

narrative techniques, the study of which allows us to see how the subject matter can be brought closer to the sphere of interest of the public. From the range of different narrative techniques that can be identified in the documentaries which have been studied, there are some that are particularly important in the popularisation of science. Among those that stand out are: the simplification of content, anthropomorphic approaches and the introduction of entertaining elements.

3.2.1 The Simplification of Content

Good scientific documentaries stand out because of their ability to simplify the terms that are used to deal with the subject matter. According to Dorothy Nelkin (1990: 17), journalists and broadcasters simplify scientific issues because they believe that it is the only way that the public will be able to understand them. She considers that simplification is now obligatory, as a result of the influence of television and its particular style of giving information, based on short bursts of content and on images, which leave little margin for in-depth explanations.

Generally speaking, scriptwriters and television producers agree that "medium time" is a scarce commodity, and so it is necessary to restrict wherever possible the content of the subject matter. The general criteria of the BBC (in Wyatt, 1983: 4) for the production of documentaries is that the choice of information that is to be presented should always be that which is strictly necessary. Given the fact that in one single programme it is not possible to cover all the different aspects of a subject, it becomes necessary to select that which is the most novel, interesting and important.

On the need to select information for a documentary, David Attenborough (in Langley, 1985: 21) considers the following:

People don't remember many of the ideas of a television programme, so the number of points that can be made is limited. It is a mistake to try to introduce too many ideas. You have got to make it perfectly clear which is the most important point, or two.

The first means of simplifying the content is the process which is followed when determining the sequence of ideas which will appear in the documentary. Determining the sequence of ideas is the first and most basic form of simplification documentary producers use. In this process, numerous elements, which could contribute to the development or nuance of the programme, are eliminated. However, these elements would have probably made the understanding of the subject more difficult.

It is significant that the content of many documentaries can be expressed in a few lines of written text. The process followed by the scriptwriter consists of reducing the problem to its essence, and from there, establishing a line of development to which the dynamic of the problem-solution approach is applied. According to Flesch (1960: 226), this is a good way of facing any question as it facilitates finding good ways of communicating ideas.

Occasionally, the way in which the contents are selected distorts the final message. A study conducted prior to the First Iberian-American Scientific Journalism Congress shows that the following is common: "marked attention is given to the secondary elements of the scientific information, to the detriment of the main elements, in order to accentuate the impact on the reader" (Calvo Hernando, 1977: 81). This is precisely one of the challenges faced by any journalist or broadcaster: that the elements which are selected, allow the central theme to be explained in such a way that the content is not limited to secondary issues.

a) The Treatment of Complex Scientific Matters

One of the most controversial means of simplification is that which is used when eliminating complex issues because, these are, for many people, the kernel of science. Scientific knowledge is, in general, complex, because of its breadth and specialization. However, in popularising discourse, this complexity is not made apparent.

There is a certain controversy among scientists as to whether the simplification of scientific matters necessarily means losing

essential meaning. The French palaeontologist Yves Coppens (1994: 16–17) states that, although the attitude of the scientific community is changing, some researchers are still reluctant to broadcast their work, because, when trying to simplify scientific discourse, it is necessary to slightly distort reality. For this reason, these scientists refuse to give up a certain type of specialised terminology, for fear of betraying the truth because of a lack of precision. On the other hand, the Nobel prize laureate Richard Feynman (in Martín Pereda, 1995: 16), writes in his introduction to *Quantitative Electrodynamics: The Strange Theory of Light and Matter* that he tried to achieve maximum clarity and simplicity, after many hours of discussion, without distorting reality.

The issues dealt with in a documentary can be more or less intrinsically complex. But, in every case the scriptwriter must carry out a simplification process. This simplification implies, firstly, the translation of scientific language into everyday language, using the criteria previously mentioned.

According to the model put forward by Fernández del Moral (1994: 124–8), the index of intelligibility determines the percentage ratio between the number of specialised terms and the total number of words that appear in a text. This ratio can be used to establish one of the criteria that distinguishes good popularising discourse; given that, in general, good journalists and broadcasters tend to avoid specialised terms such as scientific names that could be difficult for the general public to understand; i.e. they aim for a high index of intelligibility in their work. This is the case, for example, in the David Attenborough documentaries, illustrated in the following text. It is a fragment from *The Private Lives of Plants* (episode 2, sequence 3) where the process of photosynthesis is explained:

Leaves are the factories in which plants produce their food. They are powered by the sunshine and they use the simplest of raw materials: air, water and a few minerals. (...) Air seeps into the leaves through the pores on their surface. It circulates

within them and reaches tiny granules that contain a green substance: chlorophyll. This is the key facilitator that uses the energy of the sun to convert carbon dioxide and hydrogen to produce carbohydrates, sugars and starches.

Below is a comparison of this fragment with a scientific text that describes the same biological process (see photosynthesis in *Diccionario de la Naturaleza*, Madrid, Espasa-Calpe, 1987):

The biosynthesis of the organic compounds involves their reduction through a supply of electrons. Specifically, and for example, the reduction of atmospheric carbon dioxide (CO₂) to carbohydrates (CH₂O)_x, of nitrates (NO₃) from the earth or the atmosphere to the amino group (-NH₂) of the amino acids. Thus, the photosynthesis of cellular material (carbohydrates, proteins, lipids, etc..) requires:

-a source of energy provided by solar energy.

-a donor of electrons, necessary to generate reduction power

(...) Photosynthesis, also called chlorophyllic function, depending on the chlorophyll photosynthesising pigment, can be verified in the center of some organelles, chloroplasts.

When comparing the two passages, it is important to note that Attenborough talks about "solar energy" instead of "electrons" and "small particles" instead of "chloroplasts". In the same fragment three chemical components are mentioned: carbohydrates, sugars, and starches, which are probably familiar to the general public. On the other hand, the text avoids any reference to components such as glucose, lipids, or proteins, which are probably less familiar to the audience.

Comparing the two explanations of photosynthesis above, it can be seen that none of the statements made by Attenborough contradict any of those in the scientific text. Quite the contrary, it seems that the explanation given, although simple, reflects reality. However, it is clear that certain aspects have been left out, some of which are important to fully understand what photosynthesis is. Some of the chemical components which are the result of the process, for example, have been omitted. Yet this example

is a good illustration of the way in which good journalists and broadcasters simplify the subject matter and their extraordinary ability to undertake vast, complex topics and transform them into something which is very simple.

The danger of this type of simplification is, precisely, taking it to such an extreme that the viewer mistakenly believes that he has understood the subject. Attenborough (1997) himself explained this as follows:

One has to be alert to the use of certain forms of oversimplification that lack precision and that give a false sense of understanding. Things can be simplified and translated into everyday language which you think will help people understand a topic. But really they don't understand. For example, in particle physics, I am sure that people think that particles are like ping-pong balls, and we know that they are not; it's just a simple metaphor. And so you have to be aware of how far you can go with simplification.

b) Suppressing Controversy

Another means of simplifying the complexity of science, which is used frequently, is to eliminate controversy. Despite the fact that reality can often have different interpretations, journalists and broadcasters usually present one single explanation, as if this were the irrefutable truth. According to Considine (1986: 42), nature documentaries often use a narrative that "pretends to be omniscient, metonymic of the scientific community, harmonious and disinterested".

This means of simplifying reality is also used by journalists and broadcasters of other scientific disciplines. According to Roqueplo (1983: 123–125), the sciences carry out a type of "cultural terrorism", in spite of the fact that scientific knowledge is constantly being revised and questioned, because they are regarded by the public as being indisputable and having irrefutable teachings. For Roqueplo the paradox can be explained in three ways:

- a) The privacy of scientific disciplines, which prevents non-experts from participating in controversies.
- b) The fact that published texts, once naturalised, are loaded with "ontology" ("this can not be any other way").
- c) The mediation of the mass media, immersed in a process which is unilateral – and therefore indisputable, solitary – and therefore uncritical – and contemplative.

In general, in documentaries, narrators put themselves in positions of omniscience from which they offer the uncontroversial and apparently irrefutable truth, where there is not only no room for scientific controversy, but no room for doubt. In this position there have been instances of extreme forms of oversimplification, considering that models of behaviour that are presented can transform grey areas of science into areas which are either black or white.

c) Reducing Dimensions

Another frequently used means of simplification is to reduce the dimensions of the aspects of reality which are shown. Calvo Hernando (1977:186) points out that the transpositions, "the reduction of facts and numbers to a scale that is more accessible to the imagination, is always well accepted by the public". This humanisation of scale is found in many nature documentaries in the form of a reduction of time scale. One of the most brilliant examples of this type of simplification can be seen in the first episode of David Attenborough's series *Life on Earth* (sequence 15), where the history of mankind is reduced to one single year, so that in this hypothetical calendar man would not have appeared on Earth until December 31st.

Another clear reduction of time is the technique of "time-lapse photography" used in documentaries, which show the movements of plants or other natural phenomena, condensing the movements in such a way that processes which last days, months or years are reduced to a few seconds.

On the other hand, the great majority of documentaries clearly reduce the time span of the events they show. In this way, in an

hour-long programme, we can see condensed, for example, an expedition led by Cousteau that lasted, in reality several months. This type of time reduction is found, to a greater or lesser degree, in all audiovisual genres which generally refer to time periods which are longer than the programme itself. Occasionally, the passage of time is suggested through visual transitions such as mixings. On the other hand, transitions between shots are carried out by cuts in the editing, which seem to be an attempt to suggest that all the events which comprise the sequence are presented on the same time scale.

In this sense, it is interesting to note that editors of a prestigious institution like the BBC Natural History Unit, aim to create a single sequence of images by using cuts during the editing, with the result that the action seems to be continuous. However, sometimes the sequences can be completed with images from other moments of the action, or even from archive material.

These reductions in time scale produce a visual simplification which does not result in a change in the content of the issues presented, but rather is a means of making the narrative more agile. In fact, this visual simplification technique has been used since the very first documentaries. As Ellis (1989: 21) points out, the way in which the protagonist in *Nanook* (Flaherty's classic) constructs his igloo is shown so simply and clearly that "we ourselves could go out and build one if they gave us enough snow".

3.2.2 *Anthropomorphic approaches*

One of the techniques which is most often used in nature documentaries is anthropomorphism; that is to say, the attribution of human forms, characteristics and attitudes to beings that, in reality, do not have them.

Some of Disney's classics, like *The Living Desert*, have been criticised for using this technique to an exaggerated degree, as the animals appear to be human parodies, an effect which is