

Physics and Film in Postmodernism: Demystifying the Created Art in Gravity's Rainbow

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Film's multiple identities—art, industry, technology, activity—can be difficult to tease out, and even more difficult to separate from the herd. But reminding ourselves that film is, in the end, a play of chemical reactions, lights and shadows is one way out of narrative thrall. Reading film through Thomas Pynchon's *Gravity's Rainbow*, Jessica Durgan argues that Pynchon sheds the modernist paranoia surrounding mass art, by reminding us that, at base, film is a science, a math.

In *Gravity's Rainbow* (1973), Thomas Pynchon makes a jarring yet intriguing juxtaposition: he compares film and calculus, calling them “both pornographies of flight” (567). While it may seem strange and almost incoherent for Pynchon to compare a creative art with a mathematical science, Pynchon's almost encyclopedic knowledge places film and calculus much closer together than the average layman, reader, or academic realizes, as evidenced in several critical works on *Gravity's Rainbow* which discuss Pynchon's use of science and film under separate chapter headings. Film is commonly considered a creative art: its technical and scientific basis is often overlooked. Pynchon, however, realizing the inaccuracy of this neglect, systemically exposes his reader to film's technical components in an effort to illustrate the connection between film and science. As an author, he attempts to strip film of its creative aura, that which gives art its ideological power, and instead places film into the scientific world, the world which he, as an engineering major from Cornell, understands, thus demystifying the art form and undermining the hold cinema has had upon popular culture in the 1960s

and 1970s.

As previously stated, the connections between film and calculus are stronger than is commonly known and Pynchon illustrates this relationship by comparing the two at several points throughout the novel. By the time Slothrop calls calculus and math the “pornographies of flight” (567), the seeds of the concept have already been planted by the characters of Franz and Leni Pökler earlier in the novel. In one scene, the couple have attended the cinema and seen Fritz Lang's *Die Frau Im Mond (By Rocket To The Moon, 1929)*. While Franz, a rocket scientist, is unimpressed, Leni sees in the film “[...] a dream of flight. One of many possible. Real flight and dreams of flight go together. Both are part of the same movement” (*Gravity's Rainbow*, 159). Although Franz is interested only in picking apart the technical elements of the portrayed rocket flight, Leni (and Pynchon) are attempting to show him how flight and dreams of flight, or science and film “go together.” As Franz is incapable of stepping out of his scientific world, Leni tries to enter into it, resulting in the dreamer of flight attempting to speak the language of the master of flight:

She even tried, from what little calculus she'd picked up, to explain [the connection] to Franz as delta-t approaching zero, eternally approaching, the slices of time growing thinner and thinner, a succession of rooms each with walls more silver, transparent, as the pure light of zero comes nearer [...] (159)

Leni refers to the slices of time growing thinner and

thinner; she is in fact calling up the image of layers of emulsion in film, each thin and transparent, consisting of three layers altogether. Leni's phrasing is strategically controlled by Pynchon as she makes several internal references to film stock structures and characteristics. Every layer of film emulsion is near "transparent," made up of thin celluloid which is similar to blood plasma, in which float, not blood cells, but rather "silver" halloid crystals waiting to be exposed to "light" in order to capture their image.

Likewise, the phrase of "delta-t approaching zero" is a theme throughout the book, a play upon the mathematical asymptote, in which the graph approaches but never reaches zero, though the difference is not visible to the human eye. The asymptote of the pure light of zero references the impact of the rocket in the novel, but it also works as a reference to a film camera. In the novel, despite the aperture of the camera lens being opened completely, a certain amount of light is still caught in the glass of the lens itself (92). Because of this glass barrier, the pure light of zero cannot physically enter and shine upon the film, and even the most expensive camera apertures are limited to quantity of one, labeled upon the lens' sides, unable to offer the ability to reach zero.

This play between zero and one occurs frequently within the novel, often referring to scientific aspects of rocket building. It also recalls the image of a computer programming language in which bytes of information are recorded by codes of zeros and ones, a technology that is eerily anachronistic in a WWII novel, but developed during the postmodern era in which Pynchon produced *Gravity's Rainbow*. However, the number play also refers to the zero of film latitude which is seen in a film stock's log exposure graph, a concept explicated through theories of calculus. In log exposure graphs (click here for fig. 1), the individual layers of the film approach but never reach zero, which in film latitude is the tonal value of pure black (the absence of all light) and pure white (a perfect light in which every wavelength, from infrared to ultraviolet, is equally represented). The difference between one and zero on each end of the spectrum is not visible to the human eye, which sees black and white as extremes, but cannot catch the tiny impurities of camera lens and emulsion. Essentially, when Leni attempts to explain film along calculus terms, she is supporting film and calculus, the two pornographies of flight, as two sciences that are almost indistinguishable.

While Leni and Slothrop refer specifically to film's

relationship with calculus, several sciences are required to create a film. Slothrop would be just as correct to compare film and chemistry, another science which figures prominently in Pynchon's novel and film production. Film's visible image is the result of an actual chemical reaction, the reaction of light being exposed to the film plane. All film is simply reflected light being recorded onto silver crystals, be it from the sun, "tungsten light,"¹ or "carbon arc"² lighting, cinematic lighting sources that are all mentioned in the novel (92, 381). A chemical reaction between the light and the crystals changes the form of the crystals in degrees, or shades, between white and black, a change which is dependent upon on the amount of light bouncing off the object being recorded. This chemical reaction leads to a gray area between science and art; in photography, one is using scientific methods to create art for the first time.

Historically, this confusion of art and science led to the popular view of cinema as a form of entertainment rather than art, an idea which only began to change in the mid-twentieth century. Film critic Stanley Kauffmann explains how the 1960s gave birth to the "Film Generation," which he defines as "the first generation that matur[ed] in a culture in which film has been of accepted serious relevance" (Marcus 97). While he maintains that films had been more popular before WWII, cinema then had been seen as a means to escapism, rather than a fully realized art form. This viewpoint changed after the war, but as Pynchon seems to suggest, might have swung too far in the other direction, as film moved from an undefined form of entertainment to a highly regarded artistic genre, to which postmodern society often concedes the right to define its reality. Postmodern poet Laurie Anderson writes:

I went to the movies,
and I saw a dog thirty feet high.
And this dog was made entirely of light. (qtd. in
Harper 49)

Anderson's poem clearly illustrates the cultural perspective during the era of the postmodern novel. At the movies, the narrator of Anderson's poem is seeing the light which once reflected off a dog in front of a camera, which has been captured and transmuted into the light of the projector, enlarging the image and allowing her own irises to interpret the light. In this specific way, film is often perceived as more realistic than other types of art, such as literature or painting which are recognizably representations, pigment on

canvas or ink on paper, often stylistically defined from reality, as in the artistic movements of Impressionism or Surrealism. In contrast, film exposure is the physical reaction of the earth's elements chemically combining, silver halloid reacting to light; therefore, film can only expose what is in the earth's environment to expose. Laurie Anderson's dog made of light and shadow, while disproportionately large, still appears to be more realistic than a painting of a dog which hangs upon a wall with visible brush strokes and paint deposits.

Commonly, confusion results from partial understanding of this conception of the realistic qualities of film. Film can only expose that which is provided by the environment, but the environment must be carefully controlled and manipulated in order to reach exposure at all. For example, many factors must be taken into account during film production: a much more extensive amount of light is required to register an object on film than to the human eye, almost exponentially so; the light must be the right color temperature to reflect correctly, (i.e. a florescent light will make a white shirt appear green on film while the human eye observing the shirt under the same lighting would correct for the florescent and still see a white shirt); and the light must be directional to create shadow and portray three dimensions, while the human eye perceives the most minute of shadows as indicative of depth and dimension. The human eye is quite superior to film; it corrects unconsciously and inherently for these factors. Film, however, does not have such abilities, and must be carefully attended to and manipulated during film exposure.

However, the average viewer does not understand these manipulations in the representations on film, a fact which Pynchon portrays both in *Gravity's Rainbow* and more extensively in his later work *Vineland*. In the latter, Pynchon portrays a revolutionary film collective called 24fps, a group that believes in the "myth of the objective image," according to Pynchon scholar Vokler Hummel. 24fps, which stands for 24 frames per second, believe that the image of film speaks truly and is misled because, as Hummel states, "[film] may strongly affect the beholder because it so perfectly mirrors reality" (Sec. 4.2.1). The use of the word "mirror," a theme which appears in several of Pynchon's novels³, is important as humans recognize that the image in the mirror looks real, but remains only a representation in two dimensions, a notion which remains true when applied to cinema but which is not always recognized—and this misconception of film is exposed by Pynchon within his narrative.

Similarly, the methods of film presentation increase the realism inherent in its structure. Theorist Jean-Francois Lyotard claims, "[...]photography and cinema always have the edge over painting and the novel when it is a matter of stabilizing the referent, of ordering it from a point of view that would give it recognizable meaning" (5). This ordering of shot followed by shot leads the viewer and results in "effects of reality" being "multiplied" in a manner inaccessible to painting and novels printed on paper (Lyotard 5). Of interest here, is that it is the ordering of film, with its projection of film frames at the rate of twenty-four frames per second, which promotes the acceptance of film as realistic. At such a projection rate, film scenes appear as convincing motion, with the "succession of frames" matching the processing rate of the human eye and "creat[ing] the illusion of movement" (Stark 140). However, this illusion blurs and conceals the reality of motion picture film, which actually consists of a number of static, motionless frames. Pynchon recognizes this misleading projection rate: he has named the naive film collective "24fps." If film was still projected at sixteen frames per second, as it was during the earliest stages of film projection, the resulting unrealistic and stunted motion, not aligned with the capabilities of the human eye, would not allow for the possibility of idealizing film as a realistic or "objective" image.

The proliferation of film art as realism throughout the novel "brings to bear the imprint of cinema upon modern life. It demonstrates the pervasive influence of movies in all facets of our culture" (Clerc 104). A few of Pynchon's characters, specifically Gerhardt Von Göll, believe film to be more powerful than reality. When Von Göll learns that real African-American troops, called the Schwartzkommando, reside in Germany, after he has shot propaganda footage insinuating that very thing, "he is convinced that his film has somehow brought them into being" (*Gravity's Rainbow* 388). This suggests that for Von Göll, "film has more reality than does ordinary existence" (Grace 668). Through characters such as Von Göll, the novel indicates that "art precedes life, as it were" (Clerc 106). The novel's reality consists of an "extremely 'layered' social reality" (Schwartzman 250), reminiscent of the emulsion layers of film, and is strongly influenced by the objectiveness or truthfulness seemingly inherent in film—the misconception surrounding the idea that film cannot show what is not there as it cannot reflect light that does not exist. Therefore, the characters believe in the reality of film over their own existence, though film is just one of many realities present within Pynchon's work. However, it is Pynchon's challenge to the reader

to recognize this misconception, which he illustrates to readers through two types of cinematic references: those to existing films and those to the technical aspects of cinema production.

The former of these references, allusions to existing films and genres, are peppered throughout the book and shape the manner in which characters see reality. Clerc calls the protagonist Slothrop “the perfect instrument by which Pynchon can show impressionability and convey the enormous influence of cinema upon the human psyche” because he has been “brainwashed by all the movies he has ever seen” (130). For instance, when Slothrop is asked to play the mythical role of Plechazunga, the Pig-Hero, in a German village ceremony that dates back to the tenth century, he can only describe his costume as “a German Expressionist pig” (*Gravity’s Rainbow* 568). Slothrop has no ability to orient new items within his own world without the context of film, which functions as his center, replacing the past social mediators of history and myth. This depiction of film functioning as a seemingly new social center is evidenced in the extensive use of film-related similes, such as “the whole joint is lit up like a Hollywood premiere” (380), which suggest that the characters (and perhaps readers) cannot describe or visualize anything without the common social narrative of film. However, the fact that Pynchon’s book is filled with scientific, literary, and historical references exemplifies that other, perhaps more reliable, means exist with which to make connections and to find universal points of reference.

The second, and most effective, way in which Pynchon attempts to expel the misconception of the objective image is through the references to the technical aspects of film production which are prevalent throughout the novel. These production references are sometimes given in the context of actual filmmaking, such as the description of the White Visitation’s filming of Katje in order to condition an octopus named Grigori, which is told from the cameraman’s point of view. The cameraman is “pleased” with the overall effect of Katje’s appearance (*Gravity’s Rainbow* 94), but it is captured only through manipulation, as the cameraman has used “the widest lens opening” with “extra tungsten light laid on” (92). These very technical descriptions of lens openings (camera aperture) and tungsten lighting (yellow indoor light) could easily be described simply as elements ensuring correct exposure. Yet, clearly, Pynchon does not want to simplify the technical elements of filmmaking, rather he wants to expose the manipulation inherent in the art form, and accentuate the connection between film production and science. Through the emphasis

of this relationship, Pynchon is slowly reverting film from creative art to created art, an art which is only the sum of its parts. As he places so much emphasis on the technical elements which influence the reality of film, Pynchon is stripping cinema of its artistic qualities as a method to complete the destruction of art’s “aura.” The concept of aura is defined by 1930s theorist Walter Benjamin “as the unique quality traditionally attributed to an artwork, giving it a special status equivalent to that of a sacred object in religious ritual” (Leitch 1164), an element of art that Benjamin conjectures as to have been declining since the advent of capitalism in the 19th century (Wolin 187). He claims that photography (and film especially) extinguishes art’s aura, which is “the unique and the non-identical” (Roberts 61); therefore, it cannot exist in the art of film, as Benjamin addresses in his seminal essay “The Work of Art in the Age of Mechanical Reproduction.” For Benjamin, it is the reproduction of film, from negative to distributed prints, which by its large scale, embodies the change of art from spiritually- to politically-based and “opens up enormous, hitherto untapped potentials for the political deployment of art” (Wolin 189). This potential is only pleasing to Benjamin when the political objectives of the created art meet those of his own and triggers within him a fear or paranoia of the power of film’s influence when used against humanity by a “pernicious political program,” which in Benjamin’s case consists of Nazi facism (Leitch 1165).

And yet, by the time of Pynchon’s novel, film, perhaps, has been tamed of its potentially radical pathways, and domesticated and contained under the constraints of narrative domination. In this shift, film also moves from the suspect neophyte to the respected seventh art: rather than shatter the auratic quality of art, film replicated it. Like Benjamin, but now at a later date, Pynchon wants to smash film’s auratic quality; although ironically he targets the very medium which, for Benjamin, offered an alternative from auratic contemplation. Unlike Benjamin, however, Pynchon masters his paranoia of the misuse of film’s power by furthering the decline of the aura by dissecting the very creation of film. His technical representation of the art of film, interrelated and almost indistinguishable from sciences such as calculus and chemistry, allows the art form to be pinned down, categorized, and essentially understood. By being presented as only the sum of its parts, emulsion and light, cinema is stripped of the aura and brought down to a comprehensible, calculable, and controllable level, reduced in significance and conquered by the human consciousness.

This is Jessica Durgan's first contribution to Synoptique.

WORKS CITED

Clerc, Charles. "Film in Gravity's Rainbow." *Approaches to Gravity's Rainbow*. Ed. Charles Clerc. Columbus: Ohio State UP, 1983.

Grace, Sherrill E. "Fritz Lang and the 'Paracinematic Lives' of *Gravity's Rainbow*." *Modern Fiction Studies* 29.4 (1963): 655-70.

Harper, Phillip Brian. *Framing the Margins: The Social Logic of Postmodern Culture*. New York: Oxford UP, 1994.

Hummel, Volker. *Television and Literature: David Foster Wallace's Concept of Image-Fiction, Don DeLillo's White Noise and Thomas Pynchon's Vineland*. 10 Feb. 2005 .

Kodak Film Characteristic Film Latitude Curve Graph. Advertisement. 2 February 2005. .

Leitch, Vincent B., ed. *The Norton Anthology of Theory and Criticism*. New York: W. Norton and Company, 2001.

Lyotard, Jean-Francois. "Answer to the Question, What is Postmodernism?" *The Postmodern Explained*. Trans. Julian Pefanis and Morgan Thomas. Minneapolis: U of Minneapolis P, 1992.

Marcus, Fred Harold, ed. *Film and Literature: Contrasts in Media*. Scranton: Chandler Publishing Company, 1971.

Pynchon, Thomas. *Gravity's Rainbow*. 1973. New York: Penguin Books, 1995.

—. *Vineland*. Boston: Little, Brown and Company, 1990.

Roberts, David. "On Aura and an Ecological Aesthetics of Nature." 'With the Sharpened Axe of Reason': *Approaches to Walter Benjamin*. Ed. Gerhard Fischer. Oxford: Berg, 1996.

Schwartzman, John. "Art, Science, and Change in Western Society." *Ethos* 5.3 (1977): 239-62.

Stark, John O. *Pynchon's Fictions: Thomas Pynchon and the Literature of Information*. Athens, Ohio: Ohio UP, 1980.

Wolin, Richard. *Walter Benjamin: An Aesthetic of Redemption*. New York: Columbia UP, 1982.

NOTES

1 A yellow light consisting of a color temperature of 3200 degrees Kelvin, often associated with indoor lighting.

2 A type of light invented for film making which burns carbon, and can be manipulated from 5100 degrees Kelvin (roughly the average color temperature of daylight, depending on the weather) to 3200 degrees Kelvin (roughly the color of indoor lighting).

3 Specifically, Pynchon's *The Crying of Lot 49*, in which the protagonist, Oedipa Maas encounters several mirrors in hotel rooms during her journey across California.

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