

John Robison
Art Humanities
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Final Assignment

Section I: Introduction to the Work

The Street, The Store: Pop Art and Consumer Culture is a section of the Art Humanities curriculum focused on the work and legacy of Andy Warhol. Andy Warhol was interested in creating work that reflected contemporary American values and problematized the logical extremes of consumerism. In addition, his work implicitly suggested that all modern art is derivative of past work; and that the very notion of originality is innocuous in a society that only consumes that which we are comfortable with—naturally, this suggests that truly original thinking is by definition uncomfortable for the masses, and thus cannot be popular or in demand in a consumer-driven society. Although Warhol played to this consumer culture and often produced art in an almost industrial fashion, the very mechanisms he utilized to generate art also served simultaneously as a satirization of our society's larger values.

An interesting work to put into conversation with Warhol's work and larger philosophical constructs is *Die Primzahlen* (see Figure 1), a work by Rune Miels, a German artist interested in exploring the relationship between numbers and symbols. Similar to Warhol's work, Miels' work does not necessarily present any new or distinct methods of portraying art. Her subjects are largely derived from mathematics; and her work appears to be somewhat mechanical in nature. However, Miels' methodology offers an interesting complement to Warhol's own system; and thus, the inclusion of Miels into the Core Curriculum would enable students to better understand how this mathematics-inspired art can further the dialogue surrounding Pop Art and

Consumer Culture. However, before we can discuss these larger ramifications, it is essential to first focus on the formal qualities of *Die Primzahlen*.

Section II: Formal Analysis

Die Primzahlen is a structured, well-ordered, but not entirely symmetric acrylic on canvas painting. The lines outlining the numbers are hard, straight, and mechanical in nature. Conversely, the lines outlining the letters are softer but still retain the straight, mechanical characteristics. The lines clearly create and define distinct shapes in space. The numbers are all equal in size. The letters are also all equal in size, and larger relative to the numbers. Although the canvas is two-dimensional, the numbers appear to be physically further forward than the letters—thus, creating the illusion of three-dimensional space. The artist creates this illusion primarily through creating a contrast between line types and color schemes. The hard edges of the numbers compared to the softer edges of the letters makes the numbers feel distinctly more in focus. In addition, the use of black for the numbers, white for the letters, and a permutation of gray filling in the remaining background space further creates a contrast that places the numbers in the foreground and the letters in the background. By using a slightly whiter version of gray, the letters appear closer to the background medium than the numbers do (using color similarity as a metric space measurement between objects). Because the majority of the surface area of the work is either white or white-gray, the segments of black create a strong contrast that further emphasizes the forward nature of the numbers. The texture is relatively homogeneous throughout.

At first glance, the numbers are arranged somewhat haphazardly. The contextual overview will slightly contradict this statement; but for now, suffice it to say that the arrangement of numbers is essentially random. The only string of cohesion amidst the

randomness is that these numbers run in a parallel grid across the canvas: thus, amidst the randomness, there is an underlying system of order. The letters, by contrast, are arranged so that they fill almost the entire space. Because these letters form words—the statement “Die Zahlen sind die Drogen,” to be precise—each word occupies a distinct line in space. The two core elements in this work are the numbers and the words. Although they are distinct in many regards with respect to their color, texture, lines, and spacing, the elements are ultimately unified by the overlapping sets of parallel lines that keep both sets of elements along a structured grid. The work is asymmetrically balanced, as neither the numbers nor the words fall along any particular axis in a symmetric pattern. The elements within the work generate rhythm through their repetition of consistent form: the increasing string of numbers creates a cascading effect that establishes a sense of visual flow from the top left to the bottom right of the canvas.

This work is largely an homage to the ephemeral nature of prime numbers communicated via a physical medium. The statement “Die Zahlen sind die Drogen” is translated into English as literally meaning “the numbers are the drugs.” This is a reference to how mathematicians often see their discipline as simultaneously art and science. Although mathematics has rigorous standards and narrow definitions of truth, the ultimate goal of mathematics is the pursuit of truth for its own sake. These numbers, therefore, have no purpose other than to engage, excite, and serve as “drugs” for both the mind and soul. The numbers’ positions across the canvas are meant to mirror the position of the first prime numbers in a sequence of one hundred natural numbers using the Sieve of Eratosthenes (we will define these terms later). Thus, the balance between symmetry and asymmetry found within this canvas is meant to reflect the larger mystery and curiosity of prime numbers that mathematicians have sought to explore for thousands of years. Therefore, an analysis into the order and chaos found in this work may serve as a primer for

more ephemeral questions that often spark the curiosity of individuals who devote their lives to mathematics. This acrylic on canvas work serves as a gateway drug of the curiosity of prime numbers to the inquisitive observer and invites them to explore further into the infinite mysteries of mathematics.

Section III: Connection to Pop Art and Consumer Culture

Although both Warhol's and Miels's works are largely mechanical in nature and represent derivations of existing form, Miels's work into the physical representation of prime number theory strongly challenges Warhol's postmodernist philosophy. Postmodernism largely posits that truth and systems of value are by and large socially constructed and conditioned, so Warhol's art largely satirized past forms of modernism with its strict adherence to unoriginal, copied, or repetitive work. His work is largely deconstructive in nature, in which his art criticizes consumer culture which is driven by economic prosperity and highlighted by a ritualistic obsession with celebrities. Conversely, Miels's work serves as an intellectual counterweight to postmodernism. Whereas postmodernism largely serves as a critique of Western values and empirical, generational knowledge, mathematics and its pursuit of absolute truth represents the pinnacle of this form of knowledge. Indeed, Number Theory, which is largely regarded as the purest and least applied form of pure mathematics, represents an empirical quest for truth completely abstracted from the quest of truth for economic or political advantage. Therefore, whereas Warhol's work serves fundamentally as a critique of generational empirical knowledge, Miels's work serves as a bastion of the power and beauty that resides within such generational knowledge. However, these artists are by no means fundamentally contradictory: as Warhol's work deconstructs social norms and critiques the status quo without seemingly offering any sensible alternative, Miels's work represents a solution to Warhol's critique: namely, a shift away

from art dominated by consumerism and back towards purer forms of knowledge in which truth is fundamentally paramount to immediate financial profit. Thus, while postmodernism offers an effective critique of contemporary social conditioning, pure mathematics reminds us that certain aspects of truth can and should be pursued for their own sake, regardless of current social conditioning or immediate financial gains.

Section IV: Connection to the Broader Core Curriculum

There is a fundamental beauty that exists within mathematics. The ability to describe or categorize nature within a finite set of equations is remarkable in its efficacy and scope. Furthermore, the pursuit of mathematics is to understand the world on a macro level through various forms of abstraction. This is done by reducing the physical realm to numbers and then bringing the full force of mathematical analysis to bear upon these numbers so as to derive meaningful insight towards larger relationships and patterns. Conversely, the goal of art is to understand the world and express the human condition on a micro level through various physical mediums. Therefore, although the goals of these disciplines may seem disparate at the surface, they are in fact fundamentally and inextricably linked as two sides of the same coin: the quest to understand and derive beauty at the inflection point between the chaos and order that govern the natural world. However, although these disciplines both seek to uncover beauty, the nature of academia has essentially divorced the two topics. Rarely (if ever) do mathematicians use art as a means to explain a difficult concept; conversely, it is equally unlikely for an art historian to begin writing down a series of equations in order to better understand a work of art.

However, I believe that both branches of academia are missing out on substantial pedagogical and epistemological improvement across their respective disciplines. How many mathematics majors spend their whole lives writing down thousands of lines of equations

without ever truly understanding the visual beauty that captures these concepts? Similarly, how many young art history majors examine works critically without also appreciating to some degree the mathematical framework that fundamentally underlies the chaos or order captured within the work? Therefore, in order to truly create an interdisciplinary core curriculum that facilitates the Beginner's Mind, students should be able to not only feel comfortable with both entry level mathematics and art history; but there should also be fruitful conversations across disciplines discussing how each specific department could feasibly enhance or augment the other department. Only through intense, interdisciplinary collaboration can Columbia College students truly take full advantage of the core curriculum.

However, the next logical question is naturally: where should we start with our conversation regarding the intersection of mathematics and art? Many works of art can be described by concepts in Projective Geometry such as linear perspective (most notably works from Hellenistic- and Renaissance-era artists) or concepts in Chaos Theory such as the entropy of Markov processes or stochastic physics (which relate closely to the order of randomness found in a Picasso or a Basquiat work). Unfortunately, these mathematical topics are rarely covered by first-year undergraduates and thus would not be suitable as an inclusion into the Art Humanities curriculum.

Conversely, elementary topics in Number Theory are relatively accessible for the reader and also have many applications to modern art. Consider the work I have chosen for inclusion into the Art Humanities curriculum: it is an artistic interpretation of the Sieve of Eratosthenes. The Sieve of Eratosthenes is an algorithm developed in Ancient Greece by a mathematician, Eratosthenes, in order to "sieve" out all prime numbers from a set of N natural numbers. A natural number is essentially a number you can count, such as 1,2,3,...etc. A prime number, for

the purpose of this exercise, is simply a natural number that cannot be non-trivially factored (i.e. represented as the multiplication between two smaller natural number numbers other than 1 and itself). For example, 17 is only equal to 17 multiplied by 1; thus, 17 is a prime. Conversely, 15 can be represented as the multiplication between 15 and 1 but also between 5 and 3. Thus, 15 is not a prime number. The Sieve of Eratosthenes therefore works as follows: take numbers between 1 and N (for the purpose of this essay, consider numbers between 1 and 100). For every number that is a multiple of a prime not including this prime, cross out this number. Continue this process for every non-crossed number until only the numbers which are prime remain.

Therefore, the inclusion of Miels' work is now apparent: there is a substantial need for mathematicians and art historians to work together in order to enhance the pedagogy of both disciplines. However, this collaboration is unlikely to ever happen unless it is instilled at a young age; therefore, the need to focus undergraduate core courses on interdisciplinary collaboration is apparent. The inclusion of Miels' work offers that bridge between mathematics and art history. Her chosen subject area of prime numbers and Number Theory is accessible enough for undergraduates of all backgrounds to understand. Furthermore, the ability to combine formal analysis with mathematical analysis provides two concurrent layers of depth and breadth that enable a level of comprehension for art that would not exist otherwise.

Section V: Connection to the Broader Art World

Warhol's fundamental critique of the art world was that the pursuit of originality and truth is often marred by the need to generate cash by producing largely derivative, repetitive works for wealthy vendors who have neither the stomach nor the inclination to understand truly meaningful, original work. In addition, he seemed to call into question whether this pursuit of originality was even possible. Conversely, Miels' work reminds us that the fundamental truth

and beauty contained within pure mathematics can always center us in first principles and foundational truths, even when the outside world is marred by contradictions and often replaces the pursuit of truth for the maximization of personal and financial gain.

However, Warhol's critique was largely based on an old system of the world in which a few wealthy vendors and collectors decided whose work did or did not get purchased or seen; but this is no longer the case. Advancements in Number Theory and Computer Science have led to the field of Mathematical Cryptography, which is essentially the science of making and breaking codes. This in turn has led to the development of blockchain technology, which is a new internet protocol that aims to use heightened security protocols to transfer power from massive corporations back into the hands of everyday people. Blockchain technology has led to the development of Non-Fungible Tokens, which are digital assets that enable anyone to buy or sell cryptographic signatures that guarantee you own a specific digital asset. And why does this matter? Because up until this point in history, elite vendors controlled who could or could not have access to the upper echelons of the art world. The bias of curators will always skew representation and authentic voice. However, in the era of blockchain technology, artists will no longer have to appeal to traditional vendors; instead, they can publish their work directly to the internet and raise money by selling an NFT of their work. Because only they can own the unique cryptographic hash function assigned to their work, it is computationally impossible to copy or edit this work. What this means is that blockchain technology will give more agency to individual artistic voices and ensure the inclusivity of the art world is not determined by the biases of endowed institutions with their own special interests. Thus, from its humble beginnings in ancient Greece and the Sieve of Eratosthenes to the development of Mathematical Cryptography and blockchain technology, prime numbers have come full circle to serve their

original purpose for humanity: namely, as a democratizing tool to enable all people to partake in expressing their unique vision and truth. Thus, the Sieve of Eratosthenes as represented by Rune Miels' *Die Primzahlen* offers a unique look into the beautiful past of mathematics; but also provides a glimpse of the potential future of art paired with mathematics in the form of Non-Fungible Tokens. Therefore, understanding this fundamental intersection between mathematics and art should be a categorical imperative for the Core Curriculum; which completes my original argument: Rune Miels' *Die Primzahlen* should be added to the Core Curriculum.



Figure 1

Title: *Die Primzahlen* (translated as “The Prime Numbers”); **Date:** 2015; **Origin:** Germany;

Artist: Rune Miels; **Medium:** Acrylic on Canvas

Works Cited

Aylesworth, Gary. "Postmodernism." *Stanford Encyclopedia of Philosophy*, Stanford University, 5 Feb. 2015, plato.stanford.edu/entries/postmodernism/.

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