monochrome (or quasi- monochrome) proliferated, while possible paths beyond this reductionism became harder to imagine.

One of the few artists who seemed to point to a considered way forward was Frank Stella. Although Stella’s canvases were nearly as Stygian as Reinhardt’s, he began inscribing them with lines that reprised the external shape of the canvas. These lines suggested the idea of producing differently configured canvases, and Stella began

16 Greenberg, 1993, 17-19.

17 Idem., 37.

18 Quoted in Kellein, 2014.

19 Glaser, 1991,13.

creating canvases shaped into a variety of geometric forms (Fig. 2). These shaped canvases seemed to provide a realization of Greenberg’s dictum that modernist paintings “impose the picture’s framing shape as a regulating norm with a new force and completeness by echoing that shape so closely.”²⁰ However, Stella’s canvases also presented a danger as well, in seeming to provide a precedent for the venerated tradition of painting eventually degenerating into the production of mere, physical objects. Greenberg’s student Michael Fried referred to this as a “fight over Stella’s soul,” with proper Greenbergian modernism one on side, and the corrupting influence of what would become Minimal sculpture on the other.

In this spiritual tug-of-war, Fried considered himself to be particularly at odds with Carl Andre, a pioneer of sculptural work composed of modular units built not on a pedestal-centric configuration but out into the real space of the viewer. Andre’s floor-bound fire bricks and zinc plates would soon be joined by all other manner of regularized industrial materials: Robert Morris’ plywood constructions, Dan Flavin’s light fixtures and Donald Judd’s aluminum boxes.²¹ As art historian Elizabeth Legge has argued, for Judd in particular the industrial box became the natural afterlife of the now-expired rectangle of painting. According to Legge, Judd “argued that the rectangle had become a "definite form" rather than a "neutral limit," compromised by its association with the rectangle of the conventional canvas. The rectangle, for the minimalists, had come to stand for the exhaustion of painting.”²² In the widely accepted narrative, this exhaustion precipitated an unraveling: the neatly delineated, medium-specific boundaries of boundaries came unwound into what Rosalind Krauss presciently termed “the expanded field” of contemporary art practice. But this turning outwards—painting becoming object becoming postmodern installation—was not the only response to the perceived exhaustion of the signal form of modernism. A different group of artists pushed in a markedly different direction. These artists turned painting more deeply inwards, using the concept of reflexive critique not to install the media more firmly in its arena of Greenbergian competence but rather to undermine this solidity from within. In order to situate this alternative, we must make a detour into the history of mathematics.

Producing Every Theorem, Generating Paradox

20 Greenberg, 1986, 90.

21 Meyer, 2004, 16

22 Legge, 2009, 74.

While Greenberg did not specifically elaborate on the details through which modern art “belongs to the same specific cultural tendency as modern science,” one resonance that he clearly had in mind was the application of self-critical method towards the mutually exclusive and collectively exhaustive delineation of the different entities that populate the space of “painting.” It is very striking that a similar intellectual impulse manifested itself in the numerous late 19th and early 20th century foundational programs in mathematics—in the case of mathematics, as a response to various crises that had emerged alongside the introduction of novel mathematical concepts such as the higher infinite. Indeed, from this point of view, Greenberg’s ideas about the development of modernism as a progressive purification of the genres of cultural production (painting becoming ever more like painting), occupies the same conceptual territory as many of the above-mentioned foundational programs, in particular Bertrand Russell’s type theory, a foundational program aiming to ground mathematics by means of a set of complex typologies that, for reasons of logical consistency, have to be kept rigidly at bay from one another. Specifically, a Russellian type structure stratifies the conceptual field according to a scheme which takes the initial state of the system at the ground level, and then forms subsequent levels by internalization: thus objects at a given level are absorbed into the level directly above; and objects of this next, higher level are equipped with a mechanism enabling them to act on—speak about—the newly internalized objects. This production of levels is then iterated ad infinitum.

Type theory came about as a way of repairing an earlier foundational system due to Gottlob Frege, set out in his 1887 *Grundgesetze*, which allowed the formulation of a self-referential paradox. As Russell explained in 1919,

Normally a class is not a member of itself. Mankind, for example, is not a man. Form now the assemblage of all classes which are not members of themselves. This is a class: is it a member of itself or not? If it is, it is one of those classes that are not members of themselves, i.e., it is not a member of itself. If it is not, it is not one of those classes that are not members of themselves, i.e. it is a member of itself. Thus of the two hypotheses – that it is, and that it is not, a member of itself – each implies its contradictory. This is a contradiction.²³

23 Russell, 1919, 136.

Russell’s solution lay in a *post hoc* rule in which transformations could only move down in the classification schema.

We will return to Russell’s typological repair in a moment, but in order to properly attend to the recursive strategies of 1960s conceptual art, we must address the foundational program put forward in the early 20th century by the German mathematician David Hilbert, which was a sequel to Frege’s. As background, the 19th century saw the rise of what is now called “pure mathematics,” by which is meant the development of mathematics on the basis of methods and concepts of a very high degree of abstraction, completely severed from any overt connection to the empirical domain.²⁴ This shift of perspective turned out to be very fruitful; on the other hand, certain theoretical oddities began to emerge—pathological examples of familiar concepts, anomalies surrounding Georg Cantor’s conception of the higher infinite, Russell’s discovery of an inconsistency in Gottlob Frege’s *Grundgesetze*—generating an unease, if not an outright suspicion, that mathematics had put itself onto shaky ontological, if not even methodological, ground.²⁵

Hilbert took it upon himself to demonstrate once and for all the soundness of these new methods. “No one,” he would famously say, “will expel us from the paradise Cantor has created for us.”²⁶ Moving beyond arguments for the consistency and reliability of mathematical methods based on any exterior, a priori philosophical discourse, at the core of Hilbert’s view was the idea that mathematics would set its own grounding, using the tools of *mathematics itself*.²⁷ The program gave a perfect mathematical expression to this principle of self-reliance: using only finitary concepts, Hilbert sought to prove three core principles: completeness (all statements of the language could be demonstrated via proof, or refuted); self-consistency (no false statement could be demonstrated via proof) and conservativity (all truths could be proved without infinitary concepts).

It is ironic that the crystalline clarity of the program, which surpassed any previous attempt, set the stage for its collapse. This collapse was catalyzed by the incompleteness theorems Kurt Gödel published in 1931, theorems which had a distinct formal resonance with

24 E.g., the Cantorian higher infinite, but also so-called “imaginary numbers” and higher dimensional space.

25 Frege’s 1893 *Grundgesetze der arithmetik* was essentially the first attempt to lay down the basic principles of arithmetic.

26 Hilbert, David, 1918a, “Axiomatisches Denken”, *Mathematische Annalen*, 78: 405–15. Lecture given at the Swiss Society of Mathematicians, 11 September 1917.

27 Hilbert, 1918a,: 405–15.

Russell's paradox, observed by Russell three decades earlier. Hilbert's foundational project entails the use of specific syntax: a fixed, finite alphabet in which every mathematical proposition can be expressed. With this precise syntax in hand, Gödel's innovation was to *arithmetize the syntax* so that each proposition expressible in the language is assigned a number, its so-called *Gödel number*. But then if a proposition can be viewed as a number, this means that a proposition can also say things about other propositions (so long as the latter appear through their Gödel numbers)—in fact, a mathematical proposition can say something about itself.

Of pivotal importance for the aspirations of the Hilbert Program, a single mathematical proposition can be made, not just to refer to itself, but—apparently—to contradict itself. The result of this seemingly harmless innovation was to demonstrate not merely the essential *incompleteness* of the systems the Hilbert Program had put forward, but the incompleteness of all the foundational systems that had been proposed to date, including Russell's type theory.²⁸

The proof of Gödel's first incompleteness theorem can be rehearsed as follows. Consider the statement $S(x)$, which says: “ x is not provable.” Now construct A with Gödel number s such that A is equivalent to $S(s)$. Now, if A , and hence $S(s)$, were provable in the system under consideration, then it would be true, i.e. A would be not be provable. This shows that A , and hence $S(s)$, is not provable, and at the same time it follows that A is true, because what it says is the case. But then the negation of A is also not provable. Gödel's move was patterned exactly after the classical conundrum known as the liar's paradox: “This statement is false.” If it is true, it becomes false, but if false, it becomes true.²⁹

The expressive capacity of the simple theory of types, the system Gödel used to prove his theorem, allowed a pernicious form of self-reference to be implanted within it. This did not destroy type theory—no actual inconsistency had been shown—but it destroyed the grand ambition of the modernist foundational project to systematize mathematics in such a way that the solvability of every question could be, in principle at least, shown.³⁰

28 Gödel referred to his proof as a “parlor trick”. See Kreisel, 1980, 148-224.

29 More precisely, the paradox follows once Hilbert's systems are assumed to be complete and self-consistent. One also assumes that the system under consideration is sufficiently expressive, i.e. it contains enough arithmetic to carry out the arithmetization. Another crucial technical requirement is the representability within the formal system of the informal concept of provability.

30 In the second incompleteness theorem Gödel destroyed the second leg of the Hilbert

The attempt to refine, perfect and purify mathematical practice by reducing that practice to its essential logical core; the idea of purging mathematics of the “ontological and methodological slums that had grown up in it over the centuries”, as Quine would later say, had left mathematicians with a too dry forest.³¹ In the end, it took very little to set it alight.

The Eruption of (Self Referential) Language

While one should not minimize the originality of Gödel's approach, pernicious self-reference had already been shown to be an inherent part of the modernist grounding programs delineated by figures such as Frege. Self-reference had also been used by Cantor, as a way of charting the higher infinite. What was not seen by Russell and Hilbert, was that self-reference could also be used to attack claims of completeness. The very robustness of particularly the systems of the Hilbert School created this kind of blind spot. For the authors, the necessity of this tradeoff—between the expressive power of a system and its facility in producing pernicious self-reference—is the clearest explanation of how and why Greenbergian modernism unraveled in the way that it did.³²

As artists in both the US and Europe made extensive use of textual strategies such as recursion—a phenomenon analyzed in greater depth by historian Liz Kotz, among others—a set of examples illustrate the Gödelian rhymes at work in the art world with particular clarity. Works such as Dan Graham's *Schema (March 1966)* (1966-70), Robert Smithson's *Heap of Language* (1966), Joseph Kosuth's *Definition* (1966), John Baldessari's *This Is Not To Be Looked At* (1968), Mel Bochner's *Actual Size* (1968) and Louise Lawler's *Fragment/Frame/Text* (1984) all employ strategies of self-reference and self-negation in order to inject an instability or undecidability into a larger system. Baldessari in particular

Program, by showing that any system of the type considered by Hilbert and his school, could not prove its “own” consistency in a finitary fashion.

31 The philosopher W.V.O. Quine famously used this colorful terminology in describing the ontologist's task: “On the other hand it is scrutiny of this uncritical acceptance of the realm of physical objects itself, or of classes, etc., that devolves upon ontology. Here is the task of making explicit what had been tacit, and precise what had been vague; of exposing and resolving paradoxes, smoothing kinks, lopping off vestigial growths, clearing ontological slums.” Quine, 1961, 275.

32 Indeed, Owens' argument itself leaves an interpretive gap. Per Owens, the eruption of language “disrupted the stability of a modernist partition of the aesthetic field...dislodg[ing] literary activity from enclaves into which it had settled.” (“Earthwords,” 126.) He does not, however, provide an explanation for why language should play a privileged role as the vector of the postmodern, nor does he suggest a concomitant opening of the textual to visuality. It seems that the dissolution of modernist medium specificity is an effect, then, not a cause, of linguistic profusion.

turned this approach into a leitmotif in his art, and the below discussion draws on key examples from his work from the mid-1960s.

It should be noted that there are in fact scattered references to Gödel in period artist's writings—including a 1966 Bruce Nauman journal entry, a 1969 Carl Andre poem, and most tellingly, a reprint of a non-specialist explanatory article in a 1973 issue of the British journal *Art-Language: The Journal of Conceptual Art*.³³ However, the disconnected nature of these references suggest not so much a case of hidden influence, but an example of the larger art-world interest in contemporaneous developments in the worlds of Cold War era science and mathematics. Indeed, a particular set of artists was drawn to scientific ideas that entailed an essential epistemological limitation: information theory (Dan Graham), entropic decay (Robert Smithson), perceptual psychology (Bruce Nauman, Bridget Riley). These artists, working against the reigning orthodoxy of aesthetic modernism, gravitated towards non-aesthetic ideas that suggested the inherent untenability of such closed teleologies.

It is all the more striking, then, to observe the close resonance with Gödel's ideas.

In the cover illustration, the phrase "THIS IS NOT TO BE LOOKED AT" is written below a photograph of a 1966 issue of *Artforum* magazine, with a bold Frank Stella protractor painting on the cover. The splashy Stella—especially in the context of its appearance on the cover of a mid-1960s issue of *Artforum*—may be taken to refer to the afterlife of Greenbergian formalism in advanced painting. But the ambiguity of the pronoun *THIS* touches off a kaleidoscope of oscillating negations; it at once pleads the obsolescence of late-stage abstract painting, the irrelevance of extrinsic art criticism, and the instability of its author's own textual denouncement. It is in this last reading that the eponymous sentence appears at its most Gödelian, insisting that it itself is "false," or in the visual-art's equivalent, "not to be looked at." To complete the mathematical analogy, we might say that it is the possibility of the third (semantic self-negation) that definitively finishes off the first (modernist aspirations to self-contained purity and completeness).

The deeper one pushes, the more clearly one sees that this similarity is the result of a parallel set of parameters comprising "modernism" in disparate domains. The confusion entailed by Baldesarri's ambiguous "this" operates as conflating the levels of discourse: Stella's painting, *Artforum* criticism of the painting, Baldessari's critique of *Artforum*. Indeed, this pronoun level confusion,

33 See Nauman, 1981,3, Kotz, 2007, 151, Findlay, 1973 and Fitzpatrick, 1973. See also, Nauman, 1970, 44.

this slippage in a pronoun's referential field, is not confined to this one particular example, but recurs repeatedly in Baldessari's work from this period.³⁴

The splitting off of discourse from meta-discourse became especially important to modernism both in the artistic and mathematical domains. Throughout almost of all of its history, painting had been seen to refer in a unidirectional manner: a depiction of a tree may refer to a tree, but one would not have said that the tree referred to its painted depiction. A work of art criticism could analyze a painting, but a painting could not contextualize a work of art theory.

Indeed, it was by contrast with the received genre of supplementary artist's writings that Craig Owens introduced the new development of conceptual text pieces. "For the modernist artist," Owens argues, "writing was not an alternative medium for aesthetic practice; through it work might be explained, but never produced."³⁵ And while these Greenbergian aspirations to divide visual from literary work trace back to Gotthold Lessing's 18th century *Laocoön*, the specific ontological division between modernist work and commentary is legible in Barnett Newman's oft-repeated quip about the irrelevance of art theory to studio practice. "Aesthetics is for me," he remarked in 1952, "like ornithology must be for the birds."³⁶ While intended as a jab at the pontification of critics and philosophers, Newman's aphorism demonstrates the perceived inviolability of the division between the discourse (of painting) and the meta-discourse (of criticism and aesthetics).

A similar inviolability of the levels of discourse had also held sway in mathematics, prior to 1931. Thus a proposition concerning, say, a family of 2-dimensional curves, would not have been thought of as itself a point on such a curve. And we noted above that Russell's type theory has built into it, in order to avoid paradox, a rigid stratification blocking the formation of classes that are not members of themselves. Although this took care of inconsistency, it took Gödel to see the vulnerability of Russell's rigidly typed hierarchy to another kind of quasi-paradox, insofar as type theory claimed to be complete. Russell's discourse/ meta-discourse distinction was thought to be in harmony with, and indeed deliver, completeness—the solvability of every problem. But Gödel's (and Baldesarri's) innovation was to turn this one-way circuit

34 The most succinct version of this kind of referent-play is in his *Wrong* (1967). But the level confusion is perhaps most clearly illustrated by *A Painting That is its Own Documentation* (1966-) 106, which lists the creation and ongoing exhibition history of the painting.

35 Owens, 1979, 127.

36 Quoted in Mattick, 1993, 253.

of reference back around—to use components of system to refer back up the typological hierarchy, thereby, in Gödel's case, undermining the foundationalist ambitions of the time, Russell's as well as others. Without stretching the analogy too far, we might say that, as Gödel's means of overcoming this one-way limitation had been to encode propositions by means of numbers, Baldessari encodes a large body of images (modernist abstraction) by means of an image (a photograph of the cover of *Artforum*).

Different than another painting that would simply participate in the recent history of abstract painting, a photograph reads as an encoding of this recent history *in toto*. Photography as a coding device calls to mind Roland Barthes's well-known essay "The Photographic Message," and we may read Baldesarri's experiments with carefully selected combinations of photographs and text as a demonstration of the power of the caption on which Barthes expounds in this essay. But in light of the present discussion, we may also see the mathematical architecture of Baldessari's critique as a means of complicating Barthes' ideas. In searching for an example of a system as purely denotative as the press photograph is thought to be, Barthes contends that "mathematics" is "a denoted structure without any connotation at all."³⁷ This purely contentless system is a hallmark of the austere modernism of Hilbert's system; but as Gödel demonstrated, connotation, or in foundationalist terms, semantics, are ineliminably present in any sufficiently expressive (or robust) system. Thus the Barthean/Hilbertian aspiration to purity and completeness must remain out of reach.

Perhaps the clearest and most broadly distributed examples of what might be described as this interest in meta-level confounding can be seen in the profusion of the number of artists interested in the map/territory problem. Briefly stated, this philosophical question explores the nature of the relationship between a physical territory and the mapping systems that describe it at a remove (much as a painting might describe a tree, or a treatise might describe a painting). While Robert Smithson and Mel Bochner produced "The Domain of the Great Bear," a speculative essay on universal maps inspired by Jorge Luis Borges' short story of a destroyed map that had a 1-to-1 size correspondence with its territory, other artists including Michael Baldwin and Terry Atkinson (*Map of Itself*, 1967), Dennis Oppenheim (*Annual Rings*, 1968), and Douglas Huebler (various *Location Pieces*, 1968-1971) produced works that aimed to confuse or invert the ostensibly straightforward relationship between a map and its territory. Baldessari himself produced *California Map*

37 Barthes, 1978, 18.

Project (1968), a series of photographic images taken at the places denoted within the letters C-A-L-I-F-O-R-N-I-A in a map of the state (Fig. 3). Though it was certainly intended as a humorous piece (as many of Baldesarri's works were), the *California Map Project* enacts a kind of cartographic impossibility: using the artifacts of the map to generate a newly demarcated territory that could be then re-mapped through the camera.

And while many of these examples operate by means of negative tautologies and foreclosures, Baldesarri's *A Work With Only One Property* (1966-8) offers a kind of counterpoint: a feed-forward mechanism that perpetually defers completeness and closure (Fig. 4). The piece is among Baldesarri's most spare, and consists simply of a grey rectangle of canvas with its title emblazoned in all capital, san-serif font just above the centerline. There is no pronoun ambiguity here: the work with only one property is the painting beheld by the viewer. But the property it has is slippery: it has the property of having the property of having a sentence written on it that declares that it has the one property of having the one property, *ad infinitum*, like a Turing Machine that never halts, being programmed to perform an infinite cycle.³⁸ Viewed as such, *A Work With Only One Property* shows itself as a special kind of *language game*, in Wittgenstein's sense, in which, as Wittgenstein noted of Turing's (diagonal) argument, the viewer acts according to a single tautological rule. As logician Georg Kreisel phrased Wittgenstein's dictum: "Write what you are writing".³⁹

In Baldesarri's work from the period, this gesture ultimately effects an opening out—a new start for a kind of artmaking that hit a terminus in the black monochrome. Evidence for this optimism can be seen not only in the absurd humor that permeates his work, but in his careful selections of text extracts and captions. *Examining Pictures* (1967-8) provides a particularly clear illustration (Fig. 5). Drawing on text with a style appropriated from an instruction manual targeted at hobby painters, Baldesarri rhetorically asks his viewers "What Do Pictures Consist Of?" As expressed in the rest of the text, pictures are seen to consist of their style and subject matter, and the history of art can

38 A Turing Machine can be designed to "feed-forward" endlessly, so that the computation it performs never halts. The so-called Halting Problem, the question whether it can be determined in advance whether a Turing Machine halts or not, is unsolvable as was proved by Turing and Church independently in 1936. The proof relies on a diagonalizability argument essentially identical to that used both by Gödel for his incompleteness theorem, and by Cantor for an essential theorem about infinity. In fact, the unsolvability of the Halting Problem is just another way of viewing Gödel's incompleteness theorem. Turing, 1937 and Church, 1938.

39 Kreisel, 1950, 281.

be considered a history of attempts to enlarge this terrain. While the surface meaning implies a celebration of formalism (the infinite variety is evidenced by “the impressionists” and “the cubists”), there is the sense of Baldesarrian double meaning at play. The text’s impersonal author suggests that this history of art will be a story without a conclusion: “There is no end,” the image reads “to the number of different kinds of pictures.”

Epilogue: Post-Modernity in the Expanded Field

The significance of these resonances between Frege and Russell’s systems on the one hand, and Greenberg’s systems on the other (as well as between the interventions of Baldessari and Gödel), points to the ways in which disciplinary specific histories are constructed not only internally, but also by frameworks and relationships that transcend the specific content domains. It is a property of a descriptive system that as it increases in robustness—the ability to express more and more—it necessarily opens itself up for self-undermining “paradoxes.” Just as Gottlob Frege’s attempt to produce an exhaustive catalog of “everything that can be thought” shares with Kandinsky’s envisioned encyclopedia of every possible painting a modernist aspiration to completeness, the realization of the fundamental impossibility of this project set off a parallel set of responses.⁴⁰ For an historian of art and culture, this kind of structuralist thinking represents a departure from standard approaches, which (for good reasons) privilege local conditions and responses as explanatory of historical change. But for the historian of science and mathematics, for whom the parameters of epistemic possibility are more central to disciplinary narratives, what can the distal cultural expression of resonant ideas illuminate about the history of mathematical ideas?

Numerous historians and critics have characterized the period following the rise of conceptual art and minimal installation as one of postmodern eclecticism. Without the sense of somewhere that art was impelled to go, a *telos* towards which it must drive, artists felt free to go anywhere. Refuting her once-mentor Clement Greenberg, Rosalind Krauss famously diagnosed this as a “post-medium” condition, in which the narrative of medium specificity had to be obviated by a willfully grab-bag approach, in which artists might use means that were electronic or analog, spatial or imagistic, in service of their project. The critic Achilo Bonito-Oliva coined the term “the transavantgarde” to describe an Italian cohort of artists who rejected the linear march of History, one that an

40 . Frege, 1984, 112-21. Kandinsky, 1994, 170.

enterprising artist might aspire to lead. Rather than wrestling with their immediate predecessors and surroundings (as the avant-gardists had done) choosing instead to draw on sources ancient and recent, proximal and distant.⁴¹

From the foundations of mathematics point of view, it is striking that the loss of *telos* following the collapse of the Hilbert Program was also marked by a thoroughgoing eclecticism. This was manifested in the immediate aftermath of the incompleteness theorems by a splintering into subprograms founded on distinct *weltanschauungen*, whether platonistic or pragmatic, phenomenological or—somewhat incongruously in the wake of the incompleteness theorems—formalist. And while the mathematics of such programs continue to be actively pursued, more recently an even deeper eclecticism has set in within the foundational community at large, constructed from the search, not for a grounding but for an unveiling—a laying bare of the practice *in situ*, rather than in the shape of a formal reconstruction of it.

“Is it alright?” the philosopher Ken Manders has asked, taking note of this moment in foundations of mathematics when the pursuit of an absolute grounding gave way to the idea of “making clear”:

Is it **all right?**, traditional epistemology asks about knowledge claims. All schools in “logical foundations of mathematics” share this concern for reliability. But a long-term look at achievements in mathematics shows that *genuine mathematical accomplishment consists primarily in making **clear** by using new concepts:* ...Representations and methods from the reliability programs are not always appropriate.⁴²

Manders is asking whether the center will hold through what one might call the post-modernist turn in mathematics, now that the concept of truth—in the absolute sense—is out of view. For Gödel’s incompleteness theorems—an inevitable consequence of the eruption of language into the *mathematical* field—had ruptured the bond between truth and proof, revealed an epistemological horizon; a boundary beyond which true theorems may exist, but which can never be broached by mathematical demonstration (in the formal sense of the term).

In this way, and, as must be said, somewhat in opposition to Gödel’s own view, the incompleteness theorems figure as part of a larger abandonment of the (absolute) concept of truth in the philosophy

41 Krauss, 2000. Bonito Oliva, 1982.

42 Manders, 1987, 194-211. Bold face and italics in original.

of science. The pragmatist philosopher Richard Rorty, for example, sustained a forceful attack on the notion that science altogether (so not just mathematics) has a privileged access to an unknown but imaginable objectivity. As for naturalism, a dominant position in the philosophy of mathematics nowadays, the search for a sharp notion of truth is generally viewed as irrelevant to the naturalistic project of “tracking the practice.”⁴³

Perhaps the term post-modernism can be admitted as a variant on, if not a successor to, naturalism in mathematics. For the tendency to prescind from ideology, if not from a priori philosophical discourse altogether; to lower one’s foundational ambitions; in particular the idea of pursuing grounds, if at all, locally and opportunistically, rather than globally and absolutely; and thirdly, the idea of fractured grounds—if mathematics is even thought of as grounded in the first place—are all consequent upon the path that led, in our view, to postmodernism in art: the eruption of language into the aesthetic field, setting the stage for pernicious self-reflection, followed by the collapse of the genre. What ensued in art was a patchwork practice; what is left of foundations of mathematics is a patchwork of theories, or in the philosopher Mark Wilson’s terminology, theory façades—an atlas, rather than a scaffolding:

In the days of old Hollywood, fantastic sets were constructed that resembled Babylon in all its ancient glory on screen, but, in sober reality, consisted of nothing but paste-board cutouts arranged to appear, from the camera’s chosen angle, like an integral metropolis. In the billiard ball case, we witness sheets of mechanical assertion that do not truly cohere into unified doctrine in their own rights, but merely appear as if they do, if the qualities of their adjoining edges are not scrutinized scrupulously...they represent patchworks of incongruent claims that might very well pass for unified theories, at least, in the dark with a light behind them.⁴⁴

For the postmodern mathematician, *encore mieux*—the working mathematician has always pushed the quest for the unified theory to the borders. For the modernist mathematician, the quest for the unified theory remains urgent. Post-modernism in science, and in particular Rorty’s recommendation “to view science as one genre of literature, or, put the other way round—literature and the arts as inquiries on the same footing as scientific inquiries;” his synchronic, directionless view of scientific

43 Kennedy, 2013, 352.

44 Mark Wilson’s *Wandering Significance* is a masterpiece of what one might call late modernism in the philosophy of mathematics. Wilson, 2006, 204.

inquiry, has always been viewed by the modernist as putting mathematics directly in the path of Bonito Oliva’s notion of the *transavantgarde*: an endless plane of options with no criterion capable of making comparisons of value.⁴⁵

We close this paper by noting that both Rorty’s pragmatism and Bonito Oliva’s postmodernism seem to have provided an unexpected coda to Greenberg’s assertion that “Modernist art belongs to the same specific cultural tendency as modern science.” Of course what Rorty saw in hindsight, Greenberg could not have predicted: that intellectual structures and cultural tendencies can become self-refuting.

45 Rorty, 1982, xliii.



Figure 1: John Baldessari, *This Is Not To Be Looked At* (1966-8) Acrylic and photo-emulsion on canvas, 59 1/4" x 45 1/4" Collection of MOCA Los Angeles

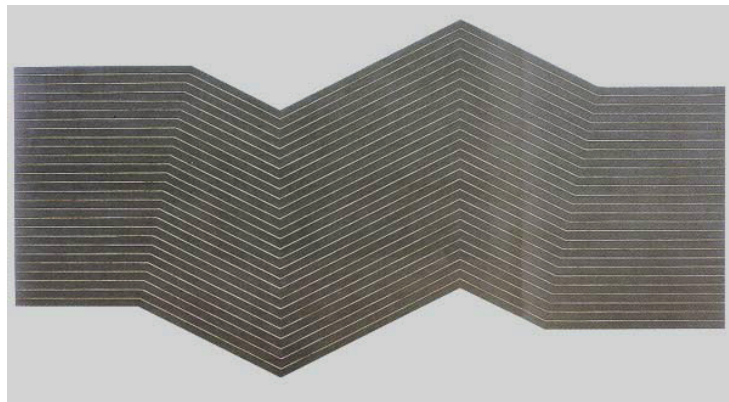


Figure 1: John Baldessari, *This Is Not To Be Looked At* (1966-8) Acrylic and photo-emulsion on canvas, 59 1/4" x 45 1/4" Collection of MOCA Los Angeles

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Figure 3: John Baldessari, *California Map Project* (1969) DETAIL Eleven mounted chromogenic prints, 8" x 10" each Private collection

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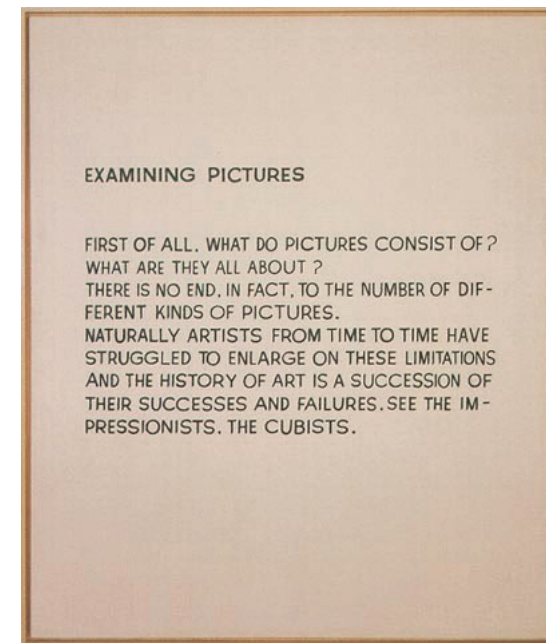


Figure 4: John Baldessari, *Examining Pictures* (1966-7) Acrylic on canvas, 68" x 56 1/2" Private collection

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