

The Rise of Narrative Non-Fiction

SIMON SINGH

Traditionally popular science writers have put the emphasis on explanation, concentrating on conveying to the reader an understanding of scientific concepts. There have been numerous successful books that follow this archetype, including the recently published *The Elegant Universe* by Brian Greene. The book has been successful because it clearly explains the ideas of relativity and quantum physics and how string theory offers hope of unifying these two models of the universe. The public will always appreciate any book that successfully explains the latest scientific understanding of the universe.

However, the last five years have witnessed the burgeoning of a new type of science writing, so-called narrative non-fiction, in which the emphasis is not solely on the explanation of science. Instead, the author also writes about the scientists, their motives, adversities and triumphs. All of this is framed within an overarching narrative. These books still explain the science, but they also tell the tale of a scientific discovery or have a biographical thread.

The ratio of explanation to story in science writing has a spectrum that ranges from academic papers (dominated by explanation) to text books to traditional science writing to narrative non-fiction (even balance between explanation and story). It is even possible to go far beyond narrative non-fiction, where we find fiction based on scientific or mathematical themes. In these books the story is naturally more important than any explanation of scientific concepts, but they do explain what drives scientists, describing the culture and atmosphere of scientific research. Recently there have been several fictional books about mathematics namely *Uncle Petros* and *Goldbach's Conjecture* by Apostolos Doxiadis and *The Parrot's Theorem* by Denis Guedj.

Arguably the trend towards narrative non-fiction began with Dava Sobel's *Longitude*, a description of the invention of the marine chronometer, which also tells the story of its inventor John Harrison, who had to battle with the establishment in order to get his breakthrough recognised and adopted. Subsequently, many other books have been categorised as narrative non-fiction, including my own books, *Fermat's Last Theorem* and *The Code Book*.

The Code Book is a history of cryptography. We can see the difference between traditional non-fiction and narrative non-fiction by examining chapter 6, in which I discuss a system of encryption called public key cryptography, one of the greatest cryptographic developments in history. Traditional non-fiction would concentrate on explaining the mathematics and mechanics of public key cryptog-

raphy. It is a fantastic, counter-intuitive and brilliant concept, so naturally readers would appreciate a clear explanation. In *The Code Book* I do, of course, explain the concept of public key cryptography, a system which is powerful because it allows two people (known as Alice and Bob) to communicate securely with each other without having previously agreed or exchanged a key (the recipe for encrypting and decrypting). The following excerpt gives an analogy for public key cryptography:

Start Quote

This anecdote concerns a country where the postal system is completely immoral, because postal employees will read any unprotected correspondence. One day, Alice wants to send an intensely personal message to Bob, and so she puts it inside an iron box, closes it and secures it with a padlock and key. She puts the padlocked box in the post and keeps the key. However, when the box reaches Bob, he is unable to open it, because he does not have the key. Alice might consider putting the key inside another box, padlocking it, and sending it to Bob, but without the key to the second padlock he is unable to open the second box, and so he cannot obtain the key that opens the first box. The only way around the problem seems to be for Alice to make a copy of her key and give it to Bob in advance when they meet for coffee. We are back to the same old problem of key distribution. Avoiding key distribution seems logically impossible – surely, if Alice wants to lock something in a box so that only Bob can open it, then she must give him a copy of the key. Or, in terms of cryptography, if Alice wants to encipher a message so that only Bob can decipher it, then she must give him a copy of the key. Key exchange is an inevitable part of encipherment ... or is it?

Picture the following scenario. As before, Alice wants to send an intensely personal message to Bob. Again, she puts her secret message in the box, padlocks it and sends it to Bob. When the box arrives, Bob adds his own padlock and sends the box back to Alice. When Alice receives the box, it is now secured by two padlocks. She removes her own padlock, leaving just Bob's padlock to secure the box. Finally, she sends the box back to Bob, who can now open the box, because the it is only secured with his own padlock, and he has the key to his own padlock.

End Quote

By performing a triple exchange with two padlocks it seems as though key distribution is not an inevitable component of encryption. The book goes on to explain the evolution of this concept and the eventual mathematical implementation. Furthermore, *The Code Book*, goes on to tell the intriguing story that surrounds the invention of public key cryptography, which is why it has been labeled an example of narrative non-fiction.

For example, *The Code Book* describes the political, social and technological circumstances that motivated the development of public key cryptography. It then introduces the three scientists who made the crucial breakthrough, namely Whitfield Diffie, Martin Hellman and Ralph Merkle. The book describes their backgrounds, their struggles, and the moment of their breakthrough. For example, one section describes Hellman's childhood as a Jewish kid growing up in a Catholic neighborhood of New York, which contributed to his independent attitude. Having been frustrated at not being like the other kids (e.g. not celebrating Christmas), he decided that it was better to be different, and radical thinking was one facet of being different.

Diffie, Hellman and Merkle developed the concept of public key cryptography, but they were unable to construct the mathematics required to make it work in practice. The *Code Book* tells the story of another trio (Rivest, Shamir and Adelman, or RSA) who were able to complete the development of public key cryptography. The book describes how the RSA cipher was invented, patented, commercialised and implemented, and how it has become one of the most important developments in security in the Information Age.

From a storyteller's point of view, there is a magnificent twist in the invention of public key cryptography. In 1997, the British government announced that researchers at the Government Communications Headquarters (GCHQ) had made the same breakthroughs as the American cryptographers, but ahead of them. However, the British research had been classified and the British researchers received no public credit for their work for a quarter of a century. The fact that the British inventors of public key cryptography remained anonymous for so long contributes to a theme that runs throughout the book.

Throughout *The Code Book*, scientific explanations are surrounded by the stories behind the science. In my opinion, the background story of science is relevant to the science itself. Also, there are two main advantages to writing in the style of narrative non-fiction.

First, the story can create drama and tension which draws readers into the science. In other words, non-scientists may read narrative non-fiction whereas they might not read traditional science writing. The narrative structure may also give readers the momentum they require to get through some of the more technical sections. At the same time, readers who are familiar and content with traditional science writing do not seem to be perturbed by the addition of narrative detail.

The second advantage of narrative nonfiction is that adding stories to science writing can often mean the inclusion of history. I have found that a historical perspective is often helpful in introducing non-scientists to science, because the earliest stages of a scientific pursuit are generally easier to understand and provide a grounding for more complicated modern ideas. In *The Code Book*, the first chapter establishes the foundations of cryptography using various historical examples, whereas the final chapter is a description of quantum cryptography. Although it is complicated, my hope is that readers will feel confident enough to read about quantum cryptography because they have achieved a solid grounding while reading about the elementary historical ciphers.

I have been writing for only four years and have only two books to my name. In both cases, the narrative non-fiction approach was entirely natural. Before writing about science, I made science television programmes, and in order to appeal to a large audience I realised that I had to introduce narrative into my programmes. Hence, when I started writing, I translated my television style into my books.

Many other exponents of the narrative non-fiction approach to science writing seem to come from a similar background to my own. Authors such as Dava Sobel, Paul Hoffman (*The Man Who Loved Only Numbers*) and Sylvia Nasar (*A Beautiful Mind*) do not work in television, but they have had careers as journalists writing for newspapers and magazines, where storytelling is equally important.

For many authors and subjects, the narrative non-fiction style may not be appropriate. Greene may have been right to take a more traditional approach towards writing *The Elegant Universe*. String theory is an area of science without a long history, neither does it have rich characters around whom a story could easily be constructed, and what little story there is does not yet have an ending.

But in general, when authors are attempting to reach out to a general readership, I would encourage the use of story telling techniques where possible. Most popular science writers have the objective of explaining science to the layperson and raising awareness of scientific issues among the general public, and I believe that narrative non-fiction can help to achieve this. However, authors should always remember that science books are about explaining science, and therefore they should not forget to include explanations within narrative non-fiction. The danger is that the trend towards storytelling in science will go too far, and that some writers will be tempted to forget the science altogether.