

Media Representation of Women in Science: A Storytelling Case Against Gender Stereotypes

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Abstract: Gender stereotypes affect not only the way people perceive others but also their image of themselves. Those stereotypes' effect, both external and internal, is often limiting. In today's post-digital society, the media can play a key role in representing genders equitably, curbing the harmful inertia of stereotypes. This research focuses on gender stereotypes related to the representation of women in science disseminated by the media. In the 21st century, when significant social and media revolutions have already occurred, it seems more than desirable that the media exercise their responsibility by granting women the space for intellectual, professional, and public projection that should never have been denied to them. The research aims to study and interpret *Women of Science*, a documentary series co-produced by public broadcasters in Austria, Belgium, Germany, Italy, Lithuania, and the United Kingdom, which portrays several female STEM scientists' daily, professional, and personal lives. The methodological approach is qualitative. After a literature review, a global discourse analysis is conducted. The results show that this documentary series portrays women scientists differently from traditional stereotypes in previous film productions. They are represented positively and diversely, not as an exception in the science community. The study confirms, among other conclusions, that *Women of Science* contributes to eliminating the stereotypical barriers that made women invisible in science, based on the didactic capacity of storytelling as a strategy for raising awareness and transforming beliefs shared by society. It can be considered a good practice that serves as an example for governments and organizations that seek to eliminate gender stereotypes and build a more equalitarian science in which all genders are represented. New lines of research will examine more cases of storytelling in the intricate post-digital media scenario and reflect on gender stereotypes in science from the perspective of non-binary gender representation.

Keywords: Gender Stereotypes; Women Representation; Storytelling; Post-digital era; Media; Women in STEM

1. Introduction

Gender equality remains a pending issue in the 21st century. There is still a disproportionate distribution between genders in access opportunities and recognition (Hideg and Krstic, 2021). This article addresses gender inequality in the field of science, specifically as it affects women.

Authors like Grañeras Pastrana, Moreno Sánchez, and Isidoro Calle (2022) argue that, over the years, this disparity has not diminished; instead, it appears to be solidifying. They also highlight notable differences in educational choices based on gender. One of the most remarkable is the significant underrepresentation of women in experimental sciences, technology, engineering, and mathematics (commonly referred to as STEM).

This underrepresentation is patently visible in the statistics, even in those nations where the share of STEM careers is highest, such as Germany, which stands out in the European context with 38.5% of students choosing STEM degrees (Buchholz, 2023). According to DESTATIS (2024), the German Federal Statistical Office, only about a third of those students are women, as shown by the figures for enrolment in STEM study programmes in recent years (31.82% in 2021; 32.39% in 2022; 32.61% in 2023).

Other European countries present similar figures confirming the aforementioned women's underrepresentation. According to data from the Higher Education Statistics Agency of the United Kingdom, in this country's 2022-2023 academic year, only 31% of students enrolled in STEM degrees were women (STEM Women, 2023). Likewise, in Spain, the rates of women enrolled in STEM university degrees in 2022-2023 did not reach 50% in almost any case. In Mathematics (36%), Physics (27%), Telecommunications (23%), and Computer Science (13%), those rates were especially low (Cobrerros, Galindo, and Raigada, 2024).

The lower number of women in the STEM field occurs not only among students but also among professors, as Casad et al (2021) report when addressing the problems of gender inequality in academia. Ross et al (2022, p. 135) raise the complaint level: they reflect on the documented gap between scientific production by men and women. In their study, the authors demonstrate that the reason is not so much a lower productivity rate among

women as that “women are significantly less likely to be named on any given article or patent produced by their team relative to their peers” and that “women’s scientific contributions are systematically less likely to be recognized.”

Among the different causes that may promote this inequality, the debate surrounding the influence of gender stereotypes on career choices remains relevant. The role of the media in disseminating stereotypes has traditionally been studied (Steinke, 1999, 2005; Flickler, 2008; Eizmendi-Iraola and Peña-Fernández, 2022). However, literature is still scarce in the contemporary context of post-digital society and its storytelling strategies. The reflection becomes even more critical since today the media are more encompassing, and digital channels cover all facets of life since an early age.

Governments, especially over the past decade, have implemented policies to enhance the inclusion and visibility of women in science. These efforts aim to encourage scientific interests among girls and young women, particularly in the STEM fields (Sedeño-Valdellós, 2022).

This research aims to analyse the documentary series *Women of Science* to discover how it portrays women and determine whether it is a good practice case to inspire governments and organisations when creating narratives against gender stereotypes in science.

2. Literature Review

2.1 Gender Stereotypes’ Influence on Career Choices

The United Nations Human Rights Office of the High Commissioner (OHCHR, 2024) warns about the limiting effect of gender stereotypes and describes them as a source of inequality:

A gender stereotype is a generalized view or preconception about attributes or characteristics, or the roles that are or ought to be possessed by, or performed by, women and men. A gender stereotype is harmful when it limits women’s and men’s capacity to develop their personal abilities, pursue their professional careers and/or make choices about their lives (para. 1).

Santoniccolo et al. (2023) conceive gender stereotypes as a key piece in the perverse machinery of restrictive gender representation in media. They denounce that gender stereotypes promote sexism, harassment and violence while limiting women’s professional possibilities and ambitions.

The influence of gender stereotypes on career choice is critical. After conducting a study in 66 countries, Miller, Eagly, and Linn (2015) concluded that these stereotypes are deeply rooted even in those societies where gender equality awareness is widespread, such as the Netherlands. They also confirmed that gender stereotypes limit women’s access to STEM careers, especially in university study programmes, not so much at lower educational levels.

Gender stereotypes exert their coaxing since childhood and adolescence. Master, Meltzoff, and Cheryan (2021) studied the perceptions of boys and girls ages 6 to 12 from different races. The authors confirmed that the stereotype that girls are less interested in computer science and engineering than boys was widely accepted among the participants. In a companion study, Master (2021) concludes that stereotypes can decrease girls’ motivation through two pathways. The first is the self-perception of lower ability, consolidated by comments from teachers or parents. The second pathway is the fear of losing belonging to the group because girls perceive that one identifying sign that defines them as a group is that they are better at non-STEM subjects.

Other authors approach the reflection from the Pygmalion and Galatea effects (Palomo-Domínguez and Tamošiūnaitė, 2024). The Pygmalion effect consists of improving a child’s abilities because they perceive that adults have high expectations of their capacity (Rosenthal, 1987). It can contribute to overcoming the gender gap in different life scenarios, classrooms, and career decisions (Gentrup and Rjosk, 2018). On the other hand, the Galatea effect focuses on the individual’s self-perception. If a person has a high self-perception of their abilities, this view of themselves can positively influence their performance (Bandura, 1986).

2.2 Storytelling and Audiovisual Discourse in the Post-digital Era

Storytelling is a powerful tool in educational environments due to its ability to generate understanding, promote learning, and reinforce societal values. Some authors emphasise that storytelling’s unique advantage lies in its capacity to evoke emotions in the audience. This emotional engagement enhances the story’s retention.

Consequently, storytelling is crucial in inspiring and motivating individuals to embrace the underlying values (Ferrés and Masanet, 2017).

The current media scenario, the post-digital era, is an intricate system where digitalisation is such a hegemonic phenomenon that it becomes natural and goes unnoticed. The distinction between online and offline channels, as well as digital and analogic realities, has lost its meaning, as it is not significant for the audience. The same happens with the mixture of discourses and communication formats since the process of hybridising messages is extremely high (Meyerhofer-Parra, González-Martínez, and Peracaula-Bosch, 2024). This complex media landscape is inundated with video content, which stands out due to the excellent storytelling skills of audiovisual language (Anderegg et al, 2017).

Despite the epistemological challenges presented by post-digital society, storytelling seems ready to adapt to all the media changes, just as it has been in any previous communicative era:

A narrative is essentially a structure that can be based on emotional, learning, educational, interactive, individual or social, imaginative, fictional or non-fictional, digital or non-digital, subjective or objective engagements. It gains attention by evoking feelings, memories and curiosity. This links the concept of storytelling directly to the definition of communication (Nielsen, 2017, p. 44).

2.3 Media Portrayal of Women in Science: Stereotypes in the Audiovisual Discourse

Many authors agree that women's representation in media does not help make their role in science visible. Eizmendi-Iraola and Peña-Fernández (2022, p. 12) synthesize this reflection in a forceful statement: "Science is still represented in the media as a male environment in which women represent the exception."

On the one hand, there is a matter of quantity: mainstream Anglo-American film and television rarely feature female scientists, neither as real scientists nor as fictional scientific characters (Chambers, 2022). In other words, female scientists are less visible because they barely appear in the media.

On the other hand, beyond quantity, quality is essential. It is crucial to problematise and investigate how women are represented. Here is another reason for invisibility: because female scientists are disguised under stereotypical caricatures, they are also less visible.

Jocelyn Steinke (1999, 2005) attempted to define female scientist models shown in films, although Flicker's classification is possibly the most revised in later studies. The Austrian sociologist Eva Flickler (2008) described a list of archetypes through which women scientists are portrayed in cinema: the old maid, the male woman, the naïve expert, the evil plotter, the daughter or assistant (of a male scientist), the lonely heroine, and the clever digital beauty, as female heroines of video games.

Mejón and Jiménez (2022) and Muñoz Gallego and Jiménez de las Heras (2023) reflect on the evolution of these models over time. So do Kool, Azevedo, and Avraamidou (2022), who highlight the prominence of the solitary heroine model in recent films.

Before those studies on stereotypes of female scientists in film, other authors had reflected on the clichés used to represent scientists without distinguishing their gender. LaFollette (1990) identified four types: the magician or the wizard, the expert, the creator or destroyer, and the hero. Weingart, Muhl, and Pansegrau (2003) presented a broader categorization after analysing 222 science fiction films. Nevertheless, these stereotypes focus on aspects such as the ethics or the scientist's purpose but are unrelated to gender. One could ask why female scientists, simply because they are women (not because of their status as scientists) have required a separate classification.

The underrepresentation of women in science does not only occur in fiction or entertainment discourses, as in film or television. The news media also offer a diminished and biased image of women in science. According to Eizmendi-Iraola and Peña-Fernández (2022), although there are more headlines about women in science, how women are shown reinforces stereotypes and pigeonholes them into a particular occupation. In the case of women in STEM, they are shown in care sectors, such as healthcare. In addition, the role of women in science is depicted as a rarity, as something exceptional.

Kool, Azevedo, and Avraamidou (2022) recommend a less stereotypical, more accurate, egalitarian representation of women scientists. They call for the representation of women to be positive, diverse, and intersectional. Chambers (2022, p. 483) claims that the media has the ability and responsibility to change the perception of science and scientists regardless of their gender: "A more intersectional approach to the

representation of the sciences on screen it may be possible to begin shifting the expectations of what science is, and who scientists are and what they look like.”

The representation of women in science must move away from the exceptional and become natural every day. It is not enough to present those scientists who have made history. The anonymous, capable, professional scientists, members of a scientific community facing daily challenges, must be shown. Rather than being presented as a strange or isolated phenomenon, they should be portrayed as a standard part of contemporary society. (Chambers and Thompson, 2020).

3. Methodology

The methodological approach is qualitative. After a brief literature review, the research delves into discourse analysis on an audiovisual storytelling case that portray women in science. Discourse analysis is an analytical technique that studies the formal and significant aspects of all types of texts, whether oral, written, or multimedia to understand the meaning and functions of those discourses in a specific social and cultural context. It emerges from the idea that language is not only a means of transmitting information but also a way of exercising power and building social reality (Gee, 2014). This critical and reflective nature makes discourse analysis an appropriate method for this research topic.

3.1 Case Presentation

The case chosen is *Women of Science*, a TV series on the professional journey of six female scientists in mathematics, technology, and engineering. It comprises six episodes of approximately 15 minutes each; they may be considered a film if screened together. *Women of Science* was released in 2023 by public broadcasters of Austria (ORF), Belgium (RTBF), Germany (SWR), Italy (RAI), Lithuania (LRT), and the UK (BBC), in cooperation with the European Broadcasting Union. It is available in the public broadcasters’ media libraries. Each episode presents the professional journey of a woman STEM scientist from those countries.

3.2 Analysis Instrument

The six episodes are examined individually, taking into account the categories outlined in Table 1. The work of Cambronero-Saiz, Cristófol-Rodríguez, and Segarra-Saavedra (2023) has served as a basis for creating the categories, which have been modified to better adapt to the research objectives. One of discourse analysis’s characteristics is the lack of a single technique with standardised steps applicable to all cases (Sayago, 2014). This methodological versatility allows proposing analysis instruments created *ad hoc* for each investigation.

Table 1: Categories and subcategories for episodes’ analysis

Categories	Subcategories
#1 Episode’s identification	Scientist’s name, country, science field
#2 Narrator and main character	Individual or collective, male or female, leader position or other, archetype of female scientist according to Flicker (2008)
#3 Person in their context	Race/Ethnicity, Generation, family, cultural and social context
#4 Topics	Scientific results, myths debunked, careers development, personal life
#5 Time structure	Duration, temporal order of the narrative according to Kim et al (2017)
#6 Text and style	Complex or understandable text, professional or colloquial tone, serious or humorous language, denotative text or use of rhetorical devices
#7 Content format	Video snips, pictures, charts, infographics, captions, testimonials
#8 Purpose	Information dissemination for the general public, scientific recognition, visibility of women in science, awareness against gender stereotypes

4. Results

4.1 Episodes’ Analysis

Category #1 identifies each episode according to the female scientist who stars in it, her country, and the scientific field in which she works, as can be read in the corresponding row of Table 2. The geographical context is confined to the realm of Europe. The fields of science, all in the STEM field, describe a varied spectrum:

information technology, aeronautical engineering, computer science, nuclear medicine, physical chemistry and neuroscience. Figure 1 shows a picture of the six women in the same order as the columns describe their episodes in Table 2.



Figure 1: Main characters in the episodes from Austria, Germany, United Kingdom, Belgium, Lithuania, and Italy (from left to right). Source: Planet Schule (2024).

Table 2: Episodes' analysis based on categories and subcategories

Cat.	Subcategories Description					
#1	Doris Schlaffer, Austria, IT	Tiziana Bräuer, Germany, aeronautical engineering	Anne-Marie Imafidon, UK, computer science	Sarah Baatout, Belgium, nuclear medicine	Ieva Plikusienė, Lithuania, physical chemistry	Monica Gori, Italy, neuroscience
#2	Individual, female, leader position, might lean towards the Male Woman	Individual, female, employee, might lean towards the Naïve Expert	Individual, female, leader position, might lean towards the Old Maid	Individual, female, leadership position, might lean towards the Old Maid	Individual, female, employee, might lean towards the Lonely Heroine	Individual, female, employee, might lean towards the Male Woman
#3	White, Gen Y, grew up with brothers, female partner, is a mother	White, Gen Y, All-Girl-School graduate	Black, Gen Y	White, Gen X	White, Gen Y, the only girl in A-level Physic class in school, father scientist, male partner, is a mother	White, Gen X, male partner, is a mother
#4	Scientific results, career development, personal life	Scientific results, career development, personal life	Career development	Scientific results, career development	Career development, personal life	Scientific results, career development
#5	15:00, chronicle	14:33, chronicle	14:30, chronicle	14:51, syllepsis	13:18, chronicle	15:55, syllepsis
#6	Complex, professional, serious, denotative	Simple, professional, serious, denotative	Simple, colloquial, serious, denotative	Simple, colloquial, serious, denotative	Simple, colloquial, serious, denotative, humour	Simple, colloquial, serious, denotative, emotions
#7	Video from workplace and private life	Video from workplace, pictures from private life	Video from tv shows she participated in, captions, testimonials	Video from workplace and private life, pictures from private life, testimonials, newspaper	Video from professional life, pictures and video snips from private life, testimonials	Video from workplace, pictures from private life
#8	Against gender stereotypes	Against gender stereotypes	Women in science, against gender stereotypes	Women in science, against gender stereotypes	Scientific recognition, women in science, against gender stereotypes	Against gender stereotypes

Category #2 describes the narrator and the protagonist. An autodiegetic narrator introduces all episodes, as the narrator of each one is the scientist who stars in it. The decision to give them the first-person voice allows for a more intimate connection between the characters and the audience. Viewers better access each character's subjective, individual, and complete reality. Besides, it grants the scientists greater visibility in the story, in contrast to traditional media portrayals that have rendered women invisible in science.

Three of them hold professional leadership positions (the scientists from Austria, UK, and Belgium). None of the Flicker's archetypes of female scientists could be precisely matched. Even making an effort to find those stereotypes, only timid nuances might lightly tend towards four of them: the Naïve Expert, the Male Woman, the Lonely Heroine, and the Old Maid. This suggests a decisive attempt to blur, if not break, gender stereotypes for women in science.

Category #3 presents the six women individually and in their context. The sample of female scientists represented shows some diversity, which encourages different profiles of women in the audience to feel identified and motivated by their message. The female scientist from the UK is black, while the rest are white. Two female protagonists belong to Gen X (Belgium and Italy), while the others are from Gen Y. The female scientist from Austria has a female partner with whom she has a baby; other female scientists have male partners and children (Lithuania, Italy); and family information is not provided about others. On the other hand, the context presented does not refer to any social or cultural elements specifically, so the receiver from any Western environment could engage with the message. The settings are diverse: laboratory, class-setting, and home or hobby environment, giving a positive view of their daily lives.

Category #4 focuses on the topics presented. The female scientists share strictly personal professional experiences, achievements, and personal life information. A common theme among them is acknowledging the difficulties faced in their scientific careers while encouraging the audience to embrace those challenges. Actually, five of the six experienced a significant change in their careers since STEM was not their initial choice. They share their experiences not as epic or exceptional feats. Theirs is not the story of a hero; it is simply the path taken by a person who has worked hard to reach their desired goal.

Category #5 refers to the length and time of the narrative. Regarding the duration, all the episodes are homogeneous, being close to the 15-minute format. As for the narrative structure, temporal logic predominates, mostly chronicle pattern, which shows the events in the order in which they occur. However, there are two stories where the temporal structure is syllepsis: the events presented are grouped by thematic categories, not in chronological order. Thus, the episodes of the scientists from Belgium and Italy first describe their professional careers and then their personal lives. A similar temporal treatment helps all the stories have the same degree of importance without distinguishing a main story from other secondary ones; it reinforces the choral character of the series as a whole. It is not a story about a star scientist but several stories of diverse women with diverse lifestyles who have developed diverse scientific interests.

Category #6 describes the style and tone. Simple language predominates, which is entirely understandable for the general public. Only in the Austrian episode the language is complex. In most episodes, there is a significant prevalence of colloquial language, except by those from Austria and Germany, where the language register is professional. Like the scientific style, the language aims to be clear and denotative, not rhetorical. That does not prevent some episodes from including touches of humour (Lithuania) or emotion (Italy), which makes the story engage the public and boost the later recall.

Category #7 analyses the content format. All videos combine information from their professional and personal life. Professional life is reflected in all cases through video snips in the workplace; personal life is mainly shown in the video but can also be presented (Germany, Italy) or supplemented (Belgium) through pictures. Three episodes (UK, Belgium, Lithuania) show testimonials regarding the professional results or personality, and one includes captions (UK), strengthening the message. Examples of intertextuality are also observed, such as video clips from a television programme in which the UK scientist participated and newspaper fragments in the Belgium episode. These pieces of supplementary information also facilitate viewers' understanding and enhance subsequent recall.

Category #8 addresses the purpose. All episodes warn against gender stereotypes in science. In addition, three strongly emphasise the visibility of women in science (UK, Belgium, Lithuania), and one points out the issue of scientific recognition (Lithuania).

4.2 Discussion

The analysis of *Women of Science* reveals that this case of storytelling has the explicit purpose of demolishing gender stereotypes. Its narrative strategy puts into practice the recommendations made in previous studies. Women scientists are shown without pigeonholing them into stereotypes; their representation is positive and diverse, as proposed by Kool, Azevedo, and Avraamidou (2022). The six scientists are presented in their everyday lives; the aim is not to show them as an exception but to underline their ability to work within the scientific

community. This TV series intends to put Chambers and Thompson's (2020) advice into practice: to normalize the figure of the female scientist. Besides, even though it is developed within the STEM field, the series allows a varied range of scientific areas to be shown, as recommended by Chambers (2022).

The diversity of women represented not only serves to escape the harmful effect of stereotypes. It also makes a broader audience feel identified and empowered by their self-perception and others' perception, which, as Palomo-Domínguez and Tamošiūnaitė (2024) pointed out, propellers free career choices. The series is articulated in the repetition of a similar narrative scheme throughout the six episodes, reinforced with elements of complementary information, appeals to humour and emotions, aspects that, as mentioned previously, describe the characteristics of storytelling and turn it into a powerful didactical tool for raising awareness (Ferrés and Masanet, 2017; Nielsen, 2017).

The study's main limitation is its broad scope. Analysing the representation of women in science throughout the post-digital narrative can be overwhelming. The authors determined to focus on a single audiovisual case, which will be complemented with subsequent studies in other media and formats.

5. Conclusions

Storytelling has adapted to the characteristics of the post-digital media landscape and its communication possibilities. It is intensively used in audiovisual formats that are distributed through various channels, primarily digital, and that hybridise different types of content, mixing information, educational aspects, and entertainment.

This mode of narration has a great capacity to raise awareness and educate the audience. Its habitual connection with emotions encourages the public to identify and generate sentimental ties that enhance the later recall. Therefore, it becomes a very effective way to promote awareness of gender equality in science and blur the limitations imposed by stereotypes.

The research analyses the case study *Women of Science*, a documentary series co-produced by public television broadcasters in six European countries. It constitutes a novel contribution to the literature since the concept of post-digital storytelling against gender stereotypes is still scarcely explored, and empirical analysis is highly needed to characterise the phenomenon.

On the other hand, it has a practical application. Interpreting the narrative strategies of this case provides recommendations that governments and organisations committed to eliminating gender stereotypes, particularly in science, can develop in future communication campaigns.

The main strengths of this replicable case are, among others, the use of storytelling with a didactic narrative strategy; reinforcing it with informative, entertaining and emotional elements; representing real and diverse women scientists that invite the identification of a broad audience and escape from being pigeonholed into stereotypes; showing a positive image of the women scientists, as members of the academic society; putting the emphasis on the normalisation of the figure of the scientist rather than on her exceptional role; mixing the message of her professional achievements with slices of life that make them more credible.

New research lines invite to explore not only more cases in the post-digital media scenario but also an approach to gender equality in science that considers non-binary genders.

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