

SCIENCE TELEVISION IS JUST TELEVISION

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“Television: the human fishbowl”

Ramón Gómez de la Serna (1955)

Abstract: This paper focuses on television, and not on science. It basically draws on my own experience as a director of a science program (Tres14) in the Spanish Public Television Corporation (Televisión Española). To start with, I will look into the fact that television professionals do not have to undergo scientific training in order to become science broadcasters. The consequences of this concerning the production processes as well as the structure and content of the final products will be discussed. Indeed, broadcasters learn science while producing science for television. Yet, it is essential for television professionals to understand or, significantly, like the subjects they cover. This paper discusses how these elements make science broadcasting a quite particular journey. In the end, a program about science is just, and no less than, a television program, and most comply with the same strategies and rules that are common to other television genres.

Keywords: science, television, popularization, popular science programs, science content production

Resum: Aquest article parla de televisió, no pas de ciència. De fet, es basa en la meua pròpia experiència com a directora d'un programa de ciència (Tres14) a Televisió Espanyola. En primer lloc, s'analitzarà el fet que els professionals de la televisió no necessitin d'una formació científica per esdevenir divulgadors de ciència. També es

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discutiran les conseqüències que es desprenen d'aquest fet, tant pel que fa als processos de producció, com a l'estructura i el contingut dels productes finals. En efecte, els professionals de la televisió aprenen ciència alhora que produeixen ciència per a la televisió. No obstant, és essencial per aquest entendre o, si més no, que els agradin les matèries de qui tracten. L'article reflexiona sobre com aquests elements fan de la divulgació de la ciència una aventura peculiar. Al cap i a la fi, un programa sobre ciència és, ni més ni menys, un programa de televisió, sotmès a les mateixes estratègies i normes que la resta de gèneres televisius.

Paraules clau: *ciència, televisió, divulgació, programes de ciència, producció de contingut científic*

Introduction

This paper focuses primarily on television, on production processes aimed at creating small screen narratives about science. Therefore, it is not so much about science itself and its popularization or, for that matter, the popularization of any kind of knowledge on or through television. What follows is an extended version of the talk I gave on May 16th, 2013 at the 7th European Spring School on History of Science and Popularization: Science on Television, that took place in Maó (Minorca, Spain). The School was an uncommon chance to exchange points of view and experiences between scholars coming from the fields of history of science and communication studies; television professionals, like myself; and the students in attendance, among whom there were also academics and media professionals, including a few people interested in the educational traits of what we call, quite broadly, science on television. Indeed, the aim was to explore the thematic and narrative intersections between science, or the processes of generation and circulation of scientific knowledge, and television, or the processes aimed at generating meaningful approaches for the circulation of scientific knowledge.

At the School, I gave a talk about my experience as director of a science television program (*Tres14*) in the Spanish Public Television Corporation (*Televisión Española*, TVE hereafter). Here, I have sought to mull a little more in depth over the issues I offered for discussion in Minorca. My starting point is the fact that it is not possible to make a television program without understanding the subject matter of the program, what is shown, whether scientific or not. I argue that a science television program is, first and foremost, a television program. To make programs about cooking, architecture or economy is a complex matter, yet the rules concerning approaches and outcomes are practically the same. In the end, content has to be interesting and it has to look alluring.

In the following pages, I will try to put in plain words some of the techniques, the ones that, in my opinion, are the most relevant, that I take into account when producing and directing the program *Tres14*.

The case study: *Tres14*

Tres14 is a science popularization program intended for the general public. It has been broadcasted weekly on TVE's channel 2 (*La2*) for 4 years (2008-2012), every Sunday evening at 8:30 pm, and it is back on air in September 2014². We have so far produced a total of 189 programs. Its episodes are 27 minutes long, monographic, and have no anchor. This program has always sought the most suitable formula for television to present scientific content. In my opinion, it is a fresh, groundbreaking approach that has got a faithful and increasing audience. Indeed, it has become the most followed television science program in Spain.

The basic aim of this paper is to explain why and how the format of *Tres14* is done as it is, which amounts to giving an account of the experience of building and developing the program over the years.

The concept

A television program must have, in the first place, a root idea, a generic purpose, just like in a novel, a film, or an essay. In the case of *Tres14*, the assignment was to make an entertaining science television program, not intended for a specialized audience, any kind of elite, but, instead, for the general public. The catch was, at the same time, the constraint to carry it out with a very tight budget. Given these premises, the first task was to define the spirit of the program, what in essence was going to set it apart from the rest of science programs that had been previously broadcasted or that were on air at the time. The defining idea, the approach I thought up, was to talk about the world around us, the world we inhabit, from a scientific point of view, to be sure, but as something that we are part of, not alien, a *human* program, rather than a *scientific* one.

What is the point of making a *human* program? By what standards were we establishing the difference between *human* and *scientific* when it comes to qualifying the spirit of a television program? Firstly, because there are and there have been already too many television approaches to science featuring grave men in lab coats, mathematic formulae and futuristic music. And secondly, in our particular case, because the budget, as mentioned, did and does not allow us to plan and carry out great trips or shootings in order to film the 'spectacular science'. The assignment was to make a science program for the general public, and wider audiences do not identify with lab-coated scientists.³ There is a *greguería*⁴ by Ramón Gómez de la Serna that serves as a succinct illustration of the spirit, the starting concept of

2. <<http://www.rtve.es/television/20140908/nueva-temporada-tres14/1007500.shtml>>

3. Despite so many such depictions, not only in documentary films and television programs, but also in fiction films, notwithstanding the wide variety of approaches and narratives.

4. A *greguería* is peculiar type of aphorism, created and developed by Ramón Gómez de la Serna, which always included a socio-cultural and or mildly political commentary.

the program, which I used to start the paper: “Television: the human fishbowl”. That is, the place where we, human beings, watch human beings just for the sake of sheer pleasure.

This simple idea of the human spirit of the program implies making many key decisions concerning content, subject selection, approach(es), visual treatment and language, apart from the selection of shooting locations and other aspects concerning the contextualization of the messages. Yet, it is important to point out that *Tres14* is not an entertainment program, but a science popularization program that aims to be as entertaining as possible. We would need a high budget, anchors, actors, a television studio, or, to put it ironically, elephants, perhaps a rocket, in order to make proper science entertainment. In all, we would need money because entertainment is spectacle.

From these premises, I will try to spell out the main features of the *Tres14* formula, an approach that has been developed and fine-tuned over the years according to the highly exploited trial-and-error method.

The *Tres14* formula

The purpose of a television program is only one and always the same: to reach the viewer, to get upward audience ratings, to make the number of viewers increase while on the air, what is commonly known as a growing audience curve, to build the viewers’ loyalty, that is, to bring them back to watch further installments. This is not to say that anything goes in the name of audience ratings, yet the fact is that, without viewers, television does not make any sense.

In other words, it is necessary to avoid boring the viewers, to keep them interested throughout the broadcast, and to get them to come back the next time. Therefore, this is a tale of seduction. And, in order to achieve this seduction, we have a number of technical and narrative tools, all of them equally important, to play with and combine properly: content, audacity, images, clarity, rhythm, beauty, color, music, empathy and poetry. All of them have to do with the abovementioned selection of subjects, approaches, language and visual treatment. I will discuss them, one by one, giving some examples from *Tres14* to illustrate them.

Content

The spirit of the program, as defined above, has to be taken into account when selecting the subjects. It is not just a matter of choosing from current affairs or what is fashionable. Yet it is necessary to bear in mind the possibilities (and limitations) a subject matter offers in terms of time and the medium, that is, a 27-minute television slot. We know by experience that the subject matters that work best are the ones related to health, technology, the brain and the universe. There is a lot of research going on about these themes, they generate lots of questions and people perceive them as close to their everyday lives. Yet, it is the popularizer’s job to tackle other, uncommon subjects, and present them as close or interesting as the former. It is also the popularizer’s job to frame these topics. The available time and the complexity of the subject matter will help us to determine how far or deep we can delve into

it. In addition, the visual potential is also decisive, as well as the possibilities it offers to link it to the viewers' everyday lives, to *real* life.

For instance, we have chosen, earlier, mathematics as a subject matter.⁵ It is not necessarily a visual topic, as it is abstract and requires lots of graphics that could be quite boring. So we decided to tackle it as something tangible, such as security issues with credit cards, and from there pointing at all the math there is in real life and we, unaware, use all the time.

Perception is another example, to look at how we perceive things.⁶ It is a visually challenging program that needs a lot of visual metaphors. However, the topic can be easily linked to the viewer. Our approach was to tackle perception from magic, focusing on how we get or do not get (fooled by) tricks, and then beyond, on the problem of how tricks do not fool people with autism. These kinds of approaches help illustrate and explain what we know about perception and attention.

Another illustrative example is a program about the management of space, *Tetris*⁷, where we focused on the verb 'to fit'. Management of space is an essential feature in everybody's life, individually and collectively. And it is a highly visual subject that responds to many aspects of a globalized world, from how freighters are loaded to how a piece of furniture can be folded over into a minimal package, or to how successfully play the Tetris videogame.

The aim of all these programs is not so much to make the viewer find an answer to the classic question 'what is it for', but to make them feel part, and not just as observers, of the world science explores. Thus, we look for content both from scientific literature and elsewhere. This is indeed part of the spirit of the program as introduced above, that is, to look for worldly subject matters, not only coming from the world of the scientific research that is carried out. The program about management of space I just mentioned was suggested by a whole season of the well-known television series *The Wire*⁸, which was centered on the management of cargo ships in a mafia-controlled harbor.

In order to get this kind of content successfully through a monographic program, we try, whenever possible, to address it transversally. Themes as diverse as movement, the sky, life, the sun, water or freedom thus become sort of files. Regarding water, for instance, the focus can be on cleaning systems, water collection systems, glaciers, ecological homes, cactus gardens, salmons, the problems of access to drinking water, etc. So many different fields of research, so many questions and results, are involved and can be combined, all them clearly distinct and yet related. To be able to treat a theme transversally, whenever possible, is

5. *Seguridad* [Security]. Broadcasted on June 20, 2010. <<http://www.rtve.es/television/20100614/seguridad-tres14/335455.shtml>>

6. *Prestar atención* [Paying attention]. Broadcasted on April 5, 2010. <<http://www.rtve.es/television/20100330/atencion-tres14/325861.shtml>>

7. *Tetris*. Broadcasted on September 26, 2010. <<http://www.rtve.es/television/20100920/tres14-aire/355336.shtml>>

8. *The Wire*, season 2 (2003).

essential for popularization. In the last two centuries, science has taken the path of specialization, compartmentalizing areas of inquiry. However, we are now looking for connections. Specialization on television works well for particular kinds of viewers interested in particular subjects. Yet, we may risk losing all the rest, the vast majority of them. A plural point of view captures more viewers as it addresses a variety of interests. This allows us to talk about physics, chemistry, botany, and astronomy in the course of just one program. Furthermore, specialization bears yet another risk on television, which is the conveyance of excessive complexity. Television is not a medium for complexity. It is not built with specialists' papers; it is, instead, a generalist medium. We cannot count on the viewer's professed will, and, on top of that, we compete with many other television channels and other media and platforms, such as the internet, notwithstanding the common occurrences of domestic life, the phone, an assortment of noises, the family.

Images and audacity

Television cannot be done without images. What I mean by this obvious assertion is that we need to be able to visualize the subject. A good part of the popularizer's job is to think about those images. In a certain way, anything goes, such as family videos, historical archive films, or dream short films shot with a cell phone camera. The key lies in making such a wide variety of materials to fit and make sense. Actors, graphics, cartoons are among the most obvious resources we can count on to build these images. The point is to have the audacity to find original images and narratives. Audacity is the only way to find new ways of presenting any kind of knowledge, of content. If we limit ourselves to spell out content in a straightforward, comprehensible way and do not try new approaches, we will never find something really innovative and/or better. For instance, and I write this perhaps with a bit of deliberate exaggeration, scientists treat themselves reciprocally with a lot of distance, with detachment, in *serious* programs; these, and they, the scientists, do not sound like rock 'n' roll. Breaking the rules, that is, for instance, making scientists play, ask them to act or speak in unexpected ways, even from a completely different standpoint; to dare illustrate science with amusing images or soundtracks that do not fit with traditional genre expectations, is a sure path to either failure or, better, actual innovation. Having the audacity to surprise the viewers, to pose them challenges and new languages to decipher is undoubtedly risky, but hopefully fruitful as well.

Clarity

Yet, clarity is crucial in the transmission of knowledge on television. We are not in a classroom, so, for those who get lost, there is no chance to stop and ask. If someone indeed gets lost, he or she will switch to another channel.

In order to attain clarity, there are certain aspects that have to be taken into account: we must know and understand the content, the subject matter, what we are talking about, and

also the treatment, the way we are addressing it, without forgetting the spirit of the program, the premises, and the limits in order to convey it in the 27-minute slot we have. Then, the narrative and the language have to be simple, well ordered, plain, featuring repetition, if necessary, and assisted by examples and analogies in order to avoid, if possible, scientific terminology. Analogies, sometimes, must come in pairs. For instance, in order to explain what a telomere is in the documentary *Road to immortality*, we used two analogies: on the one hand, the ferrule (plastic tip) that holds the end of a shoestring, and on the other, a hair band⁹. We must make sure that the viewer understands what a telomere is because, otherwise, the program will not make sense at all.

Another important feature related to the problem of clarity is synthesis, and it is the popularizer's job to attain it, without fear of resorting to intervention, repeated questioning and summarizing.

Rhythm

Rhythm is key for any kind of narrative. The step outline, or beat sheet, is the document that summarizes the program structure in terms of time, thus marking the tempo on television. The step outline in *Tres14* aims for the viewer not to get tired or bored. Music (see below), math and intuition concerning time periods are essential.

The longest videos we feature are not longer than 6-7 minutes. Within the program structure, reports are alternated with very brief, assorted sections. We try to combine scientific content with anecdotes, tales, quotes, and other elements, in order to offer the viewer enough time, pauses, to digest, rest and return to pay attention. If we demand too much from the viewer, who is sitting on his or her couch while watching television at home, he or she might shift channels. Conversely, if we ask too little, he or she might abandon us as well due to sheer boredom. The key lies in finding the halfway point. Brief content, carefully sliced, helps the program go forward at a nice pace. Back in the 1980s, science television had an unhurried nature: long shots, slow pace, silences. Nowadays, audiovisual language has evolved toward the dizzy, and we cannot stay back, fall behind, yet we are not making music videos, for we need to bear in mind the viewer's understanding.

At the beginning of the program *Who am I?*, right after a voice over introduces the subject matter, we see all the people interviewed for this feature briefly answering a simple, short question: 'Where does our identity reside?'.¹⁰ This is the introductory question for a program that will tackle the 'I'. The interviewees' answers point at the brain, the body and the environment, cells, DNA, proteins. And so, this tiny video clip sets the beat, introducing

9. *Camino a la inmortalidad* [*Road to immortality*]. Broadcasted on January 25, 2012. <<http://www.rtve.es/alacarta/videos/otros-documentales/camino-inmortalidad/1303764/>>, 10:07-11:00.

10. *¿Quién soy?* [*Who am I?*]. Broadcasted on April 8, 2012. <<http://www.rtve.es/alacarta/videos/tres14/tres14-identidad/1230989/>>, 02:30.

characters in a clear and naturalistic way, and helps the narrative just because of the fact that they do not agree. Discord is fundamental in television as it provides rhythm and interest. What works best in television is debate, discussion. Controversy is appealing. Unfortunately, we see it used in many programs in quite aggressive ways, such as in tabloid magazine programs and reality shows, yet it is a fact that disagreement is, in general terms, interesting to us, to the viewers, because it demands taking sides. However, science has to be portrayed as something solved, finished, as televised absolute truths. 'The expert says X', period. Scientists' doubts, debates, controversies and contradictions are hardly ever shown or talked about. But we know that science advances through questioning and disagreements, so, in my opinion, it is important to show it on television, for it generates debate, and debate is life, as doubt is very human. And, as abovementioned, the idea is to make a human program about science.

Beauty (and color)

"The communists used to say that color distracts spectators". This is a quote I remember from my college years. Not only television has also been defined all over as the opium of the people, but colors as well. Newspapers had to be published in black and white, for they had to be somber. In schools, they used to say, too, 'spare the rod and spoil the child', and as such it was carried out. In fact, British tabloids, the yellow press, were indeed published in yellow paper, as opposed to the serious, reliable white sheets for newspapers. Conversely, contemporary pedagogy explores and aims at teaching through playing and learning through joy. And science popularization revolves nowadays around these same grounds, that is, approaches of seduction. To popularize is to transmit, convey a specific knowledge to non-specialized viewers, the general public, a volunteer audience that will not ever have to pass a test about what is featured in a program. The suitable way seems to be the one that reaches a larger amount of viewers, and without beauty, the chance for seduction is really low.

In audiovisual terms, beauty is conveyed through images, sounds, voices and graphics. All these elements are important, and the higher level of beauty one can achieve by using them jointly, the higher the chance for the message to reach a wider audience, a larger amount of television sets. Spaces, locations where interviews are held are crucial, the colors featured in each shot, the quality and opportunity of the music, the soundtrack, the balance of graphics. The subject matter, raw, as just text, means nothing in audiovisual media, does not exist. For content includes everything, text, image and sound. Even though this seems too obvious, it is important to point it out, as, in scientific contexts, the text is deemed as the essential part of the content, while all the rest is considered as decoration.

Indeed, many programs have been and are done upon such premises, yet all those elements contribute to the content if there are the will and the knowledge to use them appropriately. A song, a given color, or a text, do not only transmit feelings, but also information

if we want to. The question of aesthetics is not banal, but crucial, because if we wish to seduce the viewers, we must battle against decades of boring scientists talking from non-existent or hidden locations, covered with dust, and surrounded by test tubes, as if they were 'entities' or gods. This is a valid approach to catch the attention of some elites that already have their own specialized channels. But it is useless, in my opinion, to catch viewers among the general public.

In other, somehow unorthodox, words, it is time to rescue science from unattractiveness. Offices and laboratories or studios with black backgrounds do not convey anything but darkness, and do not contribute a real dimension of the subjects scientists are conducting research about, nor a close view of the scientists either. Lab coats are not strictly necessary (plus they terribly reflect light, which makes shootings really difficult). To put it bluntly, scientists have also got legs and that only becomes clear when they are shown walking. *Tres14* prioritizes, whenever possible, casual clothing, ordinary human gestures, attitudes and activities, such as walking or having a cup of coffee, for scientists do not only think or work in front of computers, blackboards and microscopes (see below, *empathy*).

And sure enough, locations have to be in sync, contribute meaning in this same sense. For instance, the setting where an interview is held might convey much more information about the subject matter than a laboratory or an office. A cosmologist will transmit the unattainable if we situate him or her in the backdrop of a boundless landscape; a nutritionist, when in a market full of fruit, will seem very close and healthy to us; a neurologist in a strongly lighted environment would be quite possibly talking about connections and synapses, while if he or she is shot with a peaceful sky in the background, he or she will be most likely talking about the mysteries of the brain, thus suggesting a completely different mood.¹¹

Music

On the other hand, music, the soundtrack, is one of the most powerful carriers of content in audiovisual media. It may warn the viewers about a danger, or predispose them to listen to something light or funny. Even the lyrics of a song may help the viewers introduce a subject.

In a recent program, we interviewed the orientalist philosopher and scientist Salvador Páñiker.¹² We were talking about the origins of everything, something orientalists do not often mull over. The conversation led to the following statement: "In my deontological scales, if you put the universe, the big bang, all the galaxies and all we know about them on

11. An example of incorrect use of location: *Bebés* [*Babies*]. Broadcasted on September 27, 2009. <<http://www.rtve.es/television/20090921/bebes-tres14-septiembre/293280.shtml>>, around 07:00. And an example of correct use of location: *Universo* [*Universe*]. Broadcasted on February 7, 2011. <<http://www.rtve.es/television/20110124/universo-tres14/397727.shtml>>, 05:04.

12. <<http://www.rtve.es/alicarta/videos/tres14/tres14-origen/2792796/>>, 12:25 to 13:46.

one side, and Bach's fine-tuned clavichord on the other, Bach's clavichord will always win." Surely, he was referring to the connection human beings attain with art, in this case, music. There is no possible competitor. There is nothing else to explain. It just goes in.

Music is perhaps one of the best tools to work on the seduction of viewers. To caress, surprise, frighten, awaken, move or entertain the viewers. Indeed, the word 'audiovisual' starts with the voice 'audio' because words, sounds, come before paper, writing. Radio was also developed before television. And 'audio' refers to both talking and singing voices, to music and to sound effects. Diegetic care and use of music are not just reserved to cinema. For instance, most *Tres14* young viewers often inquire, through social networks, for the program's soundtrack. They appreciate the effort we make about it, enjoy it and comment (about) it to the point that we have decided to upload the track list of each program on the website. Music constitutes a connection that never fails, while contributing a lot of information, not only about the subject, but about the kind of program we are making (the spirit, as abovementioned), as well as about the viewers we seek. If we only play classical music, we would be introducing *Tres14* most likely as a slightly elitist program, focusing on intellectuals of a certain age. If, on the other hand, we only play the latest hits, it might as well become a program for young people exclusively. If, yet beyond, we only play experimental vanguards, we are quite possibly appealing to young elites. However, if we play all kinds of music, it will be an open and learned program. Not in vain, the music of the header and the logo constitute the image of the program, its seal, its business card. That is where the idea, the concept, the spirit, is synthesized. Sometimes, in fact, programs evolve, but not their headers, and so they become outmoded. The aim is to keep the signature, the theme music the viewer easily recognizes, yet, often, as time goes by, that cover becomes false. That is also the case of *Tres14*. The new season, starting in the fall of 2014, will feature new theme music and header, which will respond to the characteristics of the renewed program.

Empathy

Scientists are the characters of a science program, the actors, and their role, historically, is that of detachment. They have been portrayed as bearers of incomprehensible knowledge, busy people with no communication skills, conceited, and sometimes eccentric. In *Tres14*, in our search for human traits, we seek empathy, and do our best to depict scientists as equal with the viewers, that is, people that use the same language and codes, and whom the viewer can really understand.

This entails the use of a plain language, of analogies, and to dispense as much as possible with lab coats and traditional scientific gear. Empathy works in any kind of communication, including television. To see a scientist as somebody who may be living around the corner helps the viewers think that what he or she are about to tell is interesting and comprehensible. For instance, the program *Road to immortality* starts with a toddler on the screen and a voiceover stating: "This girl does not know that one day she will have to die,

but perhaps she will live healthy up to 120 years; this mouse has achieved so, his name is *Triple*.” Then we see scientist María Blasco, without lab coat, laughing while she says: “*Triple*, we call him *Triple*, the *Triple*.”¹³ This is how we introduce María Blasco, molecular oncologist, researcher, collaborator of a Nobel Prize winner, and director of the National Center for Oncology. We introduce her with a laugh, and the viewers, instead of putting themselves on guard against a complex and serious content, immediately relax because they are positive they will understand what this woman (not seen as a scientist just yet) is about to tell them.

Poetry

The idea of *Tres14* is that science is part of the world around us. This opens up room for contextualization. Can we address science with poetry, literature or music? Or is science a parallel reality? In the current intellectual context in which Descartes’ foundations are shaken by the threat of quantum physics, interdisciplinary trends, the combination of approaches to tackle anything, liquid reality, and orientalist influences that permeate from philosophy to medicine, to contextualize scientific content in relation to non-scientific disciplines, albeit human, does not seem too wild. Moreover, the use of literary references, music, or poetic perspectives, helps us present science as something else, something that coexists, something ultimately accessible to people that do not have any specific scientific training. In this sense, just the same that would occur with art, literature, poetry, cooking, do-it-yourself, or humor.

If we consider science as part of culture, why should we isolate it? If we consider science as a complex and difficult-to-convey content, why should we not resort to other, more enjoyable and known types of content? Many science programs include quotes from the world of literature and poetry. Most scientists in science programs use scientists’ quotes. *Tres14* does it too, sometimes, scientists’ quotes, but also writers’, poets’, artists’.

Yet, from my point of view, the use of poetry is not limited to the use of quotes. It is a matter of treatment, of designing a poetic treatment or perspective of subjects. The straightforward beauty of a given image, or of a piece of music, or of a few words, gives value to the scientific content, humanizes it. In addition, this gives respite to the viewers. Poetics establishes connections with the intellect, but above all with senses and emotions.

The program *The benefits of dirt* tackles bacteria’s virtues. Considering that there are more bacteria in our body than (own) cells, it would seem interesting, at least, to try and tell their good side, their healing properties, and their importance in the origin and the development of life. By the end of the program, as an epilogue, an underwater video allows viewers to watch a girl’s legs while she is floating in the water, kind of with the cadence of a placid

13. *Camino a la inmortalidad* [Road to immortality]. Broadcasted on January 25, 2012. <<http://www.rtve.es/alacarta/videos/otros-documentales/camino-inmortalidad/1303764/>>, 00:00-01:03.

music, a pop theme. A text is added: "Millions of bacteria and a girl swam in a blue swimming pool. Meanwhile, the sun was shining and Wilco's *Sky blue sky* was playing."¹⁴

The idea of closing programs with this kind of key is simple: to relax, to offer viewers a very simple and alluring final thought. In this case, the concept was that dirt is not so disturbing, it is part of life, and it even protects it. It is both the starting and final point of the program and can be conveyed in many ways: with a sentence, a formula, a declaration, with numbers and statistics, with graphs, or, certainly, with a poetic video clip. In this way, we try to connect with the viewers, not only with their brains. As I have said from the beginning and throughout the paper, we aim at making a program whose spirit leaves a human taste in the mouth.

Conclusion: on error

Mistakes are science's greatest enemies, but not television's. For a scientist, an incomplete explanation, oversimplifications, a misplaced comma, are surely mistakes. So they are on television, but not so much. Error has kept many sciences apart from the screens, popularizers' mistakes, misinterpretations that may damage a scientist's prestige. However, it is important to clarify and keep in mind that prestige is only harmed in scientific contexts. The popularizer's task is to try and avoid mistakes, but human beings make mistakes, and so, much more, journalists, because they work outside the scientific method, almost always without budget and lacking enough time.

With this in mind, scientist should ask themselves if it is better to risk mistakes or not getting anyone to talk about their research. Salvador Dalí once said that when someone harshly criticized him, he used to ask: "In how many lines?" The game in media is precisely to show up and get people talk, in our case, about science, so that science becomes important. This is risky, to be sure, but nobody is ever going to operate on anyone following the prescriptions given in a popular science program. Therefore, the risk is the tiniest.

The influx of information, nowadays, is so huge that not even error remains for an extended time, as it happens with correct information as well. In my opinion, from television, we can only hope for spreading interest, curiosity, perhaps through the transmission of very general ideas, given the ephemeral nature of the medium and the fierce competition. As an example, in a program about age, people's, animals', plants', the Universe's age, a voiceover talks about a song that was for a while in the top five of the British charts, yet it was strongly criticized by scientists because it stated that the Universe was 12 thousand million years old, as opposed to the widely held figure of 13.7 thousand million years,¹⁵

14. *Los beneficios de la suciedad* [*The benefits of dirt*]. Broadcasted on October 9, 2011. <<http://www.rtve.es/television/20111004/beneficios-suciedad/465988.shtml>>, 25:40.

15. *Edad* [Age]. Broadcasted on October 17, 2010. <<http://www.rtve.es/television/20101011/tres14-aire/360073.shtml>>, 06:51.

The lyrics were wrong, yet the age of the Universe and the stars was part of a big hit. In this sense, the popularizer's job is to give the viewers confidence, through work done with-in a team where he or she may suggest a plain language and analogies, and ask for examples. Simplicity is the best weapon, as abovementioned, to prevent error. In all, science is human, is alive, and that is how it should be depicted. In my view, to popularize is to seduce. I hope I have seduced all of you, or most of you, to read till here.

Further reading

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