

# Implementation of Teaching Science Fiction Literature in the Process of Teaching English as a Foreign Language

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## Abstract

As Irène Langlet (2006) explains, in the academic world, reading science fiction is still a relatively rare activity due to a heritage of prejudice and stereotypical images regarding the genre. Although works such as Aldous Huxley's *Brave New World* (1931), George Orwell's *Nineteen Eighty-Four* (1949), or Margaret Atwood's *The Handmaid's Tale* (1981) have now become part of the canon of the genre, their science fiction nature has regularly been masked by labels such as “speculative fiction”, often relegating the term “science fiction” to mere pulp fiction, a genre generally looked down upon. These observations may be true for the study of science fiction in literature classes, but what about its possible use in the ESP classroom? In her article on “How scientific is science fiction? From ‘Scientification’ to Cyberpunk and beyond” (2004), Andreolle discusses the link between science fiction and FASP studies and pleads in favour of a “vaster definition (or perhaps sub-category definition) closer to the widely-embracing Anglosaxon expression expert fiction, with a label such as FASS (fiction à substrat spécialisé) which would allow for the inclusion of popular genres like science fiction” (2004: 153). It is within this “vaster definition” or “sub-category definition” that we place this study related to the possible use of science fiction in an ESP context of students specialising in astrophysics and biotechnology. We start with a brief historical overview of the popular genre of science fiction, by exploring its beginnings and the important role it plays in the field of science popularisation. We then go on to present the pedagogical potential of the genre and a few specific examples of the way in which these works can be used in the classroom and to further the popularisation of science.

## Keywords

Science fiction, teaching English, ESP, literature, foreign language.

## Introduction

It is first of all important to differentiate between science fiction and the fantasy genre, and though both of them tend to “share the same shelves in Anglosaxon bookstores”, as Andreolle explains, “the vital difference is that science fiction deals with the rational, empirical environment [...] whereas fantasy literature deals with the irrational (dragons, magic and other supernatural phenomena as in *Lord of the Rings*)” (2004: 153). Science fiction stems from the mixture of science and fiction, unlike fantasy. However, pinpointing its beginnings is a difficult task since different interpretations of the term lead to different beginnings or precursors. According to Ruaud and Colson (2014), Thomas Moore's *Utopia* (1516) marks the birth of the origins of science fiction, and Mary Shelley's *Frankenstein* (1818)<sup>3</sup> could be placed somewhere within the “proto-History” of science fiction. Even though the term was not invented at the time, many works already contained the essence of what would later become “science fiction”. According to Ruaud and Colson (2014), during the 18<sup>th</sup> century, scientists and novelists illustrated the aspirations of modernity with “fantastic voyages” (“voyages fantastiques”), and in the 19<sup>th</sup> century, the French defended the idea of a “merveilleux-scientifique”, whereas the English focused on what they called “scientific romance”.

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The 19<sup>th</sup> century was also marked by the close link between technology and science, an illustration of which is Jules Verne's Nautilus which combines submarine technology and the pure science of its electrical propulsion. In the 20<sup>th</sup> century, the Americans gave a name to this literary tradition, with Hugo Gernsback's "scientifiction", a term which, for legal copyright reasons and in what could be called "a twist of fate", became "science fiction" when he created his new magazine, *Amazing Stories* (1926). The history of American science fiction is closely linked to the evolution of editorial markets, from slicks to pulps (Colson & Ruaud, 2014: 158). Science fiction became the domain of pulps, especially after the creation of *All-Story* magazine in 1905, which placed American science fiction "resolutely in the domain of popular or 'low-brow' culture" (Andréolle, 2004: 154), as opposed to European fiction which "evolved from more respectable literary forms (the Gothic romance or the Utopian narrative, for instance)" (ibid.). Science and science fiction are thus closely intertwined both historically and technologically. Science fiction tends to speculate about the future and in so doing helps to educate the non-specialist about tomorrow's new technology. It is, in fact, for this very reason that editors such as Gernsback took an active part in the popularisation of the genre.

### **Science fiction and science popularisation**

Science fiction starts off, according to Gernsback, as a way of making specialised scientific knowledge more comprehensible for the general public by popularising scientific innovations. A certain number of sci-fi writers started out as science journalists and then turned to writing fiction in order to place the technological innovations they spoke of in the context of a future era and be able to picture the possible outcomes of such changes in society (hence the popular narratives of utopias and dystopias). Although different branches of science fiction tend to focus more on scientific accuracy and others on pure entertainment (such as space operas like *Star Wars*, for example, which does not pay much heed to scientific accuracy), we will be focusing more on the ones which "respect the science", as much as possible. In his book on science fiction, Baudin (1971) explains the importance of science popularisation in a world which is otherwise difficult to penetrate for non-experts, explaining how talented scientific writers manage to render scientific advances accessible for the general public through the links between scientific research, popular science and science fiction. The construction of new knowledge in scientific laboratories leads to popular science and mediation, an in-between space in which experts and the general public can debate about science and society. As an example of this type of intermingling, astrophysics presents a good case in point. Over the recent years, astrophysics has seen a sudden surge in popularity. One example of this is the highly acclaimed comedy TV sitcom, *The Big Bang Theory*, whose main characters are physicists at CalTech. Another example is the general public's interest for the activities taking place at CERN in Geneva as we learn more and more about supermassive black holes, Higgs Boson particles and gravitational waves. Many astrophysicists have indeed risen to relative fame by focusing on public understanding of science programmes. Although Albert Einstein was by no means a science populariser, his image, coupled with what is probably the most famous equation so far,  $E=mc^2$ , has come to represent an image of the archetype of the "scientist" in the 20th century, as Edison and Tesla before him, and is now undoubtedly one of the icons of scientific pop culture.

Today, the Royal Astronomical Society, as well as quite a few notable prominent professors such as Stephen Hawking, Carl Sagan, Neil deGrasse Tyson or Lawrence Krauss, to name but a few, are active in the popularisation of astrophysics which fascinates the general public. Most of these professors have written books focusing on popular science such as, for example, *A Brief History of Time: From the Big Bang to Black Holes* (1988) by Stephen Hawking and *Death By Black Hole and Other Cosmic Quandaries* (2007), *Space Chronicles: Facing the Ultimate Frontier* (2014) by Neil deGrasse Tyson. These scientists have also taken part in television programmes, such as *Cosmos, A Personal Voyage* (Sagan, followed by deGrasse), for example, and they all take part in public conferences and debates in front of live public audiences. We also note their high visibility in popular culture through cameo appearances: Stephen Hawking makes regular appearances in *The Big Bang Theory*, for example, confirming his status as a major pop culture figure. In the same vein, YouTube channels like *60 symbols*, created by the University of Nottingham, and *PBS Space Time8*, specialise in familiarising viewers with concepts from physics, astronomy and mathematics and explain complicated theories using metaphors or concrete experiments and experiences from everyday life. These channels have hundreds of thousands of subscribers and millions of views. It is thus becoming "part of the job" to write or talk about one's "science" to the public, as is also illustrated by contests for doctoral students.

## Science Fiction in the ESP classroom

As a great admirer of Jules Verne and a connoisseur of the Anglosaxon utopias, Gernsback founded the magazine *Modern Electrics* in 1908. In “Fifty Years Hence”, a speech he gave on 5<sup>th</sup> April 1957 before the joint meeting of the Michigan Institute of Radio Engineers and the American Radio Relay League at the Henry Ford Auditorium in Michigan, Gernsback expressed his astonishment at the American public’s general ignorance of technology: It rankled me that there could be such ignorance in regard to science and I vowed to change the situation if I could. A few years later, in 1908, I turned publisher and brought out the world’s first radio magazine, *Modern Electrics*, to teach the young generation science, radio, and what was ahead for them. (Quoted in Ashley, 2000: 28)

Although his first magazines only contained speculative non-fictional articles, which aimed essentially at stimulating interest in scientific advance, before long he was also publishing fiction. The stories were not so much science fiction as scientific instruction in narrative form. In April 1916, Gernsback wrote a powerful editorial entitled “Imagination versus Facts”, encouraging his readers to write their own stories and speculative articles. Gernsback’s “science fiction” “extrapolated from existing known science to suggest future inventions and what they might achieve; and all for the sole purpose of stimulating the ordinary person with a penchant for experimenting with gadgets, into creating that future” (Ashley, 2000: 34). Gernsback also wrote his own fiction (cf. Ralph 124C 41+13). In the editorial of the first issue of *Amazing Stories* in April 1926, Gernsback gives a definition of the term “scientifiction”: “By ‘scientifiction’ I mean the Jules Verne, H. G. Wells and Edgar Allan Poe type of story—a charming romance intermingled with scientific fact and prophetic vision”. He adds: Not only do these amazing tales make tremendously interesting reading—they are also always instructive. They supply knowledge that we might not otherwise obtain—and they supply it in a very palatable form. For the best of these modern writers of scientifiction have the knack of imparting knowledge, and even inspiration, without once making us aware that *we are being taught*. (My italics)

This quotation highlights the inherently pedagogical nature of science fiction hidden behind the entertaining format. By “educating” and “instructing” the public, science fiction thus leads to the popularisation of science. If science popularisation is at the heart of science fiction, it also serves a very scientific purpose. Researchers in technology indeed rely, in part, on science fiction to find inspiration for new discoveries. In Rosen’s article entitled “Why Today’s Inventors Need to Read More Science Fiction” (2013), two MIT Media Lab researchers, Dan Novy and Sophia Brueckner, explain how studying the works of authors such as Philip K. Dick and Arthur C. Clarke helps designers “working in the very real world” not just to come up with ideas for new gadgets, but also to anticipate their consequences. As Gunn explains on his website, “The kinds of subjects that can be taught through science fiction involve all the social and physical sciences, history, ideas, futurology, religion, morality, ecology, reading skills, and many others”—in view of which, it only seems natural to assume that science fiction could also be used effectively in the ESP classroom with Science and Technology students.

The examples of fiction we discuss are based on scientific knowledge which is simplified in order to help the general public to understand the storyline. As such, it helps domain specialist students to work on their English but also to learn about how to popularize their scientific knowledge. Regarding the science fiction used in the ESP classroom, we deliberately chose two different disciplines (astrophysics and biotechnology) and different formats (a film, a video game and a novel) to highlight the variety that science fiction offers in the ESP teaching context, particularly in regard to the language skills targeted, listening comprehension in the case of a film or a video game, reading comprehension in the case of a novel.

## Discussing Example

The first case we present is taken from the film *Interstellar* whose director, Christopher Nolan, decided to work in close collaboration with Kip Thorne, a well-known American theoretical physicist and retired professor of physics at Caltech. It is thanks to him that the “science of *Interstellar*” (which is also the name of the book Thorne wrote on the subject) is as accurate as can be in a film. As Thorne declared during a conference in Copenhagen in 2014, the aim was to make a film “that would embody general relativity and its very fabric in a way that would be understandable [and compelling] to the general public”.

In fact, this collaboration was not only about science helping entertainment; with the amount of funding put into the film's visual effects, it also helped astrophysicists to better visualise objects which only exist in theory and have never been seen by the human eye before. This is the case of black holes, but also of wormholes, one of which was shown for the first time as a sphere in the film. The director's intention to make the film as scientifically accurate as possible and still maintain its entertainment value, makes it an ideal subject for an ESP class. By selecting specific examples from the film, one possible exercise would be to ask ESP students specialising in astrophysics to judge how realistic the film is, what concessions/departures from realism are made to render the film as entertaining as possible for the general public, and question them regarding the popularisation strategies involved. One such example could be the description of the "wormhole" which the characters use to travel from one part of the galaxy to another.

Kip Thorne has admitted that, although *Interstellar* strives to stay as true to "the science" as possible, for reasons of entertainment, there were some departures from realism as far as the depiction of travelling through the wormhole was concerned. Furthermore, in order to enable the non-specialist audience to understand the concept of a wormhole, a highly visual depiction is made during the conversation between two of the main characters, who also happen to be astrophysicists and astronauts: Romilly, an astrophysicist, takes a piece of paper, draws two crosses on either side of it, folds it and puts a pen through the two crosses, linking them together and showing how to get from point A to point B instantaneously thanks to a wormhole. Although the characters in *Interstellar* are supposed to be working for NASA and should thus already know what a wormhole is, this simplistic explanation, which is obviously only there for the film audience, is rendered plausible by the fact that the main character has not worked with NASA for several years since he became a farmer and has hence not kept up to date with the advance of science. A very similar scene appears in another science fiction film, *Event Horizon*, in which a specialist explains what a wormhole is in terms considered too complicated by his team who ask him for a simpler explanation. The use of such popularisation strategies could lead to a discussion on the notion of "layman's terms", by firstly explaining what the expression means (i.e.: to make something understandable by a non-specialist), leading on to some vocabulary work on what the students consider to be layman's terms, or not, in the extracts seen. In the *Event Horizon* extract, it is interesting to compare the first explanation with the second and the reaction produced on the audience. What the scientist initially assumes are layman's terms clearly aren't for his audience who ask him to explain it all again "in English". The teacher could ask the students to write down the terms which aren't understandable by the layman ("a beam of gravitons", "Weyl tensor dynamics", etc.) and explain why the second attempt is more successful (simpler vocabulary and a visual demonstration). The visual depiction in the film can be compared with the description Kip Thorne gives in the documentary about the film *Interstellar* where he uses the image of an actual wormhole in an apple, which is where the original expression came from. These extracts and exercises show the students how such images help the audience to understand the scientific concepts crucial to the narrative, and highlight the importance of science popularisation in the realm of entertainment.

The use of metaphors to illustrate the complexity of certain concepts has become a common theme within the realm of science popularisation. In his 2012 book, *Gravity's Engines: The Other Side of Black Holes*, Caleb Scharf discusses "some of the most extreme and complex astrophysical phenomena in the known universe—black holes—by deploying a whole battleship's worth of analogy, metaphor [and] simile" (2013). In his 2013 article on the subject, "In Defense of Metaphors in Scientific Writing", he explains that metaphors help people to "build an intuition for a problem, by relating it to something else", which is why they are used so frequently by scientists. Terms such as "spaghettification" are used to refer to the vertical stretching and horizontal compression of objects into what resembles spaghetti when an object comes close to a black hole and the term has now entered the realm of specialised vocabulary. This very visual depiction of something which is highly theoretical is what speaks most to the non-specialist, and so it is no wonder that the same type of images reappear in science fiction. Anthropomorphism is also commonly used, much to the dislike of some specialists who argue that phenomena such as black holes should not be "monsterised"—and in this respect, we note that in *Interstellar*, the black hole is called Gargantua, a reference to Rabelais' giant. These metaphors and visual depictions of theoretical concepts are also elements which promote linguistic analysis in an English class, during which other metaphors to describe other phenomena are also inevitably explored.

Finally, *Interstellar* uses its narrative to illustrate astrophysical concepts such as time relativity. Rather than stick to theoretical concepts, the film explicitly shows the effect of each character's perception of time as they approach a black hole. The audience follows the astronauts' timeline as they explore a planet on which one hour for them is equivalent to 7 years on earth, and when they return 23 years have elapsed. This theoretical concept has very concrete consequences on the storyline since the hero's children soon grow older than he is and its depiction in the film allows non-specialists to grasp the concept of time relativity.

## Conclusion

As this study shows, science fiction and science are closely intertwined, at least in the fiction which strives, as far as possible, to "get the science right". Using science fiction in S&T classes allows for the study of the science present in the narrative and the relevant terminology related to the students' domain of speciality, as well as an idea of the potential societal consequences of such research in the real world. In the context of this study, we have focused on two science-related areas: firstly, the importance of science popularisation and need to be able to explain the science behind the fiction to nonspecialists, nowadays considered an integral part of the scientist's job; and, secondly, the ethical questions in which science is grounded, notably with regard to the potential dystopian consequences of placing science beyond human considerations.

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