

Science, television, and adolescents: a comparative study of France and Brazil^{1*}

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Abstract

The purpose of this qualitative study was to compare how adolescents from Rio de Janeiro and Paris perceive science and scientists. These two cultures were chosen because the social role of television and the consumption of science information through the media share similarities in Brazil and France, while the institutionalization of science has differed from one country to the other. Young people from different social classes were formed into eight focus groups (four per city) and shown excerpts of science content from various genres of television programs as a way of sparking discussion. Results revealed that these young people constructed meaning about science in similar ways. They expressed thoughtful, articulate viewpoints on the issue of ethics in scientific activity, the presence of science on television, and the participation of men and women in scientific academia. Students from the two private schools in Rio de Janeiro and from all four Paris schools displayed greater similarities overall. Between-country differences were sharper when it came to the portrayal of scientists. The Brazilians believed that the traditional stereotype of the “mad scientist” is anchored in reality and that the characteristics of some real-life scientists resemble this image, while the French students perceived this stereotype as a caricature meant to entertain, but having little to do with actual reality.

Keywords

Public perception of science – Television – Adolescents – France – Brazil.

1- We thank Guilherme Tropa, Francesca Martinelli, Eleonora Urbinati, and Mariana Burlamaqui for their help organizing focus groups in the Paris region and in Rio de Janeiro.

***** This translation was the responsibility of Diane Grosklaus Whitty.

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DOI: <http://dx.doi.org/10.1590/S1678-4634201945213888>

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Introduction

According to Wolton (2006), television has had a marked presence in the history of both France and Brazil and in the daily lives of their populations. TV has played a role in social bonding and ties between classes, in modernization, and in the construction of identity in France and Brazil, where 77% of both publics said they watch television every day, either on a TV set or over the internet (EUROPEAN COMMISSION, 2017; BRASIL, 2016). In 2016, 93.9% of French households had a television (CSA, 2016). A slightly larger percentage of Brazilian homes did, that is, 97.1%; television thus remains the chief medium in Brazil, a ranking attained in the 1970s (MATTOS, 2010; IBGE, 2016).

Another similarity is that the public in both countries displays great interest in science topics. In France, 79% said they have some interest in science, while the figure for the European Union overall is lower, that is, just short of 60% (EUROPEAN COMMISSION, 2007). The most recent survey on the public perception of science and technology (S&T) in Brazil revealed that slightly more than 60% of Brazilians have some interest in S&T subjects (MOREIRA et al., 2017).

Among young people, 38% of Brazilian teens (16 and 17 years old) said they were very interested in S&T topics, a figure that is, for example, higher than the finding for sports, the arts, or fashion (MCT; CGEE, 2015). At the same time, only 29% of European young people aged 15 to 24 said they had “little interest” in the subject matter (EUROPEAN COMMISSION, 2007).

In both countries, television is the main source of science information as compared to other media. Among Europeans, 61% reported that they are somewhat regular viewers of TV programs about scientific research (EUROPEAN COMMISSION, 2007), while 79% of Brazilians said they had the same habit (MOREIRA et al., 2017).

Schäfer (2016) holds that public trust in science is to some extent shaped by the images presented by the media. Media portrayals may contribute to how the public sees, understands, and trusts scientific knowledge as well as other topics, like economics and politics, again according to Schäfer.

Siqueira (2014) contends that television shows may make science more accessible to the public or, conversely, distance them from it. Viewers may relate better when content is conveyed more accessibly, while they may lose interest when presented with stereotyped images of scientists undertaking unrealistic work that only a “genius” could reproduce.

It is evident that television broadcasting plays multiple roles and can have different kinds of impacts. It can inform the public debate on issues of social concern, like climate and health (BUCCHI, MAZZOLINI, 2003); it can entertain, warn, inform, offer debates, or even educate viewers (BAUER et al., 2001); or it can help shape viewers’ conceptions of science and scientists (STEINKE et al., 2007; MARTÍNEZ, 2003). Given television’s weight in both France and Brazil, we can infer that TV broadcasting plays an important role in learning about and constructing social representations of science.

Yet we find differences between the institutionalization of science in France and Brazil. The process began in France centuries ago—consider that the French Academy

of Science was founded in 1666. The field is younger in Brazil, where the institute that eventually became the Brazilian Academy of Sciences was established only in 1916, two hundred and fifty years after its French counterpart (FERREIRA, 1993; LETA et al., 2006).

Our hypothesis is that this historical difference in the consolidation of science may influence how the French and Brazilian publics see, know, and relate to their country's science. In other words, science and scientists may be more present in people's daily lives in France, where the field has a longer, broader history of institutionalization, while Brazilians may be less familiar with, or even ignorant of, their more fledgling scientific community.

It should be noted that France has a tradition of teaching about and researching the relationship between the media and education. Since the 1960s, French pedagogues from the new education movement have endeavored to show how the media can serve as a teaching tool (e.g., FREINET, 1963). This led to research on the cognitive and social impacts of such use (JACQUINOT, 1995; PERRIAULT, 1989) and later to the development of media education programs, fostered by the Ministry of Education. These initiatives, implemented in the 1980s and 1990s, made it possible to introduce something of a media culture into the French educational system (BARON, 2014).

However, media education only became an official part of the school curriculum in France in 2005, when the guidance and curriculum planning law for the future of schools was enacted (FRAU-MEIGS et al., 2014). The focus shifted from media-school integration to media literacy and information literacy. France's current curricular guidelines underscore the need for all students, from elementary school through the age of 16, to develop a critical attitude toward the media. A number of efforts have been aimed at this, from the establishment of a nationwide benchmark for skill acquisition to the creation of websites offering educational resources for classroom use. A similar trend can be seen in science teaching, where the discussion has centered for some years on how to foster scientific literacy in the classroom (ALBE, 2011).

But what precisely does it mean to teach a critical attitude? There is no consensus here. The goals and impacts of media education and science teaching in France are constantly challenged by the results of research on young people's information culture (LIQUÈTE et al., 2012; MACEDO-ROUET, 2016) and French youth attitudes toward S&T (LE HEBEL et al., 2014), as well as by the results of international initiatives like the Program for International Student Assessment (OECD, 2011). However, media education has now attained institutional and curricular recognition. Against this backdrop, it may be that young French people's perception of science on television is influenced by their schooling, which, at least in potential, may include discussions of information credibility and the encouragement of a critical interpretation of science and the media.

By exploring similarities and differences between Brazil and France, the present article⁴ aims to contribute to research at the intersection of the public perception of science, young people, and television. Through a qualitative study where discussions of

4- This study is part of a larger project, which enjoys the support of the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and the Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro (Faperj), conducted in collaboration with four Brazilian institutes: Fundação Oswaldo Cruz, Universidade de São Paulo, Universidade Federal do Pará, and Universidade Federal de Minas Gerais. It was also supported by CAPES, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil, Programa Capes/Cofecub.

science content were sparked by viewing segments of television programs, we explore for parallels in how adolescents in Rio de Janeiro and Paris perceive science and scientists.

Methodology

In order to compare how Brazilian and French adolescents⁵ perceive science and scientists and discover television's role in the construction of these representations, we conducted eight focus groups in the metropolitan regions of Rio de Janeiro, Brazil, and Paris, France. It should be borne in mind that ours was a qualitative perspective; it was not our intention to arrive at generalizations beyond our findings or suggest national patterns in the perceptions of science by French and Brazilian adolescents.

We selected these two cities because they bear certain similarities and dissimilarities. Both are global cities, that is, their economic, social, political, and cultural logics transcend national borders and display global features (SASSEN, 2005). On the other hand, each city has its own unique history and culture; Brazil is a country with Latin American roots, while France is a major country within the European Union. So while each city represents the country where it is located, they both reflect today's globalized environment as well.

The qualitative focus-group methodology is intended to encourage participants to behave as a group, so that shared meanings and representations are constructed and forged during a discussion activity (GASKELL, 2002). By allowing us to observe the process whereby an active discussion constructs and shifts individual perceptions (or even inconsistencies), the technique enables the capture of collective representations, perceptions, and images.

Four focus groups were organized in each city between August 2014 and June 2017. A total of 78 adolescents took part in the study; 42 students were in their second-to-last year of high school in the city of Rio de Janeiro, while 36 attended high schools (lycées) in the Metropolitan Region of Paris. The gender breakdown was 15 boys and 21 girls in France and 24 boys and 18 girls in Brazil, that is, 39 boys and 39 girls across the study. We extended the invitation to participate to young people who said they had the habit of watching TV.

In Rio de Janeiro, two groups were organized at private schools and two at public schools in order to encompass different social classes. Most students in France attend public school, while only 17% go to private schools (FRANCE, 2012). To achieve this same end (i.e., include different social classes) and enable cross-country comparison, we used a different approach in selecting the French schools. Since 83% of French parents send their students to the school closest to their homes (NAUZE-FICHET, 2003), a student body's socioeconomic profile is heavily influenced by the socioeconomic profile of the surrounding neighborhood (VAN ZANTEN, 2010, 2016). With this in mind, we formed two focus groups at schools in downtown Paris, where the socioeconomic profile would be somewhat akin to that of students at private Brazilian schools; the other two took place

5- Different organizations use different cutoffs to define adolescence. While the World Health Organization (WHO) defines it as ranging from 10 to 19 years of age, Brazil's Statute on Children and Adolescence (Estatuto da Criança e do Adolescente, or ECA) establishes the range of 12 to 18 years (BRASIL, 2005). This article uses the ECA definition.

in the satellite cities of Saint-Denis and Montreuil, where the profile would resemble that of Brazilian public schools.

The groups varied in size from 7 to 12 members, with a relative balance of boys and girls. The activity lasted about ninety minutes and took place on the school grounds.

The groups were mediated by one or two members of the research team, accompanied by at least one non-participating observer. In both cities, the mediators used a semi-structured script revolving around four topics: portrayals of scientists in different television genres; portrayals of women scientists; adolescents' personal familiarity with scientists; and the relationship between science and consumption in television advertising.

All excerpted programs had aired in 2013 on Rede Globo, the station that enjoys the highest audience ratings in Brazil (MÍDIA DADOS BRASIL, 2017) across various television categories (ARONCHI, 2004). Excerpts were selected with the goal of identifying young people's relation to different types of television programming featuring science content. We were interested in discovering such things as whether they trust certain television formats more, if they reject certain content because of the television program or genre where it appears, or if they believe television broadcasting is a mirror of reality.

For the first focus-group discussion, we played an excerpt from the program *Mais Você*, which aired on August 19, 2013. In it, TV host Ana Maria Braga explains the benefits of the shampoo Pantene Expert Anti-idade (Pantene Expert AgeDefy), which was developed by a team of scientists, and she encourages viewers to buy it. The second topic dealt with ethical issues in science, and the discussion was stimulated by a scene from the cartoon *Phineas and Ferb*, which was originally broadcast on September 18, 2013. In the scene, the character Dr. Heinz Doofenshmirtz, depicted as a mad scientist, talks about an experiment that went awry.

The third discussion was prompted by two television advertisements. The first was an ad for the Brazilian Federal Government's Young Scientist Prize, which explained the purpose of the prize and encouraged viewers to participate. This was followed by two scenes from the evening soap opera *Além do Horizonte* (Beyond the horizon), which aired November 29, 2013; in it, a scientist at a library is introduced to his new team.⁶ The fourth discussion was also generated by the viewing of two excerpts. One was an ad by the automaker Ford, where a scientist leads an experiment in simulated reality but cuts it short because one of the team members develops feelings for the leader; the other was a story originally broadcast on the *Jornal Nacional* newscast on September 26, 2013, reporting on new research findings in the field of astronomy and featuring an interview with the lead scientist.

All excerpts were translated and subtitled in French for the students from the Paris region (that is, from the two schools in central Paris and the two in the Greater Metropolitan region).

We opted to present the same TV shows to the focus groups in both countries to guarantee the consistency of the material used to kindle debate, that is, so all groups

6- These were scenes 7 and 13, which can be accessed at: <<http://gshow.globo.com/novelas/alem-do-horizonte/capitulo/2013/11/29/celina-cai-em-uma-armadilha-na-mata-e-grita-por-socorro.html>>.

would begin their discussions from the same starting points. While we were aware that the French students might find the Brazilian TV shows somewhat unusual,⁷ given the specific characteristics of Latin American television, we wanted to ensure that the differences between the students did not stem from their viewing material that differed in either form or content. All groups therefore watched the same extracts, allowing us to observe how different viewers reacted to the same programming and establish whether the ensuing discussions were similar or dissimilar between countries.

Group discussions were transcribed in full and the French texts were translated into Portuguese. The resulting texts were processed using QDA Miner software (Provalis Research). The young people's main perceptions of science and scientists were identified using a codebook and content analysis; our research team has used this same software previously and intercoder reliability has been tested.

Results and discussion

According to a pre-focus group questionnaire, television and the internet/computers are the most heavily consumed media among young people in Rio de Janeiro and Paris. Since a few questions on the questionnaires differed between countries, we will discuss results separately.

Nearly 70% of the 42 Brazilian adolescents were daily TV viewers, while almost all of them used a computer at least once a week. Cell phones were also a regular part of their lives; most used them daily (95%). Other media, like radio, video games, newspapers, and magazines, played a smaller role in their lives. Their top reason for watching television was entertainment (55%), followed by a desire to stay abreast of current affairs (38%). The respondents' most popular television genres were movies (93%), comedy programs (81%), and foreign series (69%). Their favorite networks were Rede Globo and SBT.

In France, less than half of the 36 young people (46%) said they watched TV every day, whereas they used their computers daily to communicate with friends (69%) or look up information (60%). Most of them (83%) texted friends on their cell phones every day. Another daily media practice was listening to music (92%). Conversely, only 19% said they read books every day. On a scale of 0 (no interest) to 3 (much interest), the topics that incited the most interest on TV were fiction (TV series, etc.) ($M = 2.5$; $SD = 0.7$); science ($M = 1.8$; $SD = 0.9$); sports ($M = 1.6$; $SD = 1.4$); and politics ($M = 1.6$; $SD = 0.9$), while economics ranked lowest ($M = 0.9$; $SD = 0.9$).

Four subjects were discussed by all focus groups in both countries and accounted for about 10% of the conversation in each of the groups: science content in advertising, ethics in science, portrayals of scientists, and how challenging it is for women to make a career in science. These topics are the focus of this article.

7- The French students did in fact find the programming somewhat unusual, but not to a point that would hamper research or hinder comparison of the discussions.

Science in advertising

According to Ippolito and Mathios (1990), while advertising claims often draw on scientific findings, consumers cannot easily verify this information. So when making a purchase decision, consumers might simply choose between trusting a given science and advertising claim or not; alleging that something is “scientifically proven” thus becomes a tool for encouraging consumption. A number of authors have observed recurrent reliance on this resource in advertising (FERREIRA, 2009; SALGADO et al., 2013; TORRES, 2012). Perhaps its repeated usage is why Brazilian and French young people no longer find the information compelling when presented this way.

The adolescents in this study displayed a critical attitude toward advertising. They voiced reservations about advertising promises and expressed a comprehension of the general objectives of advertising and television. We observed that these adolescents were fluent in the “idiom of television genres” (MARTÍN-BARBERO, 2009, p. 304), that is, they understood the proposal behind each type of programming and their profiles and narrative tendencies, and they constructed meaning through the interpretive keys of television genres.

In Rio de Janeiro, public school students had sharp opinions about the promises made in promoting Pantene shampoo. They called these promises lies, in the form of misleading marketing, and said many of the people portrayed were actors and not scientists. Private school students in Rio de Janeiro expressed a less radical but nevertheless negative view of this same programming. While they pointed out that advertising is biased and partial and that it highlights product benefits, they also said ads are not necessarily always misleading or deceitful.

Young people in the Paris region conveyed much the same attitude as their counterparts from private schools in Rio de Janeiro. They recognized that television broadcasting is biased but believed that government regulations prevent them from being untruthful. Still, they said they would not buy the advertised product because they felt they lacked information confirming its benefits or promises.

Sometimes, it's not that they lie, but they hide the truth (Student 01, female, Saint-Denis high school, i. v., 2016).

We don't have any evidence either. They don't give any precise examples [...] You need to go deep, present more arguments, which explain more (Student 02, male, Montreuil high school, i. v., 2017).

In all groups, the fact that advertising copy reported something as scientifically proven or developed by scientists was not deemed a determinant factor in purchase decisions. Rather, these young people felt it is a given that marketed products have been scientifically proven. The French youth also noted that this facet of publicity narratives might work more effectively with people from classes with lower purchasing power.

The Eurobarometer survey also detected a more critical outlook. The French have an ambivalent attitude toward S&T issues, with their positive perceptions of scientific activity offset by critical or even negative ones. For example, technology is seen as beneficial because it can create jobs; yet the French perceive that technology ultimately eliminates occupations, thereby increasing joblessness (EUROPEAN COMMISSION, 2010, 2015).

In this regard, the young people who took part in our study displayed attitudes much like those of the adult public in each country. In other words, while they felt scientific knowledge was reliable and had a positive opinion of science, which they saw as affording humanity more benefits than evils (EUROPEAN COMMISSION, 2010, 2015; MOREIRA et al., 2017), theirs was not blind trust. Rather, their attitudes were mediated by various factors, such as format in which information reaches them, mass media text, and TV genre. In other words, for this public, the construction of conceptions of science is a complex process bringing into play a number of factors, like cultural and social issues and even media environment.

Conceptions of science and scientific practice from the perspective of ethics

A scene from the cartoon show *Phineas and Ferb* in which a mad scientist loses control of his experiment was used to foster a discussion of ethics in science. We talked about how much freedom scientists should have in conducting their research and what moral and ethical issues bear on scientific studies. The opinions of the Brazilian teens were divided when it came to placing restrictions on research. Some of them underscored the need to preserve scientists' freedom in their work, while others felt limits are necessary to ensure greater control over research and over knowledge in general.

This dichotomy parallels findings for the Brazilian profile overall, according to the latest survey on the public perception of science. Among the general public in Brazil, 48% feel scientists should be free to do their research, while 46% think some restrictions are necessary (MCTI, CGEE, 2015). One recurrent theme was the question of animal and human testing at various moments in Brazil's history. The students stressed that science is neither good nor bad in and of itself, but that the application of this knowledge tends in one direction or the other.

There are a lot of things like that, that scientists create, they, like, try to create, in the case of cures, many people are in favor and many are against. So I think a scientist has to have the freedom to do things, if he thinks something is going to work; whatever people think, he has to do it. If he thinks it's right, he's got to do it. Because it might work or not (Student 03, male, public high school, Rio de Janeiro, i. v., 2014).

A scientist has to be committed to doing his work, without hurting others. Because the knowledge a scientist produces is in itself neutral. All knowledge is neutral. The way people are going to use it is what can produce something so-called bad or something so-called good (Student 04, male, private high school, Rio de Janeiro, i. v., 2014).

We can see that while young people in Rio de Janeiro may be divided about whether scientists should have freedom to conduct their research, the idea that science is neutral still populates their imagination.

In France, some of the students who favored placing constraints on science pointed out that no one can have total freedom. A young female teen, for example, said it is “dangerous to let a scientist do whatever he wants” (Student 05, female, Montreuil high school, i. v., 2017), and most of her classmates agreed. Furthermore, the students called attention to the fact that funding, whether governmental or private, is already limited; therefore, imposing or calling for more restrictions on science might be an exaggeration in certain areas.

We also observed that young people in the Paris region were concerned about research investments. They discussed the issue of governmental and private funding for science and displayed a rather critical, concerned attitude about it, given changes, tendencies, or biases that could appear in research proposals. They also took note of the close relation between public investments and science and emphasized that the French government invests little in initiatives to encourage young people to pursue science careers.

In both countries, those who said scientists should enjoy more freedom backed up their ideas by arguing that there is still much to be discovered; if science is restricted, they argued, humanity might suffer in the long run. They also brought up the point that a number of technological advances made in certain eras might have been deemed unethical if they had been made in a different era.

The youth from private schools in Rio de Janeiro and the French youth overall shared similar ideas in this regard and their discourse was more complex than that of young people from public schools in Rio de Janeiro. The private students from Rio and the French students used comparisons based on scholarly information, offered considerations about appropriate behavior for a scientist facing an ethical dilemma, and voiced more articulate arguments. It was noted that the French young people overall were more familiar with the concept of science, because they knew scientists personally, a number of them had visited scientists’ workplaces, and they also understood some of the scientific community’s usual practices, as we can glean from these statements:

We can come up with codes or rules. For example, we’ve created codes in ethics for cloning, so you can’t clone, for example, a human. Because that wouldn’t be morally correct. And have rules really for precise cases [...] If we really have very ambiguous cases, we’d have to hold conferences or meetings to discuss the problems something might cause, for example, such and such an invention or scientific experiment (Student 06, male, Paris high school, i. v., 2017).

I don’t think a scientist, at least not alone, can create something in his own interest, not even in a group, because scientific work takes time and what he gets paid for is research and discovery. So if he doesn’t discover anything, and if he just makes machinery in his own interest, he won’t get paid, and if he’s not paid, he’ll die (Student 07, male, Saint-Denis high school, i. v., 2016).

There may be a connection between the fact that the French young people were familiar with scientific content and the importance that French schools accord the teaching of the sciences and cultural literacy (FRANCE, 2017). There may also be some relation between this fact and the fact that about 90% of the French population expresses an interest in science topics, which is even higher than the figure for the European Union overall. The French tend to be optimistic about S&T and believe in its potential to offer concrete benefits (EUROPEAN COMMISSION, 2010, 2015).

Images of scientists: from mad scientist to female scientist

Generally speaking, the young people in this study had differing perceptions of the figure of the scientist. In a broad study of television and film, Nisbet and Dudo (2013) identified portrayals of eccentric or nerd scientists, that is, of researchers who are deeply involved in their work and forget everything and everyone (including family) to concentrate on their studies. When shown the “mad” scientist depicted in the *Phineas and Ferb* cartoon, public school students in Brazil recognized this image as stereotyped and fictionalized, but they also said some portion of actual scientists are really like this.

The private school students in Rio de Janeiro thought the stereotype of the mad scientist had entertainment value, rather than being meant to reflect reality. Still, several of the Brazilian students pointed out that some of the crazy scientists’ traits can be observed in real scientists, especially their tendency to have limited social lives, their constant use of math formulas, and their need to be isolated in order to do research.

[Scientists] think they know, but they get a bit lost in their own conscience. But there are others who are, they’re crazy, but they know what they’re doing (Student 08, female, public high school, Rio de Janeiro, i. v., 2014).

Many scientists don’t have a social life. There’s the deal that a guy, to discover something, has to be in a cage and locked up 24 hours a day working. This doesn’t necessarily have to happen. It can happen, but it doesn’t necessarily have to (Student 09, male, private high school, Rio de Janeiro, i. v., 2014).

Private school students in Rio de Janeiro also seemed more familiar with the academic scientific world. They cited the names of internationally renowned scientists, like the physicist Albert Einstein and the geneticist Lygia da Veiga Pereira, a University of São Paulo professor who authored the book *Clonagem: da ovelha Dolly às células-tronco* (Cloning: from the sheep Dolly to stem cells). They also named family members and family friends who worked at Brazilian research institutes.

We observed that the Brazilian teens from both private and public schools had a complex view of scientists. While recognizing that certain images were stereotypes, they did not wholly negate the validity of these images. Instead, they started from the stereotypes to advance criticisms and thoughtful considerations about scientists, relativizing and even rejecting certain features of the stereotype.

The French youth had a more critical view of the mad scientist stereotype. They saw this image as a caricature and exaggeration meant to entertain. These teens also knew scientists personally and described them as serious individuals who practice scientific rigor and search for discoveries.

We imagine they're more rigorous, more serious. . .more reflective. (Student 10, female, Montreuil high school, i. v., 2017).

[Scientists] will want to look for new things; they might look for unlikely things, but they aren't crazy [...] It'll be for causes like, for true causes, like conquering something or creating something. (Student 11, female, Saint-Denis high school, i. v., 2016).

The young people in this study also recognized the stereotypical nature of the image of the genius scientist, depicted in a scene from the soap opera *Além do Horizonte*. In this extract, a team receives a new scientist, who is in his early 20s, as a young prodigy in the biological sciences. The French students were particularly critical of this image, because they thought the profile might suggest that only very intelligent, gifted people can pursue a career in science.

That's what I think is too bad in this video. Because people might actually want to study science, but we also get a kind of impression that he's a scientist because he's gifted and then we have to be, if we want to be a scientist. But I think that if we study and invest ourselves, we can certainly be a scientist even if we're not especially gifted. (Student 12, male, Paris high school, i. v., 2017).

In relation to gender, the adolescents in this study said there is an imbalance between the number of men and women in academia, but not because they have different abilities. To the contrary, the French students cited data reporting that females outperform males during early years of schooling, while men surpass women in later years of education. In these students' opinion, this is because women lack confidence in themselves and their personal and professional abilities.

This has to do with woman's role in our society [...] Before, we had an inferior role, so there's still people who haven't freed themselves from this image, so [women] have less confidence; they don't risk throwing themselves into things, although they could enjoy more success. That's also why. A matter of confidence. (Student 13, female, Paris high school, i. v., 2015).

I think it's a matter of education above all, because, for instance, a boy who wants to take a preparatory class [to get into a major school], in an average family they'll encourage him to do it. [...] While a woman would get less encouragement. (Student 14, male, Paris high school, i. v., 2015).

The French students also mentioned family support, which they felt would be greater for boys interested in pursuing a career in science, while girls' parents would be

more resistant to the idea. They saw this as the result of various factors, both educational and cultural, plus the fact that France's patriarchal culture is more supportive of boys.

The French students also brought up another reason for the imbalance between male and female scientists: since the media primarily portrays male scientists, women might be discouraged from pursuing careers in science. Some said that, because of this entrenched image of the male scientist, many women tend to "belittle themselves and think they aren't capable, even though they are just as capable as men" (Student 15, female, Saint-Denis high school, i. v., 2016). Various authors have in fact reported that media portrayals in a wide variety of TV formats, both in Brazil and abroad, mostly feature male scientists (MELLOR, WEBSTER, BELL, 2011; CASTELFRANCHI, MASSARANI, RAMALHO, 2014; ARBOLEDA CASTRILLÓN et al., 2015; DUDO et al., 2010).

Discussion also revolved around having a family. According to the young people in Paris, women tend to choose family over work more often than men do, which means the former lack the dedication needed for science. One young woman said the image of a male scientist is of someone without children: "male scientists don't form families. It doesn't seem to bother them, you know. . . .That's the image we have. Most of them spend their entire lives doing research, doing their studies, and there's no family" (Student 01, female, Saint-Denis high school, i. v., 2016).

The question of having children spurred a lot of discussion among the French youth. Most of the boys said if a woman stops working during pregnancy, it does not prevent her from pursuing a career. The girls, however, worried about management intolerance toward pregnant women, because they felt this relationship is not always friendly. They believed such problems could be detected in a broad variety of work environments, including academia and research.

The French youth were thus cognizant of the various issues that can arise when a woman chooses a career in science. This more realistic perception might have to do with the fact that almost 90% of the French public sees a need for the government to foster initiatives to boost female representation on research staffs—one of the highest percentages among European nations (EUROPEAN COMMISSION, 2010; FRANCE, 2018a; FRANCE, 2018b).

There was a sharp difference in how boys and girls from Rio de Janeiro saw the gender issue. The boys tended to say that there is no longer any difference between men and women who pursue careers in science, arguing that both genders have the same job possibilities. According to them, while there used to be much bias against women in the past, the situation has been resolved, if not completely, at least in large part.

The girls in Rio de Janeiro, however, said that while things may have changed, there is still much inequality between men and women in science, including the fact that men receive greater recognition for their research. In their opinion, down through history, the work done by many female researchers has been obscured by their gender. Furthermore, they said, there have been no great women scientists, which demonstrates this inequality.

There's no woman who's recognized. I think there's just one in the lineup of the world's most intelligent people in history, just one, and that's Cleopatra. As far as the rest, there's no woman. There are lots of men, and just one woman there. (Student 16, male, private high school, Rio de Janeiro, i. v., 2014).

I think women are kind of underestimated [...] Very few really important women are cited down through history. The spotlight is always on the man. You never see a woman doing something great [...] [But] I don't think the thing is intellectual ability. I think, like, female recognition is harder [...] It's gotten better today, but it's still not 100%. (Student 17, female, private high school, Rio de Janeiro, i. v., 2014).

The view expressed by the Brazilian girls is consistent with the country's reality. Nationwide and across all fields, Brazilian women have been on equal footing with men since the turn of the twenty-first century in terms of the number of scholarships and fellowships offered by the National Council for Scientific and Technological Development (CNPq, 2017). However, as measured by the number of fellowships held by established researchers with consistent academic production, that is, at higher levels of the academic career, women account for fewer than 40%, evincing gender inequality in Brazilian science, especially in positions of power.

Final considerations

Our results, based on the focus-group approach, provide a picture of how science is perceived by youth in Rio de Janeiro, who are Brazilian and Latin American, and youth in Paris, who are French and European. We detected both similarities and differences between the two groups, allowing us to compare national research data from both countries.

First, television was a regular part of the lives of both the Brazilian and French young people, and this may have been a determining factor behind one of their key similarities: the perception that advertising uses scientific arguments as a sales device. We observed that members of all eight focus groups had a critical view of this type of programming and recognized that it can be, and often is, biased, partial, and even misleading (SALGADO et al., 2013; TORRES, 2012).

Because these teens believed advertising is aimed at selling products, they were cautious when scientific content was mentioned in publicity contexts. In other words, they were familiar enough with the formats, genres, and proposals of TV shows that they perceived their underlying intentions, even when these were not explicit, and they framed them with a critical eye. We understand this to be indicative of their close relationship and familiarity with television content, which is a product of the role this medium plays in social bonding in both countries (WOLTON, 2006).

These young people may also have been skeptical of TV advertising discourse because media and science culture are taught in school. According to the latest curriculum guidelines in France, students should develop critical thinking about the media and

science. This includes, for example, recognizing possible conflicts of interest on the part of information sources.

As Pérez and collaborators (2018) have shown, adolescents who participated in a media education program were better at spotting sites that engage in questionable business practices than students who did not. A nationwide survey of 15-year-old French students indicated that over half had reservations about the social benefits of S&T (LE HEBEL et al., 2014). This research, along with the work of Albe (2011) on the social and educational purposes of cultural literacy, suggests that media and science education may have affected our participants' critical attitude toward television content.

Overall, the adolescents in our study shared a perception that the scientific community is still mostly male. They felt women are a minority in these academics circles and receive less recognition and possibly lower salaries. But they also think the situation is changing. Furthermore, they said the media primarily present male portrayals of scientists, something reported by a number of studies (MELLOR, WEBSTER, BELL, 2011; CASTELFRANCHI, MASSARANI, RAMALHO, 2014; ARBOLEDA CASTRILLÓN et al., 2015).

This image of scientists as overwhelmingly male might be because these teens overall—and especially the girls—were not very familiar with actual scientists. Steinke (2005) argues that media portrayals of female scientists “have the potential to shape adolescent girls' perceptions of gender roles and their own future roles” (STEINKE, 2005, p. 52) and may, or may not, encourage them to pursue this career in the future.

Since the girls perceived the scientific world as a predominantly male setting, they were more worried about women's place in science and on the job market as a whole. They felt many changes have already occurred—for instance, women are now working in a variety of professions and have attained independence in various regards—but they still see a long road ahead. The boys, on the other hand, were more optimistic; they believed we have almost achieved gender equality, and little needs to be done to arrive at an ideal situation.

CNPq (2017) data on Brazil, along with a comparison of the careers of women scientists in Brazil and France by Leta and collaborators (2014), have shown that the girls' viewpoint aligns closer with actual fact. While much progress has been made in both countries, such as the systematic inclusion of women in formal teaching and on the labor market, inequality persists at the highest levels of the scientific career and other professions.

We also observed differences in opinions and viewpoints between the Brazilian and French young people. The teens in Rio de Janeiro perceived scientific activity as neutral and impartial; in other words, they felt science was neither good nor bad in and of itself but depended on how people use this knowledge. They also had a critical understanding of ethical issues related to scientific research. As the young people saw it, science is a complex activity entailing many actors. Perhaps this is why they did not reach a consensus about the need to impose restrictions.

The students from private schools in Rio de Janeiro seemed to be more familiar with actual scientists as compared to their public school peers. They engaged in deeper discussions, while their discourse still brought in the traditional stereotype of the mad

scientist. In part, this may be because Brazilian teens know little about the country's research institutions and scientists (MOREIRA et al., 2017; MCTI, CGEE, 2015).

The young people from Paris and surrounds demonstrated greater knowledge of the logic of scientific activity, consonant with the French public's marked interest in the subject matter (EUROPEAN COMMISSION, 2010, 2015). The youth's perception of government and private investments in scientific research was illustrative of this.

The same proved true in regard to portrayals of scientists. The French students displayed greater familiarity with science, which included their having personal acquaintanceship with scientists. This may have contributed to their less stereotyped view of scientists and their understanding that a good share of media portrayals of scientists are fictional.

Our qualitative data thus indicated that the young people who participated in this study in both countries generally had a positive view of science, while they were also critical and thoughtful and drew on different content to construct meaning. It should, however, be noted that our results do not lend themselves to greater generalizations, since there may have been differences between the students, schools, and regions analyzed both within the cities of Rio de Janeiro and Paris and within Brazil and France.

We hope this analysis has contributed to research on the public perception of science by offering qualitative data that illustrates the profile of Brazilian and French youth on this subject matter, based on discussions of portrayals of science and scientists in televised media.

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Received on Sep. 11, 2018

Revised on Nov. 6, 2018

Approved on Nov. 28, 2018

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