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Awe, Terror and Mathematics in Don DeLillo's *Ratner's Star*

Francesca de Lucia

This article explores the role played by emotions, particularly those related to awe and fear, in Don DeLillo's *Ratner's Star* (1976), a novel focusing on scientific research whose protagonist, Billy Twillig, is a teenage mathematical genius. Following Billy's adventures in a research centre peopled by grotesque characters, *Ratner's Star* bears the influence both of Lewis Carroll's Alice books and of E. T. Bell's popular history of mathematics *Men of Mathematics*. My essay deals first of all with how DeLillo represents the process of creative release brought forth by scientific discovery, rendering it in terms of intuition and almost mystical ineffability. Subsequently, both positive and negative emotions associated with mathematics are analyzed using critical tools drawn from the fields of psychology and philosophy. These suggest that awe is an intrinsically ambivalent emotion, something which emerges in DeLillo's descriptions of attitudes towards mathematics. It can also be useful to consider DeLillo's representation of mathematical research within conceptions of the sublime based on Kant and Burke. The article concludes with an analysis of the climactic final scene of the novel, which contrasts apocalyptic views of the "death of science" with a less rigid, and ultimately redemptive perspective which is open to error, correction and change.

Introduction

The aim of this article is to analyze the role played by emotions, in particular those related to awe and fear, in Don DeLillo's *Ratner's Star* (1976), a novel focusing on mathematics. I will draw on psychology and

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philosophy in order to illustrate these aspects, borrowing in particular from Robert Plutchik's theory of emotions, Mary-Jane Rubenstein's analyses of awe, as well as Kantian notions of the sublime. Two recurring and interrelated motifs of DeLillo's work are a sense of often undefined threat, at times associated with conspiracies and generalized paranoia, as well as a sense of almost religious awe. These elements appear for instance most visibly in *The Names* (1982), where the threatening and primitive backdrop of the novel is strongly connected to DeLillo's interest in forms of archaic religious traditions, be they Christian Orthodox procession or the Islamic pilgrimage to the Mecca. Somewhat similarly, *Underworld* (1997) interweaves a sense of paranoia coming from various sources with an examination of popular immigrant-derived Catholicism in the Bronx, which towards the end of the narrative seems to lead to actual miracles in a context of desperate squalor. More generally, DeLillo's work is informed by a kind of metaphoric mystical mode focused on communal experiences of transcendence. Thus, experiences of collective exaltation which have a redemptive quality, such as the protagonist's visit to the Parthenon in the final part of *The Names*, incarnate a sense of religious "mystery" and contrast with the more threatening mass gatherings of the Unification Church in *Mao II* (1991) or the Nazi parades described in *White Noise* (1984).

These motifs appear in a partially different form in one of DeLillo's little known early works, the 1976 novel *Ratner's Star*. It follows the adventures of Billy Twillig, a Bronx-born fourteen-year old mathematical genius, in a research centre peopled by bizarre and surreal characters, often afflicted by grotesque physical deformities. The plot focuses loosely on the scientists' attempts to decipher a message which is assumed to originate from the "Ratnerians," the alien inhabitants of a planet of the titular Ratner's star. The message turns out to come from the earth's past, though, and much of the tension between characters towards the end of the novel derives from the reasons for deciphering the message. This conflict between scientists with different views becomes a way to represent metaphorically some of the major mathematical debates of the twentieth century.

The novel also functions as a *bildungsroman*, as throughout the narrative, Billy becomes more self-confident and mature. Indeed, Billy is far from the stereotypical image of the "child genius," having been a Bronx street urchin. He also displays several standard teenage attitudes, such as a prurient sexual attitude towards women and a tendency to withdraw and sulk after he is bullied by adults. These aspects of his personality

become less evident in the latter part of the novel, suggesting Billy's growth and eventual entrance into adulthood.

The text is divided in two parts, entitled *Adventures* and *Reflections*, something that suggests, along with the presence of a child protagonist endowed with a sensible and straightforward attitude, the influence of Lewis Carroll's Alice books. Carroll's legacy is also important because of the centrality of science in the novel, including to a large extent logical controversies. The second text that plays an important role in *Ratner's Star* is E. T. Bell's *Men of Mathematics*, a popular history of mathematics that was first published in 1937 and which remains widespread. Indeed, "Adventures" follows twelve out of twenty-nine chapters of *Men of Mathematics* from the origins of the discipline in Babylonian times until the beginning of the twentieth century. The structure that DeLillo thus gives to the novel allows him to elaborate, as we shall see, a reflection on different attitudes towards scientific discourse, and in particular, mathematics, which is not, as could be expected, simply limited to the rational sphere but also rife with sometimes violent emotions, both positive and negative ones.

Mathematical intuition: between ineffability and expression

Paul Maltby observes the importance of "visionary moments" in DeLillo's fiction and points out the "visionary power" of language. This aspect is evident in DeLillo's representations of the process of mathematical discovery, a visionary moment being "a flash of insight or sudden revelation which critically raises the level of spiritual self-awareness of a character" (Maltby 258). On one occasion, Billy is asked to "tell about mathematics," to which he replies laconically, "what's to tell?", thus implying an aspect of ineffability of the discipline (323). Mathematics is seen as belonging to the sphere of the sacred, as an awe-inspiring "language inviolate" (176). At the same time, the culmination of mathematical research means being able to articulate verbally an intuition which is at first almost unutterable:

The intuition of mathematical order occupied the deeper reaches of cognitive possibility, too old and indistinct for tracing, predating even the individual scrapings of logic and language[. . .]. [Billy] was puzzled by the lack of an adequate vocabulary for mathematical invention, by his inability to understand what made his mathematics happen [. . .]. Thus the simple answer surfaced, deprived at first of linguistic silvering. In the seconds that followed *he knew it in words*. (239, italics added).

This passage suggests the struggle against terrifying forms of “inarticulateness” that haunt the novel, namely with the presence, in Billy’s Bronx reminiscences, of a demented woman known as the “scream lady” who shrieks meaningless words. The idea of progress in research as a sort of illumination that gives clarity to previously unformulated mental concepts has indeed been described by mathematicians, as shown in French mathematician Cédric Villani’s memoir *Théorème Vivant*:

L’illumination survint et je *savais* [original emphasis] comment il fallait corriger la démonstration [. . .]. Et ce matin du 9 avril 2009, c’est une nouvelle petite illumination qui a frappé à la porte de mon cerveau pour tout éclairer. Dommage, les lecteurs de l’article ne se rendront sans doute pas compte de cette euphorie, l’illumination sera noyée dans la technique. . . (155)

[The illumination arrived and I *knew* how to correct the demonstration [. . .]. On this morning of 9 April 2009, a new little illumination knocked at the door of my brain to light everything. What a shame that the readers of the article certainly won’t be aware of this euphoria, the illumination will be drowned in technics. . .] (my translation)

Like DeLillo in *Ratner’s Star*, Villani describes scientific discovery as a form of revelation of the unknown, which can be appropriated and verbalized through a form of enlightenment. In this perspective, mathematics is seen as an incredibly complex language. As pointed out by DeLillo in an interview:

Aside from everything else, pure mathematics is a kind of secret knowledge. It’s carried on almost totally outside the main current of thought. It’s a language almost no one speaks [. . .]. This purest of sciences brings out a religious feeling in people. (qtd. in LeClair 112)

As such, the religious feeling is exemplified in an extreme form by the character of the logician Edna Lown:

In this hole in the ground Edna knew she lacked nothing, wanted nothing, could easily dismiss all past associations and all prior honours. She lived in the grip of scientific rapture [. . .]. Ambition, love, friendship, the pleasures of giving up and of winning away, the comfort of professional acceptance, the soul’s snug glow at the failure of others [. . .] were so much dead air compared with this simple and total absorption, *holism* [original emphasis], a state of unqualified being. (329)

This passage suggests an almost monastic abandonment of the world, the mystical element being reinforced by the use of the term “rapture,” alluding to what DeLillo has called the “religious feeling” brought forth by pure science. The notion of rapture is obviously connected to that of awe, which I will now examine using tools derived both from the fields of psychology and philosophy.

Awe, terror and mathematics

In order to define awe as an emotion it is useful to borrow from the work of psychologist Robert Plutchik. Plutchik created a scheme known as the wheel of emotions, similar to a colour wheel, to describe how emotions interact with one another.¹ Eight primary emotions constitute the central part of the wheel; they subsequently become attenuated, as shown by the colours becoming lighter: “it is necessary to conceive of the primary emotions as hues which may vary in degree [of] intensity [. . . and are] arrangeable around an emotion-circle similar to a colour-wheel” (109). Amazement and terror are primary emotions which, in their lessened forms, become surprise and fear. When two emotions are combined, they form an emotion compound or dyad: awe is a combination of surprise and fear.

This suggests the intrinsic ambivalence of awe as an emotion. In DeLillo’s novel, mathematics is associated not only with the release of creative force in processes of scientific discovery, but also with negative, and sometimes violently paralyzing feelings. In her philosophical exploration of the concepts of wonder and awe, *Strange Wonder*, Mary-Jane Rubenstein develops concepts analogous to Plutchik’s representation of awe in the wheel of emotions. She points out that “wonder [. . .] is inherently ambivalent. [It is] the coincidence of marvel and dread, amazement and terror” (29). Rubenstein also alludes to the internalization of notions of awe within Western culture. She refers to the doctrine of “shock and awe” within international policies carried out by the United States, for instance in the context of the second Iraq war. The objective of these policies was to overwhelm the enemy psychologically and create a sense of vulnerability through acts such as extensive damage to infrastructure and a general weakening of society, thus achieving “the military imposition of wonder” (188). “Shock and awe” is meant to

¹ Plutchik’s wheel of emotions can be viewed here: <http://en.wikipedia.org/wiki/-File:Plutchik-wheel.svg>

produce an effect similar to that of the bombs over Hiroshima and Nagasaki, without the equivalent physical damage. The association with nuclear weaponry is relevant since, always according to Rubenstein, it elicits feelings almost akin to religious awe, as suggested by the well-known episode of Robert Oppenheimer's quoting of the Hindu holy book *Bhagavad Gita* while witnessing a test atomic explosion in July 1945: "I have become Death, the destroyer of worlds," thus intermingling the words attributed to a deity (the god Vishnu turning into Shiva) with a sense of terrified awe associated with a scientific discovery whose destructive potential would soon be put into practice. It may be observed that Field Experiment n.1, the mysterious and remote centre to which Billy is flown at the beginning of the novel, resembles Los Alamos, the main location of the notorious Manhattan Project, where the atomic bombs used in the Second World War were produced. Indeed, Stanislaw M. Ulam's memoir *Adventures of a Mathematician* conveys the same sense of alienation and removal from ordinary society in its description of Ulam's arrival to Los Alamos that can be found in the opening of *Ratner's Star*. In both cases, the atmosphere of the place is marked by a surfeit of intellectual resources and fervour, which, however, in DeLillo's case assumes a caricatured dimension. These analogies may suggest that, while *Ratner's Star* eschews the reflections on American history and society that appear in DeLillo's later, more realistic works, it also echoes some of his preoccupation on generalized (possibly nuclear) menaces and overarching conspiratorial networks.

More generally, Rubenstein also points out the connection between the notions of wonder and awe and those of terror and dread, alluding for instance to the concept in Biblical Hebrew of *yrah*, that is "that particular combination of awe, dread and reverence proper to those who have witnessed the signs, wonders and portents of God's work into the world" (9-10). Thus she explains the presence of dread, or even terror, in awe. Terror appears in different ways in relation to mathematics in *Ratner's Star*: in one of the most mundane ways, it is the fear and disgust for mathematics inspired by high school reminiscences, as shown by the following dialogue between Ermintrude and Billy:

"The very word strikes fear in my heart."

"Mathematics?"

"It goes back to early schooling. The muffled terror of those gray mornings, getting out of bed and going to school and opening a mathematics textbook with its strange language and letters for numbers and theorems to memorize. I didn't mind any other subject. But maths struck terror. (239)

Once again, mathematics is perceived as a secret language. The ineffable aspect of this science that we have already seen reappears in a different, much darker key as a deep and fear-inducing loneliness. It is shown thus in Billy's reflections:

There was no way out once he was in, no genuine rest, no one to talk to who was able to understand the complexity (simplicity) of the problem or the approaches to a tentative solution. There came a time in every prolonged effort when he had a moment of near panic or "terror in a lonely place." (116-17)

The reference to panic in its etymological sense as a condition of deep unease experienced both by animals and humans in the presence of Pan, the Greek god of nature, anticipates genuine forms of terror appearing in relation to rigid views of science which do not allow the process of creative release mentioned above. Rather, scientific inflexibility generates situations of destructive and self-destructive panic. However, in *Ratner's Star*, the sense of apocalyptic threat comes from an apparently harmless event, a solar eclipse which could not be foreseen and thus generates panic, bringing some characters to question the validity of science altogether.

The second part of the novel, "Reflections," which has fewer and more realistic characters, creates an opposition between figures who are completely shattered by the failure of their scientific certainties and those who manage to retain a rational and serene attitude. Examples of the former attitude are foreshadowed early on by the character of Henrik Endor, a brilliant mathematician who has gone to live in a hole in the ground from which he refuses to come out (Endor is a representation of Isaac Newton, who at one point of his life suffered a breakdown). Images of holes, including structures resembling black holes called "moholes," serve as metaphors of states of despairing anguish. Once again, this motif shifts from the mundane, represented by the description of the New York subway early on, to the eerie and terrifying. Billy has a disturbing encounter with Endor, who is described as a great scientist but who presently has been reduced to an animal-like condition, living in a hole (which includes a second hidden hole), constantly digging and eating larvae, behaving in a way that causes Billy to worry that Endor might actually eat him. Endor appears as a negative counterpart of Edna Lown, who also finds herself in a "hole in the ground," where she is, however, uplifted rather than debased. The symmetry is highlighted by the assonance between the names Endor and Edna and, while Edna is one of the few relatively realistic and sympathetic characters of

Ratner's Star, the possible symmetry suggests that, in the economy of the novel, science as complete abstraction from the world is potentially dangerous. Furthermore, these two characters represent symbolically the attitudes of awe and terror inspired by science.

On the other hand, the character of the Chinese American archaeologist Maurice Xavier Wu embodies a more pragmatic view of research and life. He not only displays scientific openness, calm and lack of arrogance but also a form of intellectual self-control even in desperate situations. This is shown in the scene where he manages to control his panic while risking being buried alive in a cave. The passages describing Wu trapped underground in complete darkness refer constantly to a sense of self-imposed calm and how he rationalizes his fear; once again, we can see here the struggle to define in clear language what appears unspeakable, in this case violent and potentially destructive emotions:

The darkness was total and he was frozen to the stone. He tried to think beyond the level of unchecked hysteria [. . .]. He told himself to remain calm. [. . .] He tried to gauge his panic, to talk to it, to determine its contents. Again he told himself to proceed with utter calm. (390)

It is significant that Wu is also the character who asks Billy to “tell [him] about mathematics” (323). Thus this figure is marked by a constant endeavour to understand and decode what is unknown (as shown by his interest in decoding “secret languages” such as mathematics or Chinese ideograms). This trait extends to the way he behaves in terrifying circumstances. The Italian psychologist Nicola Ghezzani suggests that panic is a reaction to what is perceived as alien and unfamiliar: “il confine fra il noto e l’ignoto, al di qua della porta del panico” [“the border between the known and the unknown, within the threshold of panic”] (*Uscire dal Panico* 18; my translation). Hence Wu is able to deal with fear like he deals with other, less extreme forms of the unknown. Wu is also one of the scientists who is not overcome by mindless terror when the eclipse takes place.

Mathematics and the sublime

Mathematics, with the awe and terror it inspires, might be placed within the concept of the sublime as evoked by Immanuel Kant. It is interesting to observe that, in order to describe this notion in *The Critique of Judgment*, Kant draws a distinction between what he calls the mathemati-

cal and dynamic sublime. Instances of the former occur when the individual sees objects of great magnitude that exceed the powers of the senses. It is defined in terms that echo DeLillo's evocations of the inef-fability of mathematic discovery:

For here a feeling comes home to him of the inadequacy of his imagination for presenting the idea of a whole within which that imagination attains its maximum, and, in its fruitless efforts to extend this limit, recoils upon itself, but in so doing succumbs to an emotional delight.

(The Critique of Judgment 60)

In this perspective, it is significant to observe that Endor's speech during his interaction with Billy appears to echo Kant's mathematical sublime, since Endor alludes to the infinite vastness of the universe, which the human senses cannot fully appreciate:

Planets get torn out of orbit in that kind of density. Too many stars. Too much force and counterforce [. . .]. That's just our galaxy alone. There's no need for everything to be so spread out. Why is the universe so big? And why despite the billions and billions of stars and hundreds of millions of galaxies there is so much space leftover? (84-85)

Rather than experiencing "emotional delight," however, Endor appears overwhelmed by this sense of incommensurability, from which mathematical research offered temporary solace. The enormity of the universe is viewed as a form of fascination (hence the sense of "sublime"), but ultimately acts as a crushing force for Endor. His failure to decode a message assumed to be of extra-terrestrial origin, which he hoped would allow him to measure the universe, triggers Endor's breakdown and eventual dehumanization:

I turned my panic to empty-field sources and black-body radiation. It was fascinating for a time. You could peer and count and measure and sigh. You could say: "Ahhhh, there it is, look and see." But the size of the universe began to depress me. (85)

Endor finds himself unable to accept and fully comprehend the true dimension of the universe and slides into depression, eventually entering a self-destructive process. Thus, the process of "emotional delight" eludes him. His predicament can be contrasted with that of the character of Dent.

Dent, who lives in a submarine, embodies a more positive view of the mathematical sublime, succeeding in experiencing “emotional delight.” Like Endor, Dent used to be a highly acclaimed scientist who at one point found himself overwhelmed by the potentially infinite vastness of scientific research; nevertheless, instead of enduring an eventually devastating “recoiling” of the imagination, Dent has entered a deliberate process of personal and scientific withdrawal, represented by the gradually increasing depth at which his submarine sails. When he refuses to help Softly with the Logicon, he states that, while he still constantly produces ideas, he does so simply for private fulfilment. Hence, in contrast with Endor, Dent has accepted “the inadequacy of his imagination” and the “fruitless efforts to extend this limit.” He has become conscious of the limits of the human intellect in the face of the immensity of knowledge in its entirety. This allows him to reach a state of contentment and to continue his work (albeit in a purely private form) rather than to sink into frustration and despair.

The second type of sublime as defined by Kant is the dynamic sublime. It can be encountered when observing natural phenomena that are potentially threatening from a position of security:

Might is a power which is superior to great hindrances. It is termed dominion if it is also superior to the resistance of that which itself possesses might. Nature, considered in an aesthetic judgment as might that has no dominion over us, is dynamically sublime. If we are to estimate nature as dynamically sublime, it must be represented as a source of fear. (66)

Kant includes amongst examples of the dynamic sublime thunderstorms, erupting volcanoes, hurricanes and maritime storms. He also points out that, in this context, the sublime is not a trait of these natural phenomena, but that it exists within the human mind. *Ratner's Star* concludes with a natural occurrence which carries a sense of threat, even though it is ultimately harmless, that is, an unforeseen solar eclipse. While many characters react with terror, the narrative introduces the figure of a student, in what is presumably a third-world South Asian environment, who is associated with the notion of “mathematics coinciding with the will to live” (431). *Ratner's Star* thus implies that rationality, expressed here by mathematical research, overcomes illusions of the senses (the fear caused by the eclipse is unmotivated) in a fashion analogous to Kant's perception of the sublime.

At the same time, for DeLillo, situations of the sublime similar to Kant's are not deprived of aspects of menace and fear, and from this point of view are thus possibly closer to Edmund Burke's earlier defini-

tion of the sublime in *A Philosophical Enquiry*, which highlights more strongly the aspect of terror that is present in the experience of the sublime: “there is something so overruling in whatever inspires with awe, in all things which belong ever so remotely to terror, that nothing else can stand in their presence” (82). He also mentions, in relation to awe, the extreme natural phenomena that in the Bible are associated with divine apparitions, thus echoing the frightening “wonder” inspired by the eclipse. Yet, DeLillo’s view of scientific research is not as gloomy and pessimistic as could seem at times, as shown by the final scene of the novel, which I will now turn to.

Conclusion: apocalypse now?

Billy’s encounter with Endor is important in relation to the climactic conclusion of the narrative, where Billy’s mentor Robert Softly makes a frenzied flight to Endor’s hole after the eclipse, while the latter has died and has become a decomposing corpse. Endor’s dehumanization is now complete, since he is reduced to “cities of vermiculate life” (437), being presently at one with the larvae he was in the habit of eating. Softly is also entering an increasingly animal-like state, possibly literally turning into a rabbit, as indicated by the “rudimentary and rude” (438) sounds he makes and the repeated references to his “crawling” and “scratching” and “clawing” of the dirt, which create a further analogy with Endor, who “digs and claws” the earth in the hole while discussing with Billy earlier in the novel. Both Endor and Softly adhere symbolically in this way to the perspective of the “death of science.” DeLillo fictionalizes in his narrative the debate that took place from the end of the nineteenth century to the mid-1960s between mathematicians with a more pragmatic approach and logicians attempting to create a kind of universal basis for mathematical language which risked becoming completely self-serving. The latter perspective is represented by the Logicon, a project to create a universal language which, however, becomes purposeless.

At the end of the narrative Billy seems at first to be following Softly into the hole:

On the surface another figure moved, this one on a white tricycle [. . .] madly pedalling, a boy a bit too large for his means of transportation [. . .]. He wore a jacket and a tie. A measured length of darkness passed over him as he neared the hole and found himself pedalling in the white area between the shadow bands that precede total eclipse [. . .]. Laughing as he was [. . .]. Particles bouncing around him, the reproductive dust of existence. (438)

Some critics indicate that in this scene Billy has also been overcome by the unforeseen eclipse: Joseph Dewey writes that Billy's bicycle ride is a "panicked (and absurd) flight [...] a gesture of surrender" and that "the boy-genius [is] flummoxed by the great eclipse" (63), while in his book *In the Loop* (1987) Thomas LeClair also assumes that Billy will join Endor and Softly (133). Yet the conclusion of *Ratner's Star* can also be interpreted differently. Indeed, Billy's laughter (which resembles Wu's when he manages to exit the cave) and the image of the "reproductive dust of existence" contrast starkly with the images of decomposition and dehumanization that precede it and imply that the character of Billy will be able provide a form of redemption, hinting at the survival rather than failure of science and adhering to a pragmatist view of science, rather than to the rigid view embodied by Softly and Endor. Furthermore, Billy's jacket and tie and his being too large for the tricycle (which is generally associated with small children) suggest that Billy has reached adulthood.

Thus *Ratner's Star* ultimately rejects a view of science where the unexpected or the possibility of error leads to states of destructive terror. It resembles more the position stated by the group of mathematicians working from the mid-thirties to the early 1980s under the collective pseudonym of N. Bourbaki:

Nous croyons que la mathématique est destinée à survivre, et que l'on verra jamais les parties essentielles de ce majestueux édifice s'écrouler du fait d'une contradiction soudain manifestée; mais nous ne prétendons pas que cette opinion repose sur autre chose que de l'expérience. C'est peu, diront certains. Mais voilà vingt-cinq siècles que les mathématiciens ont l'habitude de corriger leurs erreurs et d'en voir leur science enrichie, non appauvrie, cela leur donne le droit d'envisager l'avenir avec sérénité. (9)

[We believe that mathematics is destined to survive, and that we shall never see the essential parts of this majestic edifice crumble because of the manifestation of a sudden contradiction; but we do not imagine that this opinion is based on anything else than experience. It's not enough, some will say. But it's twenty-five centuries that mathematicians are used to correcting their mistakes and seeing them enrich, rather than impoverish their science; this entitles them to view the future with serenity.] (my translation)

The struggle against inarticulateness takes various different forms in *Ratner's Star*: in the fear induced by the "scream lady" that has been mentioned before but more crucially and centrally, in the rejection of

what is embodied by the Logicon, an attempt to create a totalizing “universal logical language” (95).

In the end, *Ratner's Star* suggests a redemptive view of science, highlighting the creative processes of mathematical research and suggesting the control of the possibly destructive negative emotions it sparks; ultimately the novel endorses a perspective where, as noted by the Italian mathematician Ennio de Giorgi: “il matematico ha l'intuizione e il lavoro per rendere l'intuizione comprensibile. Sogno e convivialità” (212) [“the mathematician has the intuition and the work to render an intuition comprehensible and communicable. Dream and conviviality.”] (my translation). In this perspective, the mathematician possesses the capacity of making the dreamlike intuition accessible, thus creating a link to others rather than a process of isolation. This indeed is the dimension of “conviviality.” In *Ratner's Star* the scientific process personified by the young Billy brings a sense of joyful hope that can overcome even contexts of irrational panic.

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