

BOOKS & ARTS

The ambiguity is the essence

When we consider the Universe, are we trying to impose order on a meaningless jumble?

The Human Touch: Our Part in the Creation of a Universe

by Michael Frayn

Faber & Faber: 2006. 505 pp. £20

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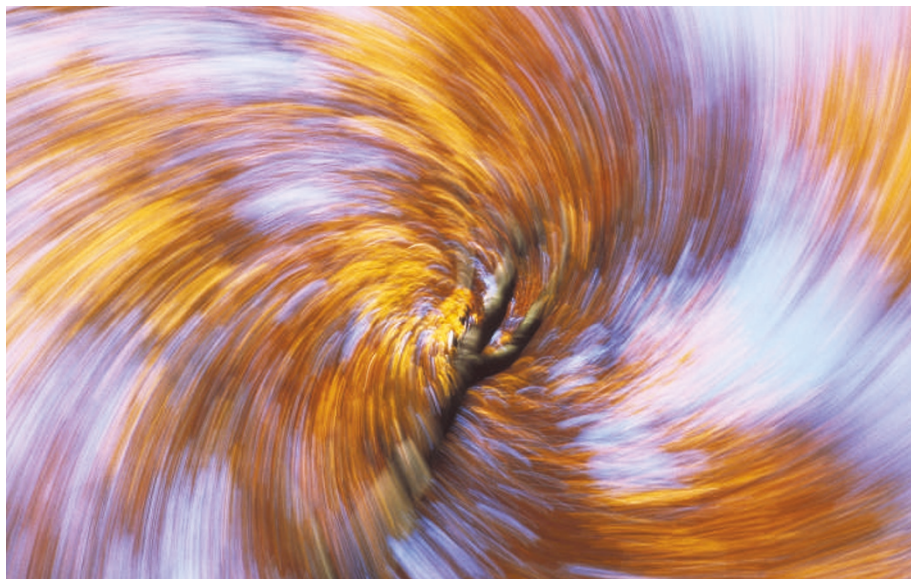
Alan Lightman

"What do you think of tastes — do they exist without the mind or no?" asks Philonous in philosopher George Berkeley's 1713 treatise *Dialogues Between Hylas and Philonous*. The materialist Hylas replies: "Can any man in his sense doubt whether sugar is sweet, or wormwood bitter?" The antimaterialist Philonous (representing Berkeley himself) then asks: "Is a sweet taste a particular kind of pleasure or pleasant sensation?" and "is not bitterness some kind of uneasiness or pain?" Hylas concurs and Philonous concludes: "If, therefore, sugar and wormwood are unthinking corporeal substances existing without the mind, how can sweetness and bitterness, that is, pleasure and pain, agree to them?"

The ancient philosophical question, of course, is this: does the Universe have any meaningful existence beyond our perception of it?

The celebrated playwright Michael Frayn is the latest to tackle this problem, in his new book *The Human Touch*. Breathtaking in its sweep and audacity, this is a huge sprawl of a book. Ranging from quantum physics to neuroscience, philosophy, linguistics and literature, Frayn brings every discipline he can muster to argue that Philonous is right: the world has no order or meaning beside what we give to it. According to Frayn, the laws of nature, cause-and-effect relationships, even time and space, are concepts largely manufactured in our minds. "Logic, it turns out, is a theoretical construction, something we have built ourselves," he writes.

To Frayn, the physical Universe is a meaningless jumble, filled with uncertainties and unpredictabilities, governed by chance and often random events. Like actors in a Greek tragedy, we are driven to find order and meaning. We develop language, we name things, we try to analyse our own consciousness and 'I-ness', we wrestle to rationalize the decisions we make, we create categories of truth and falsehood, we invent ideas of causality and logic, and we propose laws of nature — but all these attempts at order are ultimately doomed to result in ambiguity. For not only is the external Universe a



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Mind over matter: we impose our ideas on the world when we try to make sense of what we see.

complex mess, so too are our minds, subject as they are to intricacies beyond any rational understanding.

Above all else, Frayn rails against determinism, against a materialist and causal explanation of the world, from a man falling in love with a woman to Earth's orbit about the Sun. The central theme of his masterful play *Copenhagen* is repeated here over and over in intellectual garb. "The ambiguity is the essence," he writes in a chapter entitled 'Mailing a cat'.

Uncertainty, ambiguity, complexity. How do we really know why there was a change in the weather? How did we decide whether to put honey or marmalade on our toast on Sunday morning? And why, next Sunday, might we make the opposite decision? How do I know that the brownish elliptical shape I see before me is a penny? Why do I think that I am me and you are you?

Frayn does not say the endeavour of science is empty. Rather, he says that we, the living observers, are an inseparable part of that endeavour. Furthermore, the Universe, including the grey matter between our ears, is far more complex than we can possibly understand.

Consider time, that most solid pillar of reality. According to Frayn, time does not exist without events, and events, in turn, make no sense without observers: "The probabilistic universe of quantum mechanics makes no sense unless it is inhabited."

Or consider language. Here, Frayn challenges Noam Chomsky's theory of a hard-wired universal grammar, writing: "Nothing in Chomsky's view accounts for the way in which all the rules of language are endlessly extended, adapted, and stood on their heads."

Quoting extensively from the physicist Niels Bohr, philosophers Daniel Dennett and John Searle, psychologist William James, philosopher of science Karl Popper, and physicist and philosopher of science David Deutsch, and indulging not a little in his own training in philosophy, Frayn tackles all these questions with erudition, wit, a spirited and inviting voice, and supreme self-confidence. Showing no fear, he takes on the leading thinkers in any number of fields. One cannot help but be impressed by the sheer ambition of the endeavour.

In large part, *The Human Touch* is about what its title suggests. But the ubiquitous references to physics make it clear that Frayn is talking about the external Universe as well. And here, I believe, he runs into some trouble and misunderstandings.

For example, Frayn says the uncertainty principle derives from first principles and "could have been hit upon before it was necessary to explain anything, simply from an abstract analysis of the concepts of position and velocity". (Frayn's own explanation of the principle in a footnote is erroneous, by the way.) This misunderstanding is not a small point because

of Frayn's repeated suggestion that the order of the physical Universe is largely a mental construction. The uncertainty principle never could have been reached by thought alone because it requires the concept of the quantum, which is absent from the classical understanding of position and velocity. The quantum was thrust upon the human mind at the beginning of the twentieth century by the need to explain experimental results, namely the observed black-body radiation from hot, dark containers.

Likewise, Frayn says that Einstein's theory of gravity would have remained unassailable even if its predictions had not been fulfilled, because it too was derived from first principles. The only conclusion of a negative experimental result, Frayn says, would have been that those principles were deemed not applicable to those particular situations. However, the equivalence principle, on which Einstein's general theory of relativity is based, could have been proven wrong by experiment, just as the concept of parity conservation was proven wrong in the 1950s and subsequently abandoned. First principles in science, no matter how beautiful and alluring, are eventually discarded if they repeatedly disagree with experimental results.

If Frayn is right that the logic and order of the external Universe are only products of the human mind, how can we separate the physical theories we conceive, such as quantum chromodynamics or the general theory of relativity, from ourselves, the conceivers? Don't the laws of nature, Frayn argues, simply reflect our human way of understanding? I don't think so. Suppose an intelligent civilization emerges somewhere in the Universe, produces scientists, conceives laws of nature describing such things as electricity and relativity, and then self-destructs. Before annihilation, the forward-thinking beings bury their physics books. Eons pass without any life forms in the universe. Then, ten billion years later, a new civilization emerges and develops its own equations for the laws of nature. One day, they accidentally uncover the physics books left behind by the previous society. They spend years deciphering the unfamiliar language but finally succeed, as modern humans did with the Rosetta Stone, and compare their theories of nature. What is the result? Every scientist I know would bet a roomful of pocket calculators that the separate descriptions of nature, composed billions of years apart, would have substantial agreement. The order and logic of nature, by whatever name you call it, seems to exist outside our heads.

If Frayn truly believes that the Universe has no logic beyond what we give it, then why does he repeatedly board aeroplanes for trans-Atlantic trips? Each time he flies, whether consciously or not, he is trusting his life to the logic and repeatability of nature, to the predicted relationships between air pressure, density, velocity, wing area and gravity.

I find Frayn to be at his most convincing

when describing the ambiguities and complexities of the human mind and heart. Here, his experience as a novelist and playwright, his insights into human psychology, and his good sense serve him well.

"Like me, I know, you are an endlessly flowing and shifting river of perceptions and feelings, and ever-springing source of decisions and initiatives. How can I ever lay hold of this subjectiveness?... We are like fetishists, who simplify the objects of their desire by reducing the intolerably complex whole to a pair of shoes or a piece of underwear."

In the end, I was moved by this book not

because of its science, or even its philosophy, but because of its poetry. *The Human Touch* is an extended ode to our humanity, to what it means to be a thinking being in this strange cosmos we find ourselves in. I was taken on a journey by a thoughtful companion. I was entertained. I was provoked. And I was left asking afresh some ancient questions. What is thinking? What is feeling? What is that intense sense of self that we have? What does it all mean? ■

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The beginning of wisdom

Is Pluto a Planet? A Historical Journey Through the Solar System

by David A. Weintraub

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Stuart Ross Taylor

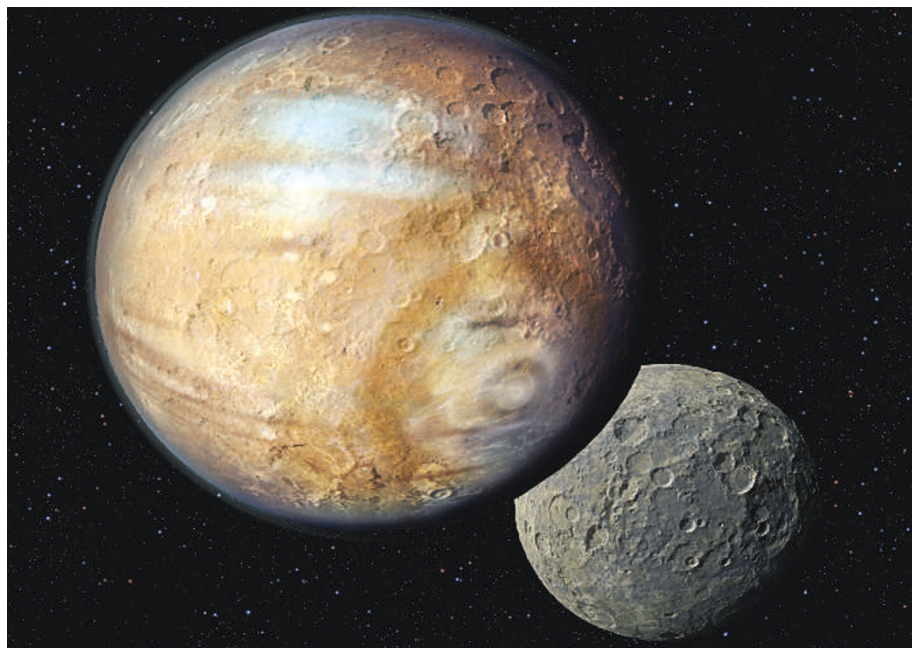
Pluto carries much the same sentimental, emotional and historical overload as Father Christmas. Even the name for this frozen dwarf, suggested in 1930 by 11-year-old Venetia Burney in Oxford, UK, is evocative, having mythological connections. And one of man's best friends appears as Disney's Pluto of the same vintage. It all makes for a heady cocktail.

Discovered by accident by Clyde Tombaugh, Pluto is a legacy of the obsession of Percival Lowell (he of the martian canals). It might otherwise not have been discovered for another 50 or 60 years, in which case the question of whether Pluto is a planet might never have arisen.

The discovery of Pluto's relatives, the trans-

Neptunian objects (TNOs), or Kuiper Belt objects as they are also known, is reminiscent of the history of the asteroid belt. Ceres, located in 1801, was hailed as the missing planet between Mars and Jupiter that was long predicted by the Titius-Bode law. But its trivial size and the rapid discovery of Pallas, Juno and Vesta in the vicinity suggested that the true situation might be more complex. It was not until 1845 that other bodies were discovered, and better telescopes led to a deluge, relegating the four new planets to the status of minor planets or asteroids. As they did not display a common origin point, even the notion that they were remnants of a shattered planet vanished.

Why, then, did it take so long to discover the predicted swarm of TNOs beyond Neptune? Probably because Pluto has such an eccentric and inclined orbit that no one was dedicated enough, or had sufficient funding or energy, to repeat Tombaugh's arduous search technique. Although Pluto's moon, Charon, was found in



After 76 years, astronomers still argue over the status of Pluto (represented here with its moon Charon).

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