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The (Self-)Presentation of Researchers in TV Documentary Formats – A Multimodal Perspective

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Zusammenfassung. Interviews mit Wissenschaftler*innen werden in TV-Dokumentationen häufig als Authentizitätsbeweis eingesetzt. Dabei erklären Wissenschaftler*innen komplexe fachliche Sachverhalte oder geschichtliche Entwicklungen, erzählen die Geschichte, wie sie zu ihren letzten bahnbrechenden Ergebnissen kamen, und tragen zur Personalisierung der Sendungen oder der Entwicklung von Argumentationslinien bei. In Anbetracht des großen Erfolgs einiger Doku-Serien liegt es auf der Hand, dass die Darstellung von Wissenschaftler*innen in diesen Formaten das Bild prägt, das sich die Gesellschaft von Universität und Forschung macht. Daher ist es wichtig und somit das Ziel dieses Beitrags, die (Selbst-)Darstellung von Wissenschaftler*innen in TV-Dokus kritisch zu beleuchten. Zu diesem Zweck wurden 26 naturwissenschaftliche und historische Dokumentationen analysiert, wobei verbale, paraverbale und nonverbale Darstellungsmodalitäten berücksichtigt wurden. Ein besonderes Augenmerk dieses Artikels liegt auf den potenziellen Unterschieden in der Darstellung von Frauen und Männern sowie auf dem Vergleich von Sendungen aus verschiedenen Produktionsländern.

Summary. TV documentary film-makers usually consider including academic experts as one of the best ways to demonstrate factual authenticity. In documentary formats, researchers explain complex scientific processes and historical evolutions, narrate a story about their latest findings, give a more personal touch to the show, and move the argument along. Given the success of some documentary series, the academics' performances on TV shape the image non-academics have of universities and research. It is thus important to critically analyze the practices of how academics are presented and present themselves in TV documentaries, which is the aim of this small-scale study. To do so, this paper has looked at 26 science and history documentaries, taking into account verbal, paraverbal and non-verbal modes of presentation. Specific points of interest are potential inequalities in the presentation of male and female researchers and a comparison of shows from different production countries.

1. Introduction

When they begin their university studies, most young adults have a clear picture of what an academic looks and talks like – and they are often relatively surprised when they meet their professors or other university teaching staff for the first time. The reason is that the media, especially TV as an audio-visual medium, have formed their image of academics. In this context, "[d]ocumentary is an important area of study because it represents one of the most traditional and high-prestige formats for science on television" (Haran et al. 2008: 67). Documentary makers tend to choose experts they judge to be credible. Credibility is not only evoked by what the experts say, but also by looking and talking in what is commonly perceived to be an expert-like manner. As a consequence, research on the portrayal of academics in popularizing media formats has claimed that these media products tend to convey a stereotypical picture of academics (cf. section 2) which cements the 'ivory tower' image of academia.

However, academia is changing fast nowadays, and it is becoming more and more common for researchers to step down from their ivory tower and to communicate their research to non-expert audiences, while well aware of the needs of the target audience. Some of the emerging formats, such as science slams or TED Talks, try to convey the impression that academia can be fun and accessible. Likewise, there are greater efforts to diminish gender inequality in academia. There is a possibility that these trends are mirrored in TV documentaries, and that the image of academics conveyed there has changed in recent times. This case study aims to describe the current practices in the presentation of academics in 26 recent TV documentaries from the US, Great Britain, and Germany.

The first part of this paper will summarize previous studies on the presentation of academics in communication to non-expert audiences (section 2). After the description of the material and the methodology as well as the categories of analysis (section 3), the results of the study will be presented (section 4). The subsequent discussion will interpret the results (section 5) before providing a brief general conclusion (section 6).

2. State of the Art

History and science documentaries on TV have a long tradition[1] and are still popular today. Their success is due to the fact that they combine educational information, ranging from the latest academic results to more general facts, with an entertaining show format. They are therefore often called 'histotainment' and 'sciencetainment'.

There are essentially three agents presenting information in documentaries, the voice-over, the presenter, and experts (Chovanec 2016: 12): Firstly, the voice-over, i.e., the off-screen commentary, leads us through the show, frames information, summarizes, concludes, etc. Secondly, many

documentaries also feature a presenter who leads through the show. In that case, they are also commonly used for the voice-over. Presenters have the advantage that they can travel to places of interest, such as archaeological sites or laboratories, to interview experts. Thirdly, information in documentaries also comes from academics and other experts, who may be in an explicit interview situation with the presenter, or feature more commonly as so-called "talking heads". The reasons why journalists use experts for media coverage, is "to provide facts, add credibility and present objectivity" (Boyce 2006: 890), and this also holds true for TV documentaries.

Previous studies on TV documentaries have claimed that the way experts are presented is often stereotypical, and the same applies to academics who repeatedly figure as experts in media products for non-expert audiences. The upcoming paragraphs will present some relevant aspects of this, condense them into categories of analysis for this case study, and try to distinguish between the ways experts present themselves (outward appearance or style of communication) and the way they are presented by the producers (selection of experts, setting, etc.)

2.1 Journalists' strategies for presenting experts

An essential question is why documentaries use experts[2] and how much attention they give them as individuals. Although interviews generally constitute an opportunity for researchers to promote their work, documentary formats do not always broadcast full answers, but instead split comments into small portions that can be easily inserted into the documentary's line of argumentation. Likewise, experts are often asked to reformulate their contributions to make them more concise (Weischenberg 2012: 242), leaving the expert to adapt to the needs of the specific medium.

> Firstly, you have to act according to the medium's conditions. Secondly, you serve as a useful idiot to some degree. From the journalists' perspective, you are somebody who fills the show for free – and really fills it rather than carries it (Weischenberg 2012: 243, transl. from German).

Documentary makers also decide how much you see of the experts. Generally, the standard shot is a medium close-up because most experts serve as talking heads (Kriwaczek 1997: 96), but anything from close-up to full shot is also possible. More importantly, experts are either permanently visible while they are talking or only for a restricted period of time while the visual channel of communication is presenting other images (Jacobs and Lorenz 2014: 164). This can be problematic for information processing at times as "[i]t seems as if the part of the brain responsible for decoding and understanding the meaning of the sound of the words is unavailable while we are watching images which grab our attention" (Kriwaczek 1997: 46f.).

When it comes to the choice of the setting, academics are often filmed against a background which emphasizes their academic status (reinforcing their credibility), such as book shelves, laboratory utensils (Gardner and Young 1981: 177), or at a desk with a computer (cf. Maier 2008: 3 for popular science magazines). Researchers are also commonly presented dynamically ("science in action"), for example by accompanying them to their workplace (van Dijck 2006: 8). However, while the reporter is only a passive observer at times, they may occasionally ask researchers to re-enact "or play out scenes to show how important scientific discoveries originally materialized" when there are no noteworthy excavations or experiments involved (van Dijck 2006: 10). A more commonly adopted style is asking the interviewees to perform typical actions associated with academics at work (Klemm 2016: 185), such as typing, writing, reading books. Another aspect to the producer's decision is who they choose for their show. Although junior scientists are usually more willing to talk to journalists (Boyce 2006: 891), journalists prefer interviewees who have at least a PhD in their field of expertise (Nölleke 2009: 102). The higher the expert's status, the better, and academic titles are often mentioned (Klemm 2016: 184f.).

2.2 Doing being an expert

"Doing being an expert" is an expression evoked by Klemm (2016: 179) to describe how being an expert in TV documentaries and other forms of science communication is also partly a matter of performance. Typical features of an expert's appearance are, according to Klemm (2016: 183f.), the use of technical terms, metaphors, and hedges. Experts tend to articulate distinctly in a calm and serious voice, while their gestures and facial expressions stay controlled. In short, academics on TV stay calm, collected and show few signs of emotional involvement. Moreover, we would not expect to see an academic expert in a documentary wearing a hoodie, but rather a suit, outdoor clothing for field research, or a lab coat (Klemm 2016: 184). Although reporters may at times influence the expert's clothing choice, for example by asking somebody to put on a lab coat, the general decision of what to wear in an interview for a documentary is usually up to the interviewee.

2.3 Gender

Previous studies have shown that men have a higher likelihood of being selected as experts to communicate with non-expert audiences: For example, Bell (2008: 4) states for British history programming that "[i]n the mid-2000s the vast majority of historians representing their profession on TV, especially as presenter-historians, are men". In Haran et al.'s (2008) dataset, based on 33 *Horizon* episodes from the early and mid-2000s, only 37

out of the 258 scientists appearing on screen were women (71). The series editor explained that this was down to the gender imbalance in science (72). According to the authors, the likelihood of women featuring as experts increases with a female media worker (73). Maier's (2008) analysis of German popular science print magazines indicates that men are also overrepresented in other science communication media. In a subset of ten BBC science documentaries, Haran et al. (2008: 76) investigated whether men were allotted more speaking time than women, but found no significant differences.

Previous studies have also claimed an imbalance in how male and female researchers are presented. In history programming, Bell (2008: 5) states that women "are often presented in ways that limit their authority". Likewise, Maier (2008: 2/5) points out that in popular science magazines women are presented as less dynamic, less powerful and less capable actors than their male counterparts. Another interesting claim the author makes is that women are presented as if they were breaking into science, whereas men are simply portrayed as being the top intellectual elite (Maier 2008: 5). This observation ties in with the strong tendency for female scientists in *Horizon* to be presented exclusively in their workplace, whereas some men are also presented in environments unrelated to their occupation, which means that women have to authenticate their status as scientists (Haran et al. 2008: 78f.). In addition, female scientists in the dataset mostly explain the science whereas male scientists are often shown in more hands-on activities (in the laboratory or in the field) or directing projects (Haran et al. 2008: 77). This tendency can also be perceived in fiction film. According to a Women's Media Center report, women in US movies are less likely to be portrayed as scientific or intellectual leaders than men (Klos 2013: 42).

Given recent initiatives promoting gender equality in various areas of life, it will be interesting to see whether the claims made by previous studies about TV documentaries still hold true for a more recent dataset.

3. Materials and Methods

The analysis is based on 26 documentaries, more specifically eight American, eight British, and ten German TV documentaries from 2014 to 2019, some of which are episodes of documentary series (Table 1). The dataset was built to choose a narrow selection of documentary types to allow for better comparability because documentary formats can be quite heterogeneous. Therefore, the shows are taken from public broadcasters (apart from the National Geographic documentary *Before the Flood*). The content or subject of the documentary can influence how academics are presented, so it is wise not to restrict the dataset to documentaries about one discipline (history, computer science, biology, …) to allow for general conclusions about the presentation of researchers in TV documentaries. The data thus include both history (H) and the wider field of science/technology (S/T).

Title	Year	Broadcaster	Series	Genre
Egypts's Lost Queens	2014	BBC Two	Timeline	H
Russia's Lost Princesses (Part 1)	2014	BBC Two		H
The Secrets of Quantum Physics: Einstein's Nightmare	2014	BBC Four		S/T
Dancing in the Dark: The End of Physics	2015	BBC Two	Horizon	S/T
Secrets of the Mona Lisa	2015	BBC Two		H
Black Nurses: The Women Who Saved the NHS	2016	BBC Four		H
Britain's Nuclear Bomb: The Inside Story	2017	BBC Four		S/H
Guides: Planets	2018	BBC Four	The Sky at Night	S
Great Cathedral Mystery	2014	PBS	Nova	H/T
Great Math Mystery	2015	PBS	Nova	S
Inside Einstein's Mind	2015	PBS	Nova	S
Secrets of Noah's Ark	2015	PBS	Nova	H
Before the Flood	2016	National Geographic		S
Genius: Why Are We Here?	2016	PBS		S/T
Treasure of the Earth: Metals	2016	PBS	Nova	S
The Race Underground	2017	PBS	American Experience	H
Einstein: Genie und Superstar[3]	2015	arte/ZDFinfo		S
Ein Tag im Mittelalter	2016	ZDF	Terra X	H
Marie Curie: Das Geheimnis der Radioaktivität (Part 1)	2016	BR		S/H
Forschung und Verbrechen	2018	SWR/arte		H

Der große Umbruch – wie Künstliche Intelligenz unseren Alltag verändert (Part 1)	2019	ARD		S
Die Akte BND	2019	Radio Bremen		H
Klimawandel in Bayern	2019	BR		S
Mythos Burg	2019	ZDF	Terra X	H
Rassismus – die Geschichte eines Wahns	2019	ZDF	History	H
Rätselhafte Welt der Quanten	2019	ZDF/3sat		S/T

Tab. 1: Dataset

Note that observations are restricted to the external appearance of experts, excluding academics functioning as presenters. All appearances of academic experts were marked and annotated. Overall, the shows feature 191 experts, most of which are employed at a university. There are a few exceptions (especially from the field of history) where experts are staged as researchers without specifying that they have an occupation outside academia. Most of the experts only appear in one show, with one exception: Five experts in *Inside Einstein's Mind* also figure in another show. More importantly, numerous researchers speak multiple times in a single documentary. As it was impossible to provide a comprehensive multimodal annotation for all appearances, only the first three interview fragments[4] of each expert per show were taken into account. This amounted to 416 manually annotated fragments.

The categories used for the analysis have been derived from the points of discussion in section 2. They draw heavily on the extensive collection of phenomena presented in Klemm (2016), but modify and extend some aspects of it, particularly when it comes to gender. The study at hand combines quantitative and qualitative analysis. The former is dominant in the first part of the analysis, but the small size of the dataset does not allow for significance tests. Qualitative analysis plays a major role in the second part (communication style). The analysis tries to answer the following questions:

- Choice of experts: How many of the experts are professors or have PhDs? Is their title, affiliation, and discipline mentioned?
- Setting: Are the interviews shot using stereotypical settings? Do the experts perform work-related activities?
- Role: How much do the viewers learn about the experts? How long are they visible on screen?
- Outward appearance: How are the experts dressed?

- Communication style: What characteristics does the researchers' language use, paraverbal and non-verbal communication display?
- Gender: Are men overrepresented in the shows? Are men and women presented differently, and do they communicate differently?

4. Results

4.1 Overall

Choice of experts. 110 (out of 191) experts are professors (58%), 56 PhDs (29%), and 25 do not have a title (13%). Table 2 presents an overview of what information about the researchers is provided by the different production countries as they seem to differ in this respect. Note that all percentages in this paper are rounded – to whole numbers in the text, and to two decimal places in tables. The British and German shows have a tendency to mention titles, in contrast to the American ones. In the two former, titles figure exclusively (Germany) and nearly exclusively (Britain) in the aston (the text in the bottom part of the screen providing additional information about a person), whereas the titles in the American shows appear either in the aston or in the voice-over. In the US, however, the affiliation seems to be considered important, more so than in the German shows, and considerably more so than in the British shows. The expert's discipline constitutes a frequent point of information in the German shows, but less so in the other documentaries.

Production country	Mention of title	Mention of affiliation	Mention of discipline
USA	19.54	72.41	29.89
Great Britain	76.00	36.00	36.00
Germany	68.52	59.26	79.63

Tab. 2: Information provided about the experts, in percent

Setting. Giving an exact account of the settings used for the documentaries is difficult as the setting is not always clearly recognizable (laboratory, library, office, desk at home, etc.). The general tendencies are the following, however: Settings typically associated with documentaries (section 2) are frequently used, in particular anything that involves books (libraries, book shelves, a pile of books on a desk). Presenting academics in their offices, especially behind their desk or at the computer, is also very common. Scientists are often positioned in a laboratory or in front of a blackboard.

The number of academics presented at least once during the 416 interview fragments in their office, in front of a book shelf, at the computer or at a blackboard is 56 (29%), and the number of those presented in a laboratory is 20 (10%). Academics are also often filmed in outdoor settings, in order to present a decorative background or to show how they do fieldwork; 43 researchers (23%) are presented outside at least once. Some documentaries use one setting for all (or most) academics, such as a room with a fireplace (*Black Nurses*), the interior of a castle (*Russia's Lost Princesses, Mythos Burg*), or a lecture hall (*Forschung und Verbrechen*). In other cases (notably in *The Race Underground*), the setting is just a standard background (either neutral or blurry so that objects cannot be recognized), which enables a clear focus on the talking head's face. The researchers are sometimes presented dynamically at a specific setting, i.e., an appearance might start off by the person driving to work or walking to their office, for example.

Actions typically associated with doing research (typing into a computer, performing a chemical experiment, etc.) can be observed at least once with 37 researchers (19%). Not only is the number smaller than expected, it is also distributed unevenly across the data. That means some of the documentaries rely heavily on those kinds of actions (*The Great Math Mystery, Rätselhafte Welt der Quanten, Ein Tag im Mittelalter*), but the rest only rarely. This usually involves tasks at the desk, most frequently typing on a computer keyboard, and also enacted discussions with colleagues. Although there is no detailed reenactment of research processes, there were two cases where a researcher pretended to be surprised about what he had just found, looking at a screen or through a microscope (*Ein Tag im Mittelalter, Treasures of the Earth*).

R o l e . 56 experts (29%) attract some attention as a person because they are mentioned in the voice-over. The voice-over may introduce their academic status or discipline, and establish them as leading researchers in their respective field. There are three prevailing patterns: a) none of the researchers is mentioned in the voice-over, e.g. in *Inside Einstein's Mind, Russia's Lost Princesses,* or *Forschung und Verbrechen*; b) all researchers are presented in the voice-over, e.g. in *Secrets of the Mona Lisa* and *Klimawandel in Bayern*; c) only some experts are presented in the voice-over, e.g. in *Great Math Mystery* or *Ein Tag im Mittelalter*. 23 (46%) of the 50 researchers in the British documentaries are mentioned in the voice-over, 16 (18%) of the 87 researchers in the American documentaries, and 17 (31%) of the 54 researchers in the German ones. Overall, the American documentaries seem most inclined to use academic experts primarily as authenticators for their line of argumentation (and narration), whereas there is a stronger focus on the expert's persona in the other two countries.

The introduction of the experts is very short and general at times (mentioning the name, title, discipline and/or affiliation), not to interrupt the flow of narration (1), but can also be more detailed (2).

(1) Physicist Max Tegmark from M.I.T. thinks he knows why (*Great Math Mystery*, 09:49).
(2) I want to begin my investigation by comparing notes with the detective who has been on this case for more than thirty years. One of the world's leading experts on Leonardo da Vinci, Oxford professor Martin Kemp, has spent much of his life obsessed by the mystery of the Mona Lisa (*Secrets of the Mona Lisa*, 02:56).

The last example is striking in that Prof. Kemp is conceptualized as a detective, and his long-lasting work on the Mona Lisa as an obsession. This gives the impression that a researcher who specializes in an area must be almost pathologically obsessed. It is also noteworthy that there is one documentary, *Dancing in the Dark*, which dedicates a lot of time to the presentation of the researchers.

What also indicates the value of an academic expert to a documentary is the amount of time he or she is visible on screen. The 416 interview fragments have been classified into four categories: fully visible (or nearly fully visible), partly visible (half of the speaking time or more), barely visible (less than half of the speaking time), not visible.[5] As Table 3 indicates, passages where the researchers are barely visible are most typical of US shows, whereas the German documentaries put more focus on the researchers by showing them for a longer time while they are speaking.

Production country	**Fully visible**	**Partly visible**	**Barely visible**	**Not visible**
USA (n = 195)	26.67	43.59	28.72	1.03
Great Britain (n = 94)	31.91	61.70	5.32	1.06
Germany (n = 127)	74.80	21.26	3.94	0.00
Total	42.55	40.87	15.87	0.72

Tab. 3: Visibility of the experts on screen during their appearance, in percent

Communication style. Of course, a researcher's communication style may be somewhat influenced by the production crew, who, at times, ask to (re)formulate something in a specific manner. This was confirmed in an interview with Friederike Haedeke from the *Terra X* editorial team, conducted by the author of this paper in September 2015. Haedeke stated that the reporters sometimes ask experts to repeat something with greater emotion. However, the style of communication still pertains very much to the individual. Unlike the previous sections, the present section is mainly based on qualitative analysis.

Communication style in documentaries can be described as a continuum, with a highly professorial verbal, paraverbal and non-verbal style on one end of the spectrum. It is expressed multimodally, as described in section 2.2, e.g., by the use of technical terms, distinct articulation, a calm and serious voice, controlled gestures/facial expressions. A variation of it is the pedagogically skilled type of researcher, who tries to explain terms comprehensively and visualizes complex matters. The other end of the spectrum is a style characterized by formulation problems, very simple, even colloquial language, and a high emotional involvement (impacting on language use, intonation, gestures, and facial expressions). These prototypical types can be exemplified by Prof. Greg Radick (3), Prof. Bob Nichol (4) and Assistant Prof. Meredith Silverstein (5):

(3) Here we have Isaac Newton's masterwork, his Principia Mathematica, the mathematical principles of natural philosophy, published in 1687 in Latin. This is where Newton set down his three laws of motion and the law of universal gravitation and set them to work to account for the system of the heavens: the tides, comets, and other natural phenomena (*Genius*, 09:08).

(4) This image shows a large cluster of galaxies. Such large objects can bend light of the galaxies that are behind it. We call this technique gravitational lensing. These arcs are distant galaxies behind the cluster that have been brightened and stretched as the light passes through the cluster and gets bent. And what's very interesting is this technique allows us to measure the mass of the lens, and when we do that using these arcs, we find the mass of the lens is about 100 times more than the light we see in this image […] (*Dancing in the Dark*, 18:26).

(5) So, I think of the Terminator with this project, which is super fun. And I don't think I've seen the Terminator since I was young, but one of the images that really stuck with me is the T-1000, you know, the all-metal guy, right? He can change shape and then self-heals. Actually, our material does all those things (*Treasures of the Earth*, 53:45).

Radick (3) is an example of the professorial communication style. In his second appearance, he sits in front of several open books, wears a shirt and a jacket, and speaks with a neutral facial expression, using technical terms from the field of physics (such as *laws of motions* and *law of universal gravitation*) and a Latin book title (*Principia Mathematica*). Although Nichol's language style is also quite academic and his facial expressions are quite neutral, he is more of the pedagogical type because he makes a noticeable effort to explain a complex topic in a simple way. Firstly, he explains the principle of gravity in the solar system using a visualization by drawing in the dust on his car bonnet and also arranging some stones. In the quoted passage (4), he shows a cluster of galaxies on a screen. He keeps pointing to the screen and tries to explain what he sees and what this implies while speaking very slowly. His vocabulary is not very technical, with the exception of *gravitational lensing,* which he explains. In contrast, Silverstein grins broadly in the first part of (5); she then starts to gesticulate vividly and

frown expressively. Although she uses a comparison which is supposed to facilitate the audience's comprehension, the way it is verbalized is not very didactic as Silverstein does not articulate slowly and distinctly, but actually speaks quickly. Moreover, she uses simple lexis as well as colloquial expressions (*guy, stuck, right*). It is also noteworthy that she is off-screen for some time, while the audience views a violent scene from *The Terminator*.

The typical professorial communication style, which represents academic authority, is indeed common in the data sample, especially in some of the German documentaries such as *Die Akte BND*. Many researchers, however, are somewhere in between the two ends of the spectrum.

The following two cases – Dr Stephanie Snow (6) and Prof. Robert Shepherd (7) – illustrate that kinesic behaviors such as gesture, posture and visual elements of the background play a major role in how an expert is perceived.

(6) There are also a lot of very negative cultural assumptions going on. There was an expectation that they would not be able to cope with the higher nursing qualification of the State Registered Nurse, compared to the slightly lower one of the State Enrolled Nurse. And a lot of them ended up on the State Enrolled Nurse program, which was an inferior qualification, didn't have international recognition, and they didn't realize until it was too late to opt out (*Black Nurses*, 14:46).

(7) Field's metal is a low-melting-temperature alloy of indium tin and bismuth. So, at 60 degrees Celsius, it is a molten liquid; below 60 degrees Celsius, it's a frozen solid (*Treasures of the Earth*, 45:19).

Snow comes across as professorial because she sits at her desk, in front of her computer and a book shelf. She has a neutral facial expression and neutral intonation, making a gesture commonly known as 'Merkel diamond'. In addition, she is referred to on screen as Dr Stephanie Snow, Senior Research Associate. However, (6) is not very technical and is relatively easy to understand, due to the use of everyday words like *a lot of, cope with, end up, opt out*. In contrast, (7) utilizes some difficult-to-understand technical terms, and the audience is likely to find the short passage very complex. At the same time, Shepherd does not wear a shirt or jacket, but simply a polo shirt and displays a relatively youthful outward appearance, which generally makes him appear less professorial than Snow.

The picture of the researchers' communication style is relatively heterogeneous. Style variations can be explained by the following three reasons:

a) individual communication styles. For example, some researchers simply seem to have a predisposition for colloquial expressions (*get on with it, badass, I'm not the hugest fan of supersymmetry, slightly messy, that's crazy*), modal particles (*you know, right*), or intensifiers (*It's just a black, black shadow, unbelievably black; It's really quite catastrophic; incredible mass of people; absolutely packed*). Some of the contributions are quite expressive because they contain emotionally charged lexis (see below in this section), vivid gestures or facial expressions such as raised eyebrows

or broad smiles. The extent of hedging and difficulties of phrasing also vary considerably.

b) The communication style depends to some degree on the specific communication situation, e.g., whether the researchers are filmed as talking heads or doing fieldwork and more or less spontaneously commenting on their work. Passages are marked by a more emotional style when researchers tell the story of how they came to be interested in a research topic, about a scientific breakthrough (like Prof. Mike Brown in 8), or their overcoming of obstacles in the research process.

(8) So, there was the key moment where we looked at it and said: "This makes no sense." But then I started looking more carefully at the other objects in the dataset that I had not been paying much attention to in the last couple of years. […] And I said: "Konstantin, I'm going to go plot these right now, and we'll see where they are, and if they're sitting right at these two spots right here, my head's going to explode" […] We just both sat there and stared at that, and I think my jaw hit the floor (*Guides*, 48:18).

c) As mentioned at the beginning of this sub-section, producers may influence the style in which researchers communicate. This particularly goes for personal stories, which occur with 19 (or 10%) of the researchers, and for emotionalization. In *The Race Underground*, for example, where all experts were filmed in the same setting and contributions were cut to short passages, the researchers' communication style generally seems relatively flawless and emotional. The use of emotionally charged lexis (*cripple, cumbersome, breathtaking, miserable, magical, anxiety, fear, powerful, scary, killed, corruption, sacred, shock*) is striking here. The documentary makes the impression of being a narrative, narrated by the voice-over and subsequent short passages from experts. It is even possible that parts of these passages were pre-formulated.

4.2 Gender

Choice of experts. The results reveal a gender imbalance in the data, although slightly less pronounced than in Haran et al. (2008). Around 80% of all fragments are passages with male researchers. Out of the 191 experts, 147 (or 77%) are male vs. 44 (or 23%) female. These findings do not generally seem to be dependent on the discipline, as they are relatively similar for history (80% vs. 20%) and science/technology (75% vs. 25%). However, looking at concrete documentaries, we can see that *Black Nurses* is the only one presenting more women than men experts, with nursing being one of the few academic disciplines dominated by women (see section 5). There is little difference between the production countries: Although the German documentaries display the highest percentage of men (80%), they are closely followed by the American (78%) and British (72%)

documentaries in this respect. An interesting point is the connection between title and gender: 63% of the male experts are professors, and 26% PhDs; with the female experts, the numbers are 41% professors and 41% PhDs. An important question is whether the imbalance just reflects the gender inequality of academia, or whether it is also created via the medial presentation.

S e t t i n g . Generally, all kinds of settings (office, laboratory, outside, etc.) appear with both female and male researchers. However, there are some tendencies that seem to confirm Maier's (2008) observation that women are presented as less dynamic than men in science journalism. They also confirm Haran et al.'s (2008) findings that men in science documentaries are more likely to perform concrete work-related tasks (see section 2): Women are more frequently presented in the environment of their office (in 41% of the cases, against 32% of the men), but less frequently in a laboratory (5% women vs. 12% men), outside in general (7% women vs. 14% men), or doing field work in particular (7% women vs. 12% men). Unlike male academics, the women are only rarely presented dynamically in their work environment, i.e., on their way to work or an excursion, walking around at work, driving a car, etc. (6 out of 47, or 13%).

O u t w a r d a p p e a r a n c e . With the male experts, suits are actually not very common (7 out of 147, or 5%), unlike shirts (55, or 37%) or shirt-jacket combinations (40, or 27%). Other unusual kinds of clothing are pullovers, T-shirts, or coats (with the latter mostly appearing when the expert is outside). With the women portrayed, the picture is mixed, ranging from blouses and blazers to all sorts of tops and dresses. Again, the "classic" option, a blazer-blouse combination, is rare. The same goes for ties, worn by only 17 (9%) out of 191 experts (including one woman).

R o l e . 41 (28%) of the 147 male academics are mentioned in the voice-over, and 15 (34%) of the 44 female academics. A potential explanation for a difference could be that the producers feel that a woman's status as an academic still has to be justified, but the difference is too small to draw conclusions. Male researchers are fully visible 143 times on screen (43%, n = 332), partly visible 131 times (39%), barely visible 56 times (17%), and not visible 2 times (1%). Similarly, female researchers are fully visible 34 times (40%, n = 84), partly visible 39 times (46%), barely visible 10 times (12%), and non-visible 1 time (1%). The results are thus comparable.

C o m m u n i c a t i o n s t y l e . The communication style does not fundamentally differ between men and women at first sight. Although it seems that the majority of the fragments which could be marked as expressive, colloquial, or emotional can be attributed to female researchers, the results are not unequivocal from a qualitative perspective. For example, most emotionally charged words in *The Race Underground* are uttered by the only two female researchers in the documentary, Rosalind William and Asha Weinstein Agrawal. At the same time, some very emotional passages stem from men (such as in example 8). Whereas 10 out of the 29 instances of the subjectivity marker *I think* can be attributed to female researchers, this

only goes for 1 out of the 15 *sort of* and 6 out of the 24 *kind of*. In sum, only a comprehensive follow-up quantitative style comparison, such as a cluster analysis, could shed more light on the question whether female and male researchers communicate differently in TV documentaries.

5. Discussion

The analysis provides three major insights, which will be discussed further in this section: a) although the image of the "classic" researcher is still communicated in the documentaries, the (self-)presentation is generally varied, as is the role the researchers play in the shows; b) in some, but not all of the categories, there is a gender imbalance, indicating primarily an overrepresentation of men; c) the tendencies sometimes differ according to the country of production.

Variation of results. The data contain all the phenomena described as typical of documentaries and science journalism in section 2, such as the role of computers, books and laboratories in settings, many of the researchers being professors, or a typically professorial communication style. Yet, the image of the researchers that is presented on screen is more heterogeneous, especially with regard to communication styles. This variation can have a whole range of reasons, such as different individual language styles, different communication situations, or different degrees of involvement by the production team. Two aspects where the results differed from a contrastive point of view, namely, according to gender and production country, will be discussed in the following paragraphs.

Gender differences. Two of the categories of analysis indicate considerable differences between the presentation of male and female academics, namely, regarding the choice of experts and setting. Is the imbalance in the results just a reproduction of the situation in academia or is it caused by the producers? There are indicators that both factors play a role – an interpretation that is in line with the following observation in Maier (2008: 1, transl. from German):

> You could argue that non-fictional texts only reflect reality, given that women in leading positions are clearly underrepresented […]. It is one of the most basic insights of media science, however, that medial images do not accurately mirror reality, but that they also construct reality.

In other words, mass media can also contribute to reinforcing gender inequalities (Kitzinger et al. 2008: 1). The following findings from studies on gender imbalance in academia help to put the results into perspective. As an Elsevier Report (2017: 18) indicates, the proportion of women researchers in the UK and the USA for the years 2011 to 2015 was 40% each, but differed considerably according to disciplines. The number of women researchers in comparison to men is relatively high in subjects such as Psycho-

logy (~69k/15k women vs. 52k/12k men in the USA/UK), Nursing (~62/15k women vs. 39/11k men), and Arts and Humanities (~55k/17k women vs. 66k/23k men); it is comparatively low in subjects such as Computer Science (~55k/10k women vs. 155k/35k), Mathematics (~27k/6k women vs. 102k/26k men), and Engineering (~68k/14k women vs. 258/52k men) (Elsevier 2017: 24–27).[6] Leslie et al. (2015: 262) show that the subjects with few female PhDs seem to have in common that they are stereotypically associated with innate talent rather than hard work, which could account for the high imbalance in the science documentaries at hand. Although expertise in history is not necessarily attributed to innate brilliance, the choice of experts is highly imbalanced in the history documentaries as well. This can be explained by the fact that "even as the rest of academia has moved toward greater balance in the representation of women, history has lagged well behind most of the other fields" (Townsend 2010). Consequently, the result of 75% men in science and 80% in history documentaries reflects to some extent the prevailing gender imbalance in a whole range of academic disciplines. However, Townsend (2010) also indicates that there are considerably more women (two thirds) than men historians employed outside academia. Given that not all the historians in the documentaries at hand are necessarily still employed at a university, but use their academic background for employment outside academia, the gender proportion should be more balanced for history documentaries if it entirely reflected societal reality. This ties in with findings in Haran et al. (2008: 73), who come to the conclusion that men are overrepresented even in documentaries about science fields with little gender imbalance. That the proportion of women experts is slightly higher in the present data than in Haran et al. (2008) – 23% vs. 14% – may, however, suggest increased awareness for gender equality issues. The way men and women are presented in the documentaries also implies that the production process is partially responsible for the inequality: The fact that women are primarily shown as talking heads while men are more frequently portrayed working in the laboratory, driving a car, etc., and that the female academics are more likely to be mentioned in the voice-over, is clearly a matter of decisions made by the production team.

The fact that the proportion of professors is smaller in the female group than in the male group is in line with statistics that show that the proportion of female academics decreases as soon as the rank increases. In Germany, for example, 44.8 % of all PhDs completed in 2017 were written by women, but only 24.1% of the professors in the same year were women (Gemeinsame Wissenschaftskonferenz 2019: 8f.). More specifically, the percentage in the humanities was 37.5, in MINT subjects 14.7.

At the same time, it is not only science journalism that is responsible for the propagation of stereotypical images of scientists – the representation of scientists in fiction also impacts on their image in society. An analysis of 222 movies conducted by Weingart et al. (2003: 282) shows that the typical scientist in Hollywood fiction is white, male and middle-aged, whereas women are underrepresented.

Differences according to the country of production. We have seen that the origin of the documentaries (USA, Britain, Germany) influences certain dimensions, notably how researchers are referred to and how much attention they receive. It is particularly striking that some of the American documentaries clearly relegate the researcher's persona to the background in comparison to the other production countries, and that there were differences in what kind of information was given about the researchers. In its initial stages, contrastive text linguistics tended to ascribe such differences in mass media texts from different countries to cross-cultural and cross-linguistic differences. But it has become clear over the years that these differences need to be interpreted more carefully (Hauser and Luginbühl 2012: 3; Jaki 2016: 216–218). In conclusion, some tendencies can be ascribed to the factor 'country of origin' (e.g. that mentioning a researcher's affiliation is particularly frequent in the US context). Yet, there are other aspects of journalistic culture[7] which also influence how researchers are presented in documentaries. These include the editorial team of a documentary series or the production company. I would hence like to encourage future research to conduct a more exhaustive comparative analysis of documentaries from different production contexts, including different nations, series, and public vs. private broadcasting.

6. Conclusion

In a time where experts play an increasingly important role in media coverage while trust in them generally is declining (Boyce 2006: 890), it is important to understand how academics are portrayed on television. On the basis of 26 documentaries from the US, Britain and Germany, this paper has analyzed aspects like the choice of experts, the kind of information provided about them, their communication style, or the setting of their interviews. The results of the study indicate that researchers are often presented – and present themselves – in a stereotypical manner, but also that strategies of presentation are fairly heterogeneous. At times, they vary from individual to individual, from documentary to documentary, from country to country, and depending on the researcher's gender. The results also suggest that documentary makers are partly responsible for the stereotypical presentation of academics in the mass media, either by their choice of experts (e.g. whether they are male or female or junior/senior faculty staff) or by intervening in the interviews to elicit a specific (mostly emotionalizing) communication style. This is something that viewers will not necessarily be aware of and that may influence the way we perceive researchers – and academia as a whole.

Notes

1 For example, the documentary series *Horizon* (Great Britain) was launched in 1964, *Nova* (USA) in 1974, and *Terra X* (Germany) in 1982, albeit under a different name.
2 "Expert", "researcher" and "academic" will be used interchangeably in this paper, as the case-study only analyzes experts who are researchers and have an academic background.
3 The titles translate as follows (chronologically, as they appear in the list): Einstein: Genius and Superstar; One Day in the Middle Ages; Marie Curie: the Secret of Radioactivity; Research and Crime; The Big Transformation – How AI Changes our Everyday Life; The BND File; Climate Change in Bavaria; The Myth of Castles; Racism: the History of a Delusion; The Mysterious Quantum World.
4 An exception was made in cases where the setting considerably changed over the course of the show, and at least one example per setting was selected.
5 The classification is based on estimations, not on precise measurements of on-screen time.
6 Although the report does not explicitly mention results for Germany, it indicates comparable proportions for Europe as a whole.
7 'Journalistic culture' can be defined as complex combinations of factors such as journalistic practices, professional standards, and ethical aspects (Hahn et al. 2008: 7).

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