

THE HUMAN SIDE OF SCIENCE IN THE NOVELS OF ALAN LIGHTMAN

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ABSTRACT

In his four novels —*Einstein's Dreams* (1993), *Good Benito* (1995), *The Diagnosis* (2000) and *Reunion* (2003)— Alan Lightman creates an interplay between the two interests which come into contact and conflict in his own life: on the one hand, science, and on the other, humanistic and literary concerns. In his fiction, he portrays scientists like his version of Albert Einstein and the fictional Bennett, or Benito, who have to reconcile the vagaries of human life with the certainties of mathematics and physics. Lightman shows how big ideas in science come as much from imaginative life as from calculations. This slant on the issue may come in part from Lightman's interest in the magic realist writers. Also, the reason/emotion paradigm is developed through a subtle feminist subplot as Lightman attempts to show the different facets involved in the discussion. In the mind/body discussion, the body is the site of the struggle against symptoms of the impact of the modern world. Here, Lightman works in a Kafkaesque play on the theme of the individual versus society, along with an ecological message involving the need for balance and variety.

KEY WORDS: Albert Einstein, dreams, reason/imagination, mind/body, feminism, ecology.

RESUMEN

En sus cuatro novelas —*Einstein's Dreams* (1993), *Good Benito* (1995), *The Diagnosis* (2000) y *Reunion* (2003)— Alan Lightman crea un juego entre los dos focos de interés que están en contacto —e incluso entran en conflicto— en su propia vida, que son, por un lado, la ciencia, y por otro, las preocupaciones humanísticas y literarias. En su ficción, crea protagonistas que son científicos, como, por ejemplo, su versión de Albert Einstein, o Benito, un personaje de ficción, que tienen que reconciliar las incertidumbres de la vida humana con las certezas de las matemáticas y la física. Lightman demuestra que las grandes ideas científicas surgen tanto de las matemáticas como de la imaginación. También, como autor comprometido, incluye en sus obras discusiones de género y de ecología, dentro del marco de la ciencia y la vida humana.

PALABRAS CLAVE: Albert Einstein, sueños, razón/imaginación, mente/cuerpo, feminismo, ecología.



On the webpage of Vintage Books, publishers of Alan Lightman's third novel, *The Diagnosis* (2000), one can find an interview with the author in which he is asked about the possible drawbacks or difficulties of being a professor of both Physics and Literature. He answered that he had been interested in both creative writing and science from a young age, though for a long time he had had to keep them separate. However, during his writing career from the early 1990s onwards, the two came into contact, producing a source of strength for his writing. This strength, ironically, seems to emerge from the points of conflict and tension between the two "worlds," as he says:

Over time, I've come to realise that the sciences and the arts represent different ways of understanding the world. Both are true, but the truths aren't the same. I think that both certainty and uncertainty are necessary in the world. My writing, whether I want it to or not, expresses this conflict. But it is a beautiful conflict. It is what makes us human. (Lightman, "Author" 1)

In this paper, I set out to examine the interplay between the scientific world of apparent rational certainty and the humanistic world of uncertainty in Lightman's four novels: *Einstein's Dreams* (1993), *Good Benito* (1995), *The Diagnosis* (2000) and *Reunion* (2003). The binary opposites of certainty versus uncertainty are extended by Lightman in another answer in the same interview:

I feel that the great push and pull in my writing life, and in my life as a whole, has been the tension between the rational and the intuitive, logic versus illogic, linear versus nonlinear, deliberate versus spontaneous, predictable versus non-predictable. I experience this tension as a constant twisting of my stomach and as a mental commotion. I've learned to live with the discomfort. (1)

We might expect, therefore, as we study Lightman's novels (as opposed to his many, equally best-selling, works of popular science), to see conflicts between rationality, logic, desire for order and stability, permanence and predictability on the side of science and the scientist, on the one hand, and between their opposites: intuition, imagination, the random and natural, the unexpected etc., associated with the non-scientific or non scientist, on the other. Indeed, Lightman has remarked on the separation between the two cultures, the scientific and the humanistic, in an essay he wrote about Einstein's five epoch-making papers of 1905, published in *Atlantic Monthly* and entitled "A Cataclysm of Thought." His conclusion was that the two cultures are just about as separate now as at the time of the famous C.P. Snow-F.R. Leavis controversy on the subject in the early 1960s. He complains that whereas literature and philosophy students read the history of their speciality, science students do not read the original works of even key scientists like Newton:

From this one observation an intelligent creature from outer space could determine that there exists a profound difference between the disciplines we call natural science and those we call humanities or art or social science. Modern textbooks on science give no sense that scientific ideas come out of the minds of human beings.



Instead science is portrayed as a set of current laws and results, inscribed like the Ten Commandments by some immediate but disembodied authority. (“Cataclysm” 1)

Lightman is not the only writer who thinks this, Ian McEwan gave a specific example in his 2001 Hay-on-Wye Festival lecture:

Scientists might know the classical laws of thermodynamics, but have never read Newton on the matter, or have grasped relativity from textbooks without reading Einstein’s Special or General Theories, or know the structure of DNA without having a first-hand knowledge of Crick and Watson’s 1953 paper. Here’s a good case in point. Their paper, a mere 1,200 words, published in the journal *Nature*, ended with the famously modest conclusion, “It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material.”

“It has not escaped our notice...” the drawing-room politesse of the double negative is touchingly transparent. It roughly translates as “Look at us everybody! We’ve found the mechanism by which life on earth replicates, we’re as excited as hell and can’t sleep a wink...” “It has not escaped our notice” is the kind of close contact I mean. It is not easily come by at first hand. (13)

Here, McEwan is saying that Crick and Watson are real people and some of their humanity, their modesty, can be detected in their wording, however clinically scientific. It is this humanity that Lightman aims to portray in the many characters in his fiction who are scientists or who are caught up indirectly in matters of science, such as medicine or technology.

1. EINSTEIN’S DREAMS

In almost all his fictional writing, Lightman tries to show us that the scientific and the non-scientific, not only should not, but cannot, be separated. The concept that scientific ideas come out of human heads was developed with great success in Lightman’s first novel, *Einstein’s Dreams*.¹ Lightman says that by studying the five famous papers of 1905, he can see into Einstein’s mind, as it was at the time. He saw that, contrary to what one might expect of a scientist,² Einstein loved to provoke his imagination with contradictions and paradoxes, in violation of his common sense. Perhaps Einstein belonged to a different age, perhaps he was a prolongation of “Renaissance Man,” who dabbled in all branches of knowledge, or perhaps Einstein was just Einstein, that is, endowed with an exceptional brain. But

¹ An international best-seller, it has been translated into thirty languages and was runner-up for the 1994 PEN award. It is used in undergraduate courses, book clubs, and has had plays and even musicals based on it.

² Einstein had recently completed a four-year physics degree at the University of Zurich.





as Lightman points out in “A Cataclysm of Thought,” Einstein, as a young man, had read Kant, Hegel and other philosophers, and in 1905, aged twenty-six, he was guided not only by his discoveries in maths and physics, but also by his philosophical leanings and a keen intuition. Kant argued that certain fundamental concepts, such as the nature of time and space, had to be fixed in the human mind prior to experience as necessary conditions for human beings to perceive the external world. Einstein challenged this tenet and postulated that time was not absolute (“Cataclysm” 1).

Lightman believes that Einstein’s great discoveries sprang from the combination of cold, scientific observation and calculation, on one hand, and intuitive thinking involving apparently rational and non-rational postulates, and knowledge of, and questioning of, our philosophical heritage, on the other. He shows us, therefore, that the so-called “scientific” cannot be separated from the non-scientific. In *Einstein’s Dreams*, furthermore, albeit in the fictional format of a novel, Lightman postulates that Einstein’s original ideas should be sought, not in his daytime calculations, but in his subconscious. That is why Lightman presents Einstein’s mental and intellectual life at the time as a series of dreams lasting a mere two months, April and May of 1905.

The thirty dreams each contain a single, unique, concept of time. They are like discrete flashbacks, in blocks of eight, and finally six, broken up by the present action. This takes place in the space of two hours, from 6.00 am to 8.06 am on a morning in late June (it must be after the last dream on 28th June) in the year 1905. It is the space in which Einstein is waiting in the Patent Office in Berne,³ where he works, for the typist to come in and type up his handwritten manuscript, which Lightman calls “his theory of time” (*Einstein’s Dreams* 178).⁴ The deictic space is broken up into a Prologue and an Epilogue, and in between are the thirty dreams; each block broken up again by three Interludes figuring Einstein and his friend Michele Besso. The first is a flashback to when the two were students together in Zurich, and he announced that his current project, an investigation into electricity and magnetism, would “require a reconception of time” (53).

The second Interlude shows Einstein and Besso sitting in a café. Einstein is portrayed as both a dedicated machine-like scientist, who neglects his body, and as

³ Einstein worked as an examiner at the Swiss Patent Office in Berne from 1900-1905, when he turned to teaching and research.

⁴ This would be the third, (or perhaps fourth, because of the repeated note of exhaustion and finality, “He feels empty,” 179) of the four articles published that year in the prestigious German physics monthly *Annalen der Physik*. The four, which, according to the *Encyclopaedia Britannica*, “forever changed man’s view of the universe” (511), were: 1) a theoretical explanation of Brownian motion; 2) a postulation that light is composed of individual quanta (later called photons), thus revolutionising the theory of light; 3) Einstein’s special theory of relativity “On the Electrodynamics of Moving Bodies,” which found that both time and motion are relative to the observer; and 4) “Does the Inertia of a Body Depend Upon Its Energy Content?” which set out the famous formula $E = mc^2$ as a mathematical footnote to the special theory of relativity.

a very human person. He is “staring at galaxies” (100), then he is ravenous because he does not stop to eat and will not accept invitations; he is antisocial. A few traits indicate his humanity. Besso says that when his first paper was published, he “imitated a rooster” (101). In the Third Interlude, Einstein and Besso are in a small fishing boat on the river (fishing and playing the violin being Einstein’s two major pastimes when science permitted, if one does not count pipe smoking). Einstein has told Besso of his theory of time, and Besso thinks he will succeed with it. But Einstein cannot bring himself to tell Besso about his dreams (147).

The narrative tense is strictly the present. One can imagine that Lightman employed this unusual device for several reasons: it fits in with the idea that the deictic space is a mere two hours, it is a short, present time, in spite of flashbacks; it is the tense of a scientific experiment; and it gives the desired atemporal, “dream-like” quality to the dreams themselves. In his dreams, Einstein sometimes sees himself, though he never names himself; he is always “a young man” playing his violin (164), or a student in Zurich with his tutor (134-5). We do have a glimpse into the future, though, ironically, looking back. In the 17th dream, time flows backwards, and we see Einstein, as just an anonymous “middle-aged man,” getting the Nobel Prize for physics. Then a friend is at what must be his graveside, with “the cold April rain on his face” (106);⁵ all of this looking “backwards” from the future, which is the past.

If the time sequence of this dream seems crazy, that is because Einstein was playing mentally and intellectually with illogical hypotheses. Einstein maintained that scientific truth must be conceived as a valid truth that is independent of humanity: “I cannot prove that I am right in this, but that is my religion” (“Albert Einstein,” 513). In terms of the narrative structure and content, perhaps one of the reasons why Lightman describes Einstein as having what we might call “unscientific” ideas is his debt to the magical realism writers such as Gabriel García Márquez, Jorge Luis Borges and Salman Rushdie. In *The Moor’s Last Sigh*, Rushdie creates a hero, Moro, for whom time goes too fast, as he ages abnormally quickly (although this is a rare, but attested, real-life medical condition). On the website “A Biography of Alan Lightman,” Lightman says he is interested by “writers who distort reality in order to see reality more clearly...” (1). He explains the unexpected connection between these South American or Anglo-Indian writers and science:

I feel that to most people the scientific culture is like a foreign country. I always enjoy writers who live in a foreign culture and try to convey that to a wider audience. Rushdie writes about India, García Márquez writes about Latin America, and both convey a mentality which is not like any other mentality. I take special delight when I can read a good writer from another culture, bringing me into that world. That’s something I would like to do with the scientific culture.” (1)

⁵ Einstein died on April 18, 1955.





When we look at Einstein's dreams, some of them seem to be taken straight from the magic realists. The last one, the 30th,⁶ is perhaps the most bizarre (to end on a crazy note): time is a flock of nightingales (174). Every grown-up person is trying to catch a bird, because if you trap one, time stops. The concept is nothing other than crazy, but it has a strange logic: only children have no desire to stop time. Another crazy concept underlies dream number 10, time is "sticky": "Hypothetically, time might be smooth or rough, prickly or silky, hard or soft" (61). Again, ludicrous though it may sound, this concept reveals a pragmatic sort of logic. Portions of towns become stuck in time (63), individuals in a part of their lives, and almost everyone is stuck *alone*, and therefore, is not happy. We can see an aura of truth about this idea in people and places, we even have the metaphorical phrase "stuck in a rut."

A large number of these dreams require the co-operation of the reader's imagination, because they are not what our experience seems to be telling us. They are all uncertain, but when Einstein said that a scientific truth can be valid independently of humanity, then the certainty/uncertainty paradigm becomes undermined by the added complexity of the human/non-human aspect. The concepts of time contained in the dreams that are non-linear, not deliberate and not predictable would be numbers 1, time is a circle (8); 2, time is like a flow of water, you can be carried back in time; 3, time has three dimensions, like space, so there is an infinity of worlds (22); 4, there are two times, mechanical time and body time, so time can move in fits and starts (24); 7, cause and effect are erratic, this acausal world has reversed logic (40); 15, time flows fitfully (85); 19, time is a sense, like sight or taste (112), its very non-linearity precludes speech, "For speech needs a sequence of words, spoken in time" (116), hence it is more a negation of time; 21, time is not a quantity but a quality (123); 23, time is a visible dimension, you can choose motion along the axis of time (133); 24, like 21, time is not continuous (140); 29, the past is solid, a single memory absorbs and becomes your life (167).

These mostly non-linear concepts are accumulated in a line, albeit in arbitrary order, within the very strict space of the (linear) time-limits of the novel, 6.00 to 8.06 am, 29th or 30th June, 1905.⁷ Several of the other time concepts in the dreams are already familiar to our imaginations, if not to our common sense. We must not forget, though, that common sense is not the same for all people at all times, it is as relative as Einstein's and Heisenberg's theories. For Kant, it was logical

⁶ The dreams are NOT numbered in the novel; I have numbered them for referential purposes. The reason why Lightman has not numbered them is no doubt because we cannot control our dreams, and because Einstein insists they are all equally plausible, so Lightman must present them in an apparently random and arbitrary order.

⁷ There are not surprisingly in the novel, constant references to clocks, from the opening sentence to the penultimate paragraph, and clock towers feature prominently in two out of the three illustrations (of Berne) in the novel.

that time and space should be fixed. For Aristotle, it was logical that the Earth should be the centre of all creation.

The penultimate paragraph of the Prologue explains about the dreams, telling us that they are *imagined*, but *possible*:

In the long narrow office on Speichergasse, the room full of practical ideas, the young patent clerk still sprawls in his chair, head down on his desk. For the past several months, since the middle of April, he has dreamed many dreams about time. His dreams have taken hold of his research. His dreams have worn him out, exhausted him so that he sometimes cannot tell whether he is awake or asleep. But the dreaming is finished. Out of many possible natures of time, imagined in as many nights, one seems compelling. Not that the others are impossible. The others might exist in other worlds. (6-7)

So we can see that there is a rigid logic to dream number 5, “time flows more slowly the farther from the center of earth” (28). If, by analogy, we think of a race with several competitors going round a circuit, those on the outside (if the starts are not staggered) have to go faster to keep up, so time seems to go more slowly on the inside. In dream number 6, time is absolute, it has exquisite regularity (33); it is an ideal, platonic concept. Ironically, Lightman parodies Gertrude Stein’s “a rose is a rose is a rose” in his “In this world, a second is a second is a second.” (34), quite reversing her meaning, since she was trying to say that each was individual and unique as well as separate in time. Dream number 11, the passage of time brings increasing order (66), is a reversal of the Second Law of Thermodynamics. It is easy for our minds to evoke opposites.

Our natural fears also contemplate traumatic and cataclysmic concepts of time, such as dream number 9, “The world will end on 26 September 1907.” (55); or dream 13 (it had to be unlucky), there is no time, only images (75); or dream 14, people have no memories (83). These anxieties haunt our fears and imaginings from time to time.

Other types of time would be logical given the necessary physical rules; these particularly, are the ones Einstein feels might exist in other worlds: dream number 17, “time flows backward” (102) —as in Martin Amis’s *Time’s Arrow* (1991), which predates *Einstein’s Dreams* by two years; or dream 28, where time is like light that bounces between two mirrors (165); or dreams 18 and 22, where people live only one day (107), and there is no future (128), respectively; or the opposite, dream 20, where people live forever (117). No wonder we are obsessed by time, as in dream 25, where people worship at the Temple of Time in Rome (148).

Lightman takes the reader inside Einstein’s mind in the Prologue, and as quoted in the relevant passage, the scientist recognises that all the possible worlds are valid: “Each time is true, but the truths are not the same” (27). But, for this world in which Einstein lives, in Berne, on the planet Earth, in the year A.D. 1905, only one is more valid than the others, it is “compelling” (7). Given the conclusions Einstein has drawn through his mathematical calculations about bodies, mass, weight, heat, magnetism, velocity etc., the compelling, or true, version of time for this laywoman (me) must be dream number 16, time seems to pass more slowly for



people in motion: “By logical tautology, the motional effect is all relative” (91).⁸ But, at first, this dream did not appear, reasonably, to be a likely candidate. The surreal nature of its beginning, where everything is in motion, with buildings on wheels, is reminiscent of the Monty Python film in which office blocks sail away. The advent of the internal combustion engine and the beginnings of rapid transportation are credited with this fixation on speed. Just as the general public did not understand Einstein’s concept of relativity when he set it out, in this dream, people do not understand that their relationship with other people and things is dependent upon the relativity of their point in space and time: “Because when two people pass on the street, each perceives the other in motion, just as a man in a train perceives the trees to fly by his window” (93). The final sentence of this dream points to what we at present hold to be the scientific truth: “Some argue that only the giant clock tower on Kramgasse keeps the true time, that it alone is at rest. Others point out that even the giant clock is in motion when viewed from the river Aare, or from a cloud” (94).

2. *GOOD BENITO*, THE DIAGNOSIS, REUNION

Einstein’s Dreams contains ideas about logic/illogic, certainty/uncertainty etc., that Lightman would develop further in his later fiction. Dream number 7, the acausal world of reversed logic, where cause and effect are erratic, talks about scientists, and in *Good Benito*, written just two years after *Einstein’s Dreams*, Lightman creates the story of a scientist who fails in his personal, human, life, because he finds that other people are not rational and logical as he would like them to be. *The Diagnosis*, a more mature book, published five years later (Lightman says it took him five years to write it), is a biting critique of the fast pace of our modern life, and it shows how our minds are determined on one thing, but our bodies do not always respond. Also, our bodies are both like machines and *not* like machines. The book is dedicated to *thanatos*, the death drive, though a more modern way of putting it would be to call it *entropy*, or the body’s response to the effects of the Second Law of Thermodynamics. The germ for these ideas can be found in dream number 4, where there are two times: mechanical time and body time. Perhaps this binary opposite, man versus machine, is also at the root of Lightman’s latest novel, *Reunion*, which is a sort of reversal of *Good Benito*. In this latter, earlier, novel, the male protagonist rejected the woman, whereas, in *Reunion*, the woman rejects the man. As the protagonist of *Reunion* regresses —through a sort of Proustian epiphany— to his student days when he courted a ballerina,⁹ he analyses *eros*, or

⁸ However, students at the University of Wisconsin (Oshkosh), on the contrary to my opinion, agreed that there was no right or wrong answer (Helmers).

⁹ Lightman’s mother was a dancing teacher (Lightman’s “home page” 1).



falling in love and desiring to procreate, in a scientific way. Because of this reversed parallel, I will deal with *Good Benito* and *Reunion* together, and then with *The Diagnosis* separately.

In *Good Benito*, Lightman shows us how a professor of physics is made and unmade. The protagonist, Bennett Lang (Benito is a nickname), progresses from a childhood like Lightman's own, in Memphis, dedicated to crude scientific experiments, through the single-minded self-sacrifice of graduate and post-graduate years ("The obsession was part of the ethic." *Good Benito* 129), to a sort of tranquility, where he lives a celibate life in the harmony of the orderly certainties of science. Early in the book, a famous physicist on his faculty had screamed at him to use maths not words, which were imprecise (22-3). Benito is happier when he does not have to live with his dysfunctional family, what Anderson calls "the classic Southern triumvirate of insomniac mother, distant father and matronly black housekeeper."

As a doctoral student of physics, Bennett has his frustrations, the research problems his tutor sets him are very difficult, but they do have answers: "You've got to specify a problem in enough detail so that it clearly has a definite solution." [...] Davis paused, as if remembering something. Some questions, he said, can never be well posed, like; Is there a God? or, Would we be happier if we lived longer?" (152-3). It is his subconscious mind that comes up with the answer to an "apprentice problem" that he has been struggling with for months, and this realisation comes to him as a sort of epiphany just as he is taking a shower:

He was planning. He sank down on the tiles, with the water pouring over his head, and saw his error as well as the entire solution to his problem. A mixture of particles was more fragile than a pure population; a mixture made the gravothermal catastrophe more likely to happen. The answer appeared in his mind *as a beautiful curve* and he tingled and shivered. It had to be right. He leaped out of the shower. Without bothering to get dressed, or even to dry off, he went to the kitchen table and got out his pages of calculations and a new pad of white paper and began writing. He lost track of time, he lost track of his body. He was completely outside of himself, outside of the world. Within two hours he had reworked his problem in complete quantitative detail. Shaking, he graphed the solution and it matched the arc in his mind. The equations, which over the last months had grown tired and suspicious, came to life, and they were right and they were graceful and they glistened like a moon over trees. (144-5, italics added)

It is one thing to see a mathematical solution in the form of "a beautiful curve," but it is quite another to reduce your marital problems and their possible solution to a mathematical curve. Bennett was attracted to Penny because they had both been inspired by the glittering diamonds of light on water. She is an artist with absolutely no confidence in herself, and Bennett cannot understand why she allows herself no sense of achievement and no ambition for the future. What he sees as her perversity causes him to be sadistic towards her. He finds this illogical for him, but, by comparing her "unreasonable" behaviour to his own, he concludes that they are incompatible:



One evening, as he sat in his office, something changed in his mind. He suddenly felt he had regained control. He had been acting illogically. He had a problem, like any other problem. The problem just hadn't been well posed. The problem was: Should he leave Penny or not? He began reviewing their relationship, listing the pros and the cons, which became zigzags of a curve in his mind, a curve arcing to some definite conclusion. A wave of relief swept over him. (203-4)

Now, in at least two personal relationships, Bennett has found that in a clear cause + effect context, the other person does not respond with what, to him, should be the correct and normal effect, even though one of them is a scientist, like himself. First, Scalapino, the great physicist: cause—a genius at physics + effect—he ought to publish his results and get the Nobel Prize. Second, Penny, his wife: cause—she is an accomplished and dedicated painter + effect—she ought to want to have exhibitions, be recognised and praised, sell paintings and acquire money and fame. Both Scalapino and Penny perversely, for Bennett, refuse point blank to have these desires and do these things, which Bennett would desire for himself in their place. This reminds us of the plight of the scientist in Einstein's dream number 7, where cause and effect do not naturally follow on:

In this acausal world, scientists are helpless. Their predictions become postdictions. Their equations become justifications, their logic, illogic. [...]

Scientists turn reckless and mutter like gamblers who cannot stop betting. Scientists are buffoons, not because they are rational but because the cosmos is irrational. Or perhaps it is not because the cosmos is irrational but because they are rational. Who can say which, in an acausal world?

In this world, artists are joyous. Unpredictability is the life of their paintings, their music, their novels. They delight in events not forecasted, happenings without explanation, retrospective. (*Einstein's Dreams* 40-1)

As Bennett struggles between reason and intuition, he slowly learns to accept the imperfections of daily life, he has to learn to live with what for him is chaos. The fact that Penny is female as well as an artist of nature adds a subtle gender and ecocritical subplot to this opposition. Bennett met Penny when both were responding to the beauty of nature, and Penny paints flowers as well as people. She fits into the subordinate half of the paradigm set out by Plumwood (43), where male is privileged over female and associated with reason:

culture	nature
reason	nature
male	female
mind	body (nature)
master	slave
reason	matter (physicality)
rationality	animality (nature)
reason	emotion (nature)
mind, spirit	nature

freedom	necessity (nature)
universal	particular
human	nature (non-human)
civilised	primitive (nature)
production	reproduction (nature)
public	private
subject	object
self	other

Like Scalapino, the emotional Penny rejects the public world and sees herself as outside society. Scalapino, the scientist, however, does it for very different reasons, he is proud and self-assured, with a stable self; he just refuses to accept the trivial rules of society. It is an older, wiser, but more compromising Bennett who learns, through the debilities of his Uncle Maury, to live with human, non-scientifically-minded, vagaries. All the same, he tells his own story, from the scientist's point of view. What Candel Bormann has to say about Neo-Victorian novels that articulate science in content and characters is equally true of *Good Benito*:

In the revisionist historical novel, science becomes part of the novel's possible subject matter, theoretically amenable to being developed in all its complexity, as a discursive practice which, in one way or another, takes account of nature's otherness. On the other hand, given that the discourse of science is often seen as a deeply "white," "middle class," "masculine" activity, it may well be that the voice of the underdog, so typical of revisionist historical novels, undermines the dominant discourse on which the articulation of science rests in the novel. (97)

The subtly feminist agenda of Lightman's writing continues in *Reunion*, where it is the woman who is motivated and driven, and rejects the man for his animalism and emotionalism. This novel is less about science than *Einstein's Dreams* and *Good Benito*, as it has no scientist characters.

The protagonist, Charles, is similar to Bennett, in that he is a middle-aged academic, a "small-college professor" (*Reunion*, 9), looking back at his past life, but he is a man of literature, not science. As he prepares to go alone to the thirtieth reunion of his year at his old college, he thinks about a book written by one of his class-mates. It is the biography of a scientist, a minor German astronomer named Ulrich Schmeken. Schmeken worked in the late nineteenth century at an observatory in Heidelberg, and his speciality was discovering asteroids (13). But if he had a passion for asteroids, no less a passion did he have for young ladies, and each of his discoveries is named after the girl of the occasion: "My own reading is that Schmeken, in his observatory, made eros from science" (15). But when a young woman refuses his advances as they gaze together at a star, he acts in a most unscientific way (15). The young woman is more intelligent than most of those who had been taken to the observatory and comes to understand the principle of eros: "that sex is the most powerful force in the universe" (16). She goes on to become a famous biologist, much more famous than Schmeken. What Schmeken did not see was that, for once, he had come up against a human being who wanted to use him as much as he





used other people. This ought to have been a cautionary lesson for Charles, since it happens to him, only the reading comes too late, after he has been devastated by his girlfriend's using and leaving him. But the reader sees the parallel, although there is a reversal to it, since the young Charles is the one who recognises the power of the urge to reproduce.

The reader only discovers at the end of the narration that Charles has had a traumatic experience exactly thirty years earlier, and that it, more than the modern world, is what has left him devoid of feeling all these years. He has been married and had a daughter, had an affair with a woman called Jenny (34) —surely not Bennett's ex-wife?— and now has a lukewarm relationship with Sheila, which, however, offers more hope at the end when he exorcises his trauma by revisiting it.

When I said earlier that in *Reunion* the protagonist's past is recovered in a Proustian epiphany triggered by going back to his old college, it is perhaps truer to say that it is more like an enactment of Einstein's second dream: time is like a flow of water, you can be carried back by a channel or a flow.¹⁰ Charles thinks of this firstly in relation to a class-mate, Michael, who met a girl for one day in a park and never saw her again, but never forgot her: "Michael's life gushed into a break point, like a river rushing to the mouth of two branching channels, [...]" (39).

Michael was not allowed a choice, and neither was Charles. At the class reunion, Charles is taken back to his past and sees himself objectively (50) as in a dream or hallucination (74). What he does not know is whether he, the fifty-two-year-old, is the same self as the twenty-two-year-old (95).¹¹ As he moves through the same halls and rooms his twenty-two-year-old self had inhabited, he re-lives the passion of that first full-blown love-affair. In the description of the different stages of his love of the ballerina, the body becomes all-important. He is very much aware of his body as, in parallel to his intellectual studies, he practises wrestling: "his body is a powerful machine [...] he is a machine, not an animal but a cunning machine" (72-3). He can inflict pain and harm upon his opponent and "see" himself doing it as if he were someone else, in a way reminiscent of Bennett being deliberately cruel to his wife. He accepts pain as part of life, as his treacherous literature teacher, James Galloway, instils in him as he teaches his favourite poet: "Frost accepts both pleasure and pain as part of life [...] Thus he makes a virtue of suffering" (163).

If Charles is able to separate mind and body and seek discipline of the latter, his girlfriend Juliana practises this to a much more exaggerated degree. Dance

¹⁰ The narrative example given of this time concept is of a time traveller being carried back in time with a prohibition on intervening in events for fear of changing the future and the course of history. The European Union of 1979 depended on Hans Klausen, and he would not have been born if a time traveller from the future had, in 1905, kicked up dust as she walked. 1979 is not an arbitrary date, it is the 100th anniversary of Einstein's birth.

¹¹ "*Reunion* seeks in less elliptical fashion than *Einstein's Dreams* to plumb life's most complicated and enduring relationship: that between who one was and who one is..." (Wilson).

demands a discipline of the group which is military in its rules, its timing, even in possessing a distinct discourse: “‘Tendu.’ Legs stretch to the sides. She motions what she wants with her arms: ‘Two front, two side, two inside.’ Everyone moves in unison, like a military regiment” (124). Juliana and the ballerinas are seen in a scientific way as well as a military way: “Bodies become geometry in motion” (81).¹² The mind over matter concept reminds us of Einstein’s fourth dream, where there are two times, mechanical time and body time:

Then there are those who think their bodies don’t exist. They live by mechanical time. They rise at seven o’clock in the morning. They eat their lunch at noon and their supper at six. They arrive at their appointments on time, precisely by the clock. They make love between eight and ten at night. They work forty hours a week, read the Sunday paper on Sunday, play chess on Tuesday nights. When their stomach growls, they look at their watch to see if it is time to eat. When they begin to lose themselves in a concert, they look at the clock above the stage to see when it will be time to go home. They know that the body is not a thing of wild magic, but a collection of chemicals, tissues, and nerve impulses. Thoughts are no more than electrical surges in the brain. Sexual arousal is no more than a flow of chemicals to certain nerve endings. Sadness no more than a bit of acid transfixed in the cerebellum. In short, the body is a machine, subject to the same laws of electricity and mechanics as an electron or clock. As such, the body must be addressed in the language of physics. And if the body speaks, it is the speaking only of so many levers and forces. The body is a thing to be ordered, not obeyed. (25-6)

That the body is a machine made up of chemical reactions and electrical impulses is applied more fully in *Reunion* to eros, or what love is.¹³ The fifty-two-year-old Charles analyses what love is made up of, and sees that it is a totalizing force. It perhaps begins with sight and aesthetics —ballet appealing to all the senses and also being a different, exotic, world for him, rather as Lightman had described the seduction of the worlds of Rushdie, Márquez and science itself. But it goes deeper than the five senses, it plunges to the basic instincts: “The life force, the rush of blood” (228). Eros is an irresistible force: “We can’t control our impulses” (179), which leads to other physical and chemical reactions: “Despite all this, my mind was extremely alert, in the way that anger and jealousy electrify every cell of the body. I was a raw nerve” (177).

¹² In Lightman’s *Time Travel and Papa Joe’s Pipe* (1984), essays on the human side of science, one essay, “Pas De Deux,” is an accounting of the laws of physics that a ballerina makes use of during her dance, presented as a pas de deux dance between the ballerina and nature.

¹³ There is an essay, “Smile,” in Lightman’s *A Modern Day Yankee in a Connecticut Court* (1986), which is a biological and chemical analysis of the first romantic meeting between a man and a woman, exploring the limits of science. See also Thomas Pynchon’s scientific analysis of love in *V*: “Ready at the slightest pressure surge in the blood lines, endocrine imbalance, quickening of nerves at the lovebreeding zones [...]” (358).

Love gives life motivation and fulfilment; and through his reading of Emily Dickinson, Charles sees that it is the only important thing in life: “Yes, he can hear what he had not heard before, a soft throbbing, the pulse of the world” (152). Juliana finds a similar exhilaration in her dancing: “‘I am alive,’ she says between gasps. ‘I have felt heaven’” (140). This is the kind of epiphany described by the scientist Bennett when he saw in his mind the solution to his problem. Juliana is equally certain about her vocation, whereas Charles suffers the uncertainty of words that Bennett’s master had denounced:

He is beginning to understand that dance is not something Juliana does the way he’s ever done anything. And this crumbling brick building is not a place where she comes for a few hours a day to get exercise or to perform. This is a temple. And she a priestess, or goddess. Her life is so simple, focused on one single thing. His mind is filled with uncertainty, hers seems to be certain. He tries to make beauty with words, she creates beauty with her body. (86-7)

Here, we see that certainty is not the prerogative of the scientist. Indeed, later in the novel, when Juliana has become pregnant and she and her aunt insist on an abortion for the sake of her career, Charles achieves a similar certainty. The force of eros makes him want absolutely to have the child and become a father. Also, he is sure that, deep down, Juliana wants to have the baby, (which she does not), because he has convinced himself that he is the father and not Galloway, his teacher. Human certainty itself, therefore, is undermined, where it is not based on hard evidence.

The pain of self-examination had also been the subject of Lightman’s earlier novel, *The Diagnosis*. The quotation above from Einstein’s dream number four (*Einstein’s Dreams*, 25-6), of a world where people live by mechanical time and fail to listen to their body’s rhythms and necessities, is equally applicable to *The Diagnosis*. Bill Chalmers appears to be living a charmed life, as he has everything: he is still young, at just turned forty; he is apparently on top of his career, since he is doing well (a junior partner, hoping to rise soon to senior partner) in a Boston communications business; he has a lovely wife and son, house, car, etc. But when his body suddenly fails him, he is forced to stop in his tracks and is made to reassess his whole life.

In the interview Lightman gave for the Vintage page when *The Diagnosis* came out, he said that he “initially conceived of the book as a non-fiction book about the modern American obsessions with speed, information, and money, all mediated by modern technology” (“Author” 2). Thus the work does have considerable scientific and technological information, this time about medicine, things such as details of computer-guided aspirators (*The Diagnosis* 30), or PETs (Positron Emission Tomography, 324-5). Lightman tells us he did research at the Harvard Medical School Library, and consulted with half-a-dozen specialists in various fields. But he saw that a first attempt did not work, and that an exploratory, hypothetical, fictional format was the better medium: “I realized that what I really wanted to do was to explore the psychological dimensions of the societal problems I was writing



about. I wanted to explore the spiritual and mental cost of these modern associations with speed, information, and money” (“Author”).

The first page, where Bill Chalmers is on his journey to work—which he has timed to the minute—is dominated by words related to speed: “in a great hurry,” “dashed,” “swept up,” “galloping,” “rushed through,” “lunged ahead,” “ran,” “speed (3). In interview with Robert Birnbaum, Lightman said:

[W]e’ve lost our way, we have lost our centeredness. We don’t have the time, literally, to think during the day. To listen to ourselves think. [...] One metaphor for how we are living is that you see so many people with cell phones. [...] When they are on their cell phones they are not where their bodies are... they are somewhere else in hyperspace. They are not grounded. We have become disembodied. (1)

Lightman makes graphic use of this idea in the chapter “Waiting Room,” the scene at the doctor’s, when Chalmers visits Dr Petrov at the Massachusetts General Hospital for the first of many appointments: “Bill made a quick examination of his fellow patients. One typed nervously at her laptop, another two scribbled on documents in manila folders, a man in the corner leaned over some massive report and muttered into his cell phone” (107). Bill is acutely aware that he does not have time for his only son, Alexander, and the two communicate by e-mail, as does his wife, Melissa, with her on-line lover.

The first symptom of what turns out to be a mysterious malady, never ever diagnosed, is a sudden loss of memory as Chalmers is on the train, on his way to work. He can only remember that he has an important appointment and that the motto of his company is “The maximum information in the minimum time” (14). As Lightman said in the Vintage interview, he is not very optimistic about our future in this speed-driven modern world (2-3).

In this novel, Lightman shows us that science and technology have brought us great progress, but they have also brought us a lifestyle which can kill us. Bill Chalmers compares himself to several people in the novel, and the reader also implicitly compares him to others. He compares himself to a man on the train, who, although Bill’s age, seems to proclaim through his “magnificent serenity” that he has “already won the Big Race” (106). Bill also compares himself to competitors and superiors at work, and it is only when he is dismissed for inefficiency (he dare not reveal his ill-health), and returns late at night to collect his belongings, that the true nature of the human cost of the success of one of his bosses is revealed to him: Harvey Stumm returns to work during the night, and, together with his harassed wife, secretly keeps pace with the workload. (252-7)

Lightman said, in his interview with Robert Birnbaum, that he owed a debt to Kafka: “I appreciate the idea of the individual person battling society” (1). In all his novels he portrays the individual up against entrenched ideas and protocols in society. This is not to say that people do not help each other; on the train, when Chalmers breaks down, and afterwards, when he is wandering around Boston trying to discover his own identity, he receives several offers of help. But he refuses most of them, as his pride will not allow him to ask help of those people he recog-





nises and who could have helped him. He knows that he must not show any sign of debility. His counterpart in the sub-plot,¹⁴ Socrates, is equally supported by many friends and sympathisers, but they too, are ineffectual when pitted against the powerful members of society. In Bill Chalmers' story, representatives of three important areas of society say they are trying to help him: the medical establishment,¹⁵ the legal establishment and the business establishment, and in the end, none of them provide a solution. The religious establishment of the Church is almost ruled out from the outset; as we see in the chapter "Church" (50-63), the church has been transformed into a bingo-hall.

The novel ends on an ambiguous, pessimistic note, and we are not encouraged to imagine a happy ending for the protagonist. The sub-plot is the embedded novella of the death of Socrates. Chalmers' son Alexander has signed up for a college course on Plato on the Internet and has broken the copy-protect lock, enabling him to download the whole course and send it to his father. Interspersed in the chapters of the main narrative, therefore, we have the story of the last days of Socrates in Athens in 399 B.C. The main parallel is between Chalmers and Socrates, because both are, in a way, killed by poison. Socrates is executed by being forced to drink hemlock. The poison works its way up through his body, starting at his feet (in the chapter entitled "The Execution," 334-337; Lightman read the writings of Hippocrates on disease and medicine, "Acknowledgements," 371). Chalmers, after his initial loss of memory, loses the feeling in his limbs and becomes paralysed, starting from his toes and working upwards. That the modern world has "poisoned" him is contained in the references to pollution in his everyday environment. In the chapter "Taxi", where he is caught in a traffic jam, we find words of both atmospheric and auditory stress: "pollution," "horns screeched" (122); also on the subway: "taking a deep breath of bus exhaust" (18).

But, just as Chalmers discovers that his bosses are also victims, he is equally compared to Socrates' tormentor and prosecutor, Anytus. Anytus is a wealthy tanner, who is fearful of Socrates' ideas. He does not want Socrates' death on his conscience and so tries to persuade him to accept exile instead of death, but Socrates refuses. Anytus is under great pressure and suffers not only from some allergy, but from the discomfort of the foul smells of the tannery. He does not suffer as much as his slaves, however, who have to work in contact with excrement, and are exploited in the same way as Chalmers is: "Above each barrel, visible even in the dim light, floated a suffocating brown cloud of airborne manure. An oily brown film coated the floor, the walls, and the ceiling" (163). Lightman thus suggests that the modern

¹⁴ On the Vintage webpage, Lightman says he was partly inspired by Mikhail Bulgakov's *The Master and Margarita* in the narrative use of an embedded novella.

¹⁵ Again on the Vintage webpage, Lightman says he has a brother and many good friends who are doctors, so he is not saying they are ineffectual in general, only in this novel. The medical establishment is not treated any differently from the other two, and all are part of our modern world and its obsession with speed, information and money (3).

world is not exceptional, since there have always been pressure, stress and even environmental pollution.

Anytus, therefore, is both executioner and victim, but Chalmers, fully the victim, is paired more with Socrates. The two stories come together at the end in death (we suppose Chalmers has no hope of survival), and the concept of dignity. Socrates refuses exile and refuses to be paid off. All he asks for is to ingest the hemlock himself and to die with dignity (his friends foil an assassination attempt ordered by Anytus). In the same way, Chalmers refuses to be hospitalised, he wants to die in the seclusion of his own home, aided, not by machines and strangers, but by his (albeit unfaithful) wife, and son. Chalmers (and the reader) is struck by Socrates' serenity: "He said that death is only the separation of the soul from the body. After that the soul is pure and free. He said that men who fear death love the body, and probably power and money as well" (337). As Verghese sums it up in his *New York Times* review of the novel:

Neither the story of Chalmers's decline nor the Socrates story comes to a satisfying resolution. This is perhaps Lightman's intent: that we should weave the two strands together and come up with a manifesto, an interpretation of Socrates in the context of our modern world. If you put vanity or the accumulation of material possessions before care of your soul (Socrates and Lightman seem to say), you risk ruining your life. (3)

As Chalmers fights for his soul, he tries to get into closer contact with the Earth: "I was driving to work this morning, and I saw a mother duck on the side of the road, with six or seven babies waddling behind her. I slowed down to look and everybody started honking at me" (239). The last strength in his hands is dedicated to drawing leaves: "He has become a seer, a historian of the life of a leaf" (296). As his nerve-endings fail him as carriers of sensations, also his sight, his hearing appears to become more acute. He seems to be able to hear, beneath the noise of machines, the basic sounds of the universe:

He switched off the computer, held his head still and continued to listen, and he could hear the tiny whine of the fluorescent lights, like the vibrations of ten thousand minuscule tuning forks. He listened and listened, and the vibrations decelerated in his mind, going slower and slower, descending in pitch, until he could hear each one coming after the other, dissected, atoms dropping to the floor. He turned off the lights, the atoms stopped. In the dark, in the dark there was still something else, even fainter, but steady, something steady and faint. What was it? Straining to hear, he held his breath. Some dim, residual sound below everything else. A hum. (132)

Thus Lightman ends with an ecological message, saying that there is no going back on the technological revolution, but we must all work together and not lose sight of our basic humanity, and our common nature as inhabitants of a fragile Earth, as he said in interview: "Science does not take place in a vacuum, it involves people, with human problems and aspirations" ("Author" 3). Scientists are human,

as we have seen in Lightman's Einstein and Bennett, and they do their best work, which benefits society, when they bring their human skills to bear upon the scientific problems. But there is no escaping "science," even if we are not trained for it. Human beings forget or ignore at our peril that the mind and the spirit, in this world at least, require a body, and that body is subject to physical and chemical laws. The more we understand about these workings, through the interchange of knowledge and ideas, the more prepared we are to survive.



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