SCIENCE ON TV: ASSESSING EFFECTS OF DIFFERENT MEDIATION PROCESSES[1]

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Abstract

The communication of scientific subjects is more than the process of "supplying" citizens with information; therefore, this communication raises several issues that exceed the mere transmission of knowledge, such as the perception of science in the current world, the role played by the scientist in the society, the consequences of the scientific and technological development and opinion-making procedures towards science, among others. The understanding of mediation processes, implicit in this form of communication, is, therefore, essential for the study of public understanding of science.

The present paper contains an analysis of 215 science programs recorded in the months of November 2004 and February 2005 on Portuguese cable TV.

The development and application of an analytical grid, that illustrate different mediation processes of science communication on TV as well as the relation between those categories and the effectiveness and communicative quality of the science programs is presented.

Keywords: Science on TV, Mediation Processes, Science Rhetoric

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This paper addressees the fuzzy, perplexing nature of communicating and understanding contemporary science. In reality, the presentation of science to the general public has been subject to profound transformation in recent years.

The traditional view, which emerges from the very use of terms like popularization or vulgarisation, sees public communication of science as a linear process from a sender (the scientific community) to a completely passive receiver (the general public which must be 'educated' to science). Most of the literature has been thereby characterized by a normative approach, providing advice and tips to journalists and other actors in charge of the mediation between specialists and non specialists in order to minimize distortions and misunderstandings.

Recent debates as well as the public controversies over environmental and technological risks exemplify, the complex relationships among science, ideology, and public policy.

The public presentation of scientific ideas cannot be reduced simply to a media or news genre, but has to be studied as one of the several levels of communication across which the scientific discourse is articulated (Hilgartner, 1990).

Television is probably the largest source of science information utilised by the general public outside of formal education. TV, then, is the principal bearer of the social meaning of 'science', and it is our contention that such a meaning has real material effects within our society. TV's construction is a lot more than a simple mirroring of scientific endeavour, an innocent transmission of scientific achievement into the public domain. Therefore, how science is presented on television is not merely a matter of aesthetic nuance, yet its role in the public communication of science and technology remains relatively unexplored.

A few studies of science on television have been done (for example Harry Collins' analysis of certainty on a few science television programs; Susanna Hornig-Priests's discussion of NOVA; Suzanne de Cheveigné analysis of forms and reception of science programmes on French television; W. Gopfert, on TV coverage of science, technology, medicine and social science programming policies in Britain and Germany; and Benvenido Leon's discussion of the work of wildlife filmmaker David Attenborough).

However such studies tend to take focus on specific episodes or programs or were developed before the generalization of cable TV. In this context, it is interesting to ask how science representation on television have been evolving, and which information is being transmitted to the public about science?

On the other hand, specific science programmes and certain areas of science consistently achieve high audiences and audience appreciation indices. There is therefore a public demand for popular science television and politicians, educationalists and scientists acknowledge an urgent need for a greater understanding of science and technology in the general public. Television could be a significant factor in facilitating greater public participation and better democratic decision making about socially sensitive issues arising out of rapidly developing science and technology.

The proposed paper plans to develop a way of monitoring science television and achieve the examination of how television programs mediate science and the techniques employed to do so effectively.

Methodology

The methodology has been developed to ensure that a representative and comparable sample of popular science television programmes are screened and analysed according to a wide range of leading principles in the fields of science communication and media theory. These principles have been developed so that the research paper contains consistent and comparable data, but also so that further fields of research can be developed from a solid methodological base.

In view of these and more questions we have tape-recorded 310 'scientific programmes' during two periods (November 2004 and February 2005) on Portuguese cable TV. After the visualization of all programs, 95 of them were not considered as representative of scientific content, therefore our sample was reduced to 215 programs.

A set of criteria has been developed for the analysis of the science programmes screened. Data was analysed according with the following categories:1) Formal qualities: use of sound, editing, music, titles and graphics as well as scheduling, format and channel) 2) Mediation processes (Dominant rhetoric mode, Narrative and Dramatic techniques, Contextualization and critical assessment of science).

Data Analysis

Our preliminary analysis leads to some tentative conclusions which we present in the following concise form.

The fact that most programs were exhibited on specialized cable channels (Table 1) and not on the traditional public channels is, in our opinion, extremely relevant and shows a trend that could be generalized, at least in the more industrialized countries. The implications are several and need to be contextualised with the recent process of globalization of media products and formats. The understanding of this process is closely tied with the development of Discovery channel

Table 1 - Channels where the programmes were broadcasted

	Frequency	Percent
Odisseia	41	19,1
Discovery Channel	70	32,6
National Geographic	64	29,8
History Channel	29	13,5
PeopleArts	1	,5
RTP2	9	4,2
BBC	1	,5
Total	215	100,0

The rise of thematic cable channels

Discovery Communications Inc. (DCI) is a global media and entertainment company that began as a single channel, the Discovery Channel, launched in 1985. Today, DCI has global operation offering 21 network entertainment brands in over 160 countries in 33 languages for over 1 billion subscribers around the globe.

Discovery's success with an all-documentary schedule influenced, broadcasters and cable competitors. Before the launch of Discovery most documentaries on nature, science and technology issues resided on productions subsidized by government grants through their public channels, and corporate sponsorship, rather than subject to unrestrained market forces.

While DCI's globalization is a case study exemplary of industry trends, it is only part of a wave of global activity by many media corporations, including its direct competitor in science and nature content, the National Geographic Channel.

In conclusion, according to Chris (2002) "it can be said that Discovery has utilized documentary on an unprecedented scale for commercial television, which has both underscored the uniqueness of its niche in an increasingly competitive and fragmented market, and played a major role in the rejuvenation of both audience interest and programmer confidence in documentary and other nonfiction formats throughout the industry. " (p. 23)

But is that really a new trend? How significant are the changes of the past two decades? As Schiller (1999) points out, "What is historically new . . . is a change in the sweep of corporate rule" as media corporations engage in not only predictable entertainment and consumer-oriented product and service lines, but also in "key functions of social reproduction" (p. 205) such as education, whether in the masked form of value-laden entertainment, or in more direct forms such as the insertion of commercial television programming into the classroom. Discovery's wide-ranging activities indicate that it seeks to position itself as a key player not only in the global media market but also in the thorough commercialization of social functions formerly guarded from profit-driven market logic. The implications of this process for the public representation of science is an area that deserve further examination.

The documentary trend: characteristics from our sample

The current trend called "documentary" is characterised by relying upon proven techniques for appealing to the maximum audience, tends to emphasize sensationalism, cultivate the entertainment value of nonfiction, and offer content of dubious historic or scientific value. The programming of this trend has little in common with its counterparts of the early 60s and 70s, which were characterized by much more attention to social and controversial issues.

The analysis of the programs we collected reveal great differences between programs, on the one hand we find productions which offer a considerably more precise presentation balancing accuracy with "spectacle"; on the other hand there are productions which emotionalize and show a tendency to mystify the subject by suggestive close-ups, musical backgrounds and other effects..

The content analysis of the programs also revealed that they have largely avoided current controversial matters giving the impression of a uncritical attitude towards science and scientists in general. Instead, these channels have regularly featured science related to natural disasters, unexplained phenomena, forensic science, reality-based crime stories and poisonous animals. This preoccupation with sensationalistic subjects, reality-based formats, and historical re-enactments was found in all analysed channels, pointing to a industry-wide process of reproduction.

Factors tending to increase the impact of media messages

Framing analysis explores the ways in which media organize and contextualize ideas. Tankard and colleagues describe a media frame as "the central organizing idea for news content that supplies a context and suggest what the issue is through the use of selection, emphasis, exclusion and elaboration." An alternate explanation by Entman suggests that "to frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation and/or treatment recommendation for the item described."

Table 2 presents the distribution of the main global frames found within the documentaries analysed, the descriptive –argumentative frame and the narrative one.

Table 2 Programmes collected by general mode of expression

	Frequency	Percent
Descriptive/Argumentative	153	71,2
Narrative	62	28,8
Total	215	100,0

Our research on the framing of science documentaries identifying those attributes and traits that best represent the idea being presented in the media message. We argue that didactic and persuasive elements are part of scientists'/narrators presentations, in order to address and persuade (multiple) lay audiences. We turn now to what we consider to be the characteristic televisual styles and techniques for presenting science.

The descriptive-argumentative frame

The conventions of television's presentation of science in this frame are those of the informative lecture. The impression conveyed is that science is able to get everything under control. The key characteristic of this 'subgenre is that it deploys a discourse of 'fact' as opposed to explanation. Motifs of cause and intention, while inevitably present, are not foregrounded: '

Due to the rational dominant tone of the documentaries, we found extremely useful the analysis of rhetorical and argumentative techniques employed.

Argumentation is fundamentally aimed at convincing other people of one's views, the study and evaluation of argumentative discourse is of extreme importance to understand the effect this may have on the audiences grasp of any media content (in this case the science) and provide a unique instrument to study how the viewer is rationally persuaded about the interest and truth of the discourse Each rhetorical mode has an effect on the science presented and the way that the audience will perceive the topic.

Programmes have been categorised according to their dominant rhetorical mode in the following way: epideitic, forensic or deliberative. The rhetoric employed by a popular science programme will alter the viewer's reading of the science presented within it. For example, television journalists have traditionally been criticised for presenting a far too celebratory version of science (Nelkin 1995, Fahnestock 1986)

We have used the scheme suggested by Fahnstock in 1986, Aristotle's division of oratory into epideitic, forensic and deliberative forms. Depending on the mode of rhetoric used how the science is communicated varies.

Table 3 Dominant Rhetorical Mode

	Frequency	Percent
Epideitic	16	7,4
Forensic	178	82,8
Deliberative	12	5,6
Not applicable	9	4,2
Total	215	100,0

- the epideitic mode is celebratory, often looking a new inventions which will improve our lives. This means that a scientific topic is often explained in terms emphasising its status as the newest, biggest, smallest thing ever.
- the forensic mode looks at the nature and causes of events
- the deliberative mode assesses the advantages and disadvantages of a new discovery and examines its implications for the future. (MaCabe, 1997)

It can be seen from Table 3 that the main form of rhetoric employed was forensic, with 178 (82,8%) of the programmes having a dominant forensic rhetorical mode. This was followed by 16 (7,4%) containing a dominant epideitic rhetorical mode and 12 (5,6%) using a deliberative rhetorical mode.

In an epideitic presentation the main theoretical purpose is to celebrate the science rather than to validate it (Fahnestock). In a popular science television programme, this approach has an editorial advantage - by claiming something is "new" or "amazing" or "for the first time you will see" , the relevance of the scientific item does not have to be explained further - the audience understands its significance in those terms alone. This approach glamorises science. A forensic presentation outlines for the audience how scientific phenomena came into being, giving some contextualisation. While both these modes are useful in explaining science to audiences, what they both lack is the element of information which allows the audience to assess critically the science which is being presented. The deliberative mode is the most problematic since not only must the programme explain the science - it must be able to assess all the advantages and disadvantages of the subject under examination, and to look at what the future may hold. To do this the producers must have a thorough critical understanding of the scientific topic themselves, present a wider variety of scientists and information and settle on a balanced view.

Beside that general rhetoric influence, two other aspects related to argumentation are usually analysed the characteristics of the speaker and his interaction with the audience. The basic dimensions involved in the credibility of the speaker are character and competence. On the other hand, the viewer’s attitude to the discourse can be improved if the speaker establishes an effective community of interests with the audience.

The typical course of the programmes included, in this frame, alternates between voice-over and 'talking head'. A talking head is television's way of saying 'this is brought directly to you without distortion or mediation'. Accordingly with Leon (1998) the narrator-presenter plays the central role in television documentary since his voice and statements to camera are the back-bone in the structure of the programme. Table 4 shows the distribution of the different agents present in the documentaries. As we can see the narrator takes the central role, should also be emphasized the fact that there was a small number of scientists on this role.

Table 4 Mediation agent

	Frequency	Percent
Jornalist	1	,5
Narrator/presenter	158	73,5
Expert	42	19,5
Other	14	6,5
Total	215	100,0

In order to be effective, the narrator must have an initial credibility due to his moral reputation (character) and knowledge of the subject (competence). But both basic dimensions can be reinforced in the programme by the *authoritative mode of their presentation* and, in many cases, the *trusted and familiar* character of the presenters.

This is in striking contrast with interviews on programmes where it is accepted that the issue is controversial and open, to some minimal degree at least, to public scrutiny, doubt, debate, etc. In those programmes we see and hear the interviewer and cut back and forth from interviewer to various protagonists, speaking directly to one another, being challenged and arguing on camera. When scientists disagree on television, one talking head is followed by another, and they are almost never in direct conversation, much less in debate. Science and its telling are synonymous with progress and convey a sense of authority and the advancing edge of objectivity.

The second category of argumentation includes several resources which aim to establish a good disposition of the audience towards the discourse. The message must be appropriate to the audience, and this becomes one of the keys elements to the effectiveness of any popularisation discourse.

The effectiveness of popularising documentary does not only depend on its intellectual capability to communicate facts, since it is also accepted or rejected by the audience depending on the emotional values it transmits. For that reason, popularising documentaries must use several resources which try to create a positive attitude in the audience towards the discourse. And this means that the speaker must establish an effective community of interest with the audience, a process where several rhetoric operations can be helpful.

The narrative frame

The key characteristic of this ‘subgenre is that it tries to build interesting discourses, to be able to attract viewers’ attention through practical interest and emotional appeal. In fact there is a range of narrative forms, the main ones are: a form of drama-documentary parallel to those featuring the emergency services in which drama and titillation are uneasily wedded to public information messages; and the model of the detective story, building suspense. Typically, the telling of the story does not convey direct conflict but rather the solving of a mystery, the fitting together of pieces of a puzzle. The characteristic absence of any cultural and historical reference point in ‘this programming is entirely deliberate. Upon this apparently neutral visual text a ‘voice of God’-style commentary in any language can be superimposed

We begin our analysis of this frame with narrative techniques, which include simplification and anthropomorphism. Table 5 presents the distribution in our sample. As we can see both simplification and anthropomorphism were common.

Table 5 Narrative Technique

	Frequency	Percent
Simplification	86	40,0
Anthropomorfism	41	19,1
Not applicable	88	40,9
Total	215	100,0

Among the narrative techniques, several ways of simplification appear, ranging from establishing the story-line of the film to eliminating scientific controversies. Another important narrative resource is anthropomorphism, which is often criticised by scientists and filmmakers but as Leon rightly points, can be a useful instrument if employed in a careful manner.

Simplification

As television is assumed not the best medium to deliver large amounts of information. Documentary films present a simplified picture of what they are reporting. There is no doubt that popularisation relies on simplification, because it's probably the only way to obtain large lay audiences.

Any film needs a story-line, or sequence of ideas, to hold the viewer's attention and lead him to the end. However, simplify science is not an easy task, you have to know how far can you go in simplification. Some scientists think simplification inevitably means distortion of reality. On the contrary, some others consider it is possible to offer a true explanation of scientific issues in relatively simple terms.

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Anthropomorphism

Popularisers have often made his job with some help from the attribution of human forms and attitudes to other beings which, in fact, do not have them. This technique is based on the assumption that human beings can understand more easily what is related to other human beings. In general, scientists disapprove anthropomorphism, because they think it can lead to a false understanding of the world. However, the strength of some scientific concepts is due to the fact that they are anthropomorphic paperions of the human world.

Dramatic Techniques

Among dramatic techniques, story building is a specially relevant device to hold the viewer's attention, as well as to create conflict and suspense.

Table 6 Dramatic Technique

	Frequency	Percent
Conflict	14	6,5
Suspense	17	7,9
Surprise	12	5,6
Speculation	13	6,0
Dramatic Re-enactment	32	14,9
Shock	9	4,2
Not applicable	118	54,9
Total	215	100,0

Table 6 presents the various dramatic techniques that can be used and clearly shows that representation by means of stories is not only used in fiction but also in non-fiction narratives. When a story is told by means of one or more characters there are several narrative resources that can be used

Dramatic structures can work very well in popularising documentaries (Leon), although they tend to avoid the multiple ramifications of scientific knowledge, in order to create a unitary artistic discourse. However, using dramatic techniques does not necessarily mean distortion of reality. Filmmakers are free to identify elements of the world which work well in drama. And, fortunately, science is full of stories, conflicts and suspense.

Conclusion

It was our departing point that effective science communication on television requires a special kind of discourse, which is not just a question of a simplification of the message but a different one, with its own characteristics, values and difficulties. However worthy of public dissemination a scientific subject may be, unless its televisual treatment is interesting, relevant and enjoyable the television audience will not choose to watch it.

In summary, our preliminary analysis leads to the conclusion that the vast majority of the examples which we investigated convey neither adequate popularized scientific knowledge nor adequate social orientation. It is not primarily science or its social impact that is presented in the scientific programmes, but rather the medium television itself; in this sense, scientific programmes are more ore less kind of public relations for science. Analysis of the context in which science is reported is a complex and subtle matter and needs further careful analysis.

Nevertheless, as good popularisers prove, it is possible to reach a balance between scientific rigour and journalistic interest. In spite of such difficulties, some examples of television programmes can be found, which succeed in establishing an effective link between scientific issues and the viewer's interest, by means of communicating science in an interesting and understandable manner

One of the keys to this balance is to simplify the issues to the point where the audience will understand, without oversimplifying them.

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