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The newsworthiness of the "March for Science" in Germany: comparing news factors in journalistic media and on Twitter

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Abstract

Germany was second in the number of March for Science participants. Applying news value theory, this article analyzes the newsworthiness of the 2018 March for Science in Germany, comparing journalistic (online) reporting on the march ($N = 86$) and Twitter communication about #marchforscience ($N = 591$). The results of the content analyses reveal that news factors were more frequent and reached higher intensities in journalistic reporting than on Twitter. Relevance, prominence, personalization, and influence were the news factors most emphasized by journalists. On Twitter, reach was the only news factor correlating with social media engagement (likes, comments, and retweets).

Keywords

Environmental communication; Representations of science and technology; Science and media

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Introduction

When the first March for Science was held in April 2017, across the United States (U.S.) and globally more than a million people marched in more than 600 cities for science, its freedom, its values, and its independence [Appenzeller, 2017; Fisher, 2018; Motta, 2018]. Although decreasing in numbers of participants since then, the March for Science still reflects an ongoing public debate about these issues, in a time in which anti-science thoughts, fake news, and post-truth are discussed publicly [Rödder, 2018]. While scientists have organized and advocated for causes throughout history, the March for Science is perceived to be the largest activist effort by scientists to date [Ross et al., 2018]. Most march-related activities were organized in the U.S.; Germany, however, was second in the number of participants [Guenther et al., 2019; March for Science Germany, 2018]. For the 2018 March for Science, marches were held in 15 German cities; public discussions were organized in six additional cities. In 2019, 13 German cities participated in the third March for Science. In 2020, due to Covid-19, there was only a small number of online events.

Because of its global scale, the March for Science has stimulated different research questions. However, up until now, research has been predominantly U.S.-focused and concerned with why people marched for science [Ross et al., 2018], the sociodemographic makeup of marchers [Fisher, 2018], how they communicated via social media to organize themselves [Ley and Brewer, 2018], or how the public felt and what they thought about the march [Funk and Rainie, 2017; Motta, 2018]. What has not yet been analyzed is the journalistic attention and public communication about the march — both can generally serve as indicators of what (relevant) characteristics of the march made it into the public discourse [see Mondragon, Gil de Montes and Valencia, 2017; Veltri, 2012] because both reach substantial audience numbers [Trilling, Tolochko and Burscher, 2017]. Thus, the present paper is interested in public communication about the 2018 March for Science in Germany, comparing journalistic (online) reporting on the march and Twitter discussions about the hashtag #marchforscience, and using news value theory to elucidate the factors that made the march a newsworthy public issue and a relevant science policy event.

Analyzing the newsworthiness of the March for Science is important because (online) media and social media information about science are among the most important sources of information about scientific issues for various audiences, potentially affecting people's perceptions, attitudes, and even behaviors [Brossard, 2013; Guenther, 2019]. Hence, what many people know about the march and the discussions around this issue stems from reports in journalistic media and posts they saw on social media. Twitter is especially important in this context as its numbers of users are growing, and thus, the microblogging service "provide[s] a window on various aspects of society" [Veltri and Atanasova, 2017, p. 724]. Indeed, the March for Science was born on Twitter [Wessel, 2017], and social media played a key role in organizing events as well as informing and mobilizing participants [Ley and Brewer, 2018]. Furthermore, comparing science journalism and Twitter communication, as planned in this paper, allows for testing the applicability of common theories of journalism to the study of social media [Büchi, 2017].

A global March for Science

From a single tweet, a global march was born [Wessel, 2017]. The idea of a march was shared by many — as a result of Trump's election in 2016, worries about the U.S. administration, and discussions about post-truth and alternative facts — and soon the twitter handle @ScienceMarchDC was created. On April 22, 2017, science advocates came together from all over the world to march for science, standing united to celebrate science, to ask for support for the scientific community, and to demonstrate against negative impacts the Trump administration may have on science [Appenzeller, 2017].

The global marches have served multiple goals: improving science outreach and public communication, emphasizing the importance and freedom of science for the well-being of society, calling for evidence-based policy making, and arguing against cuts in federal budgets to support scientific research [e.g., Motta, 2018; Ross et al., 2018], to name just a few. Most importantly, organizers aimed to draw public attention to these issues. The March for Science prompted extensive media coverage, and Twitter, in particular, raised public awareness [Ley and Brewer, 2018]. Americans were found to be divided about the media coverage of the march [Funk and Rainie, 2017]: while 41% said the media would give too much coverage to the demonstrations, 31% believed the coverage was about the right amount, and 24% thought there was too little coverage. These figures also aligned with political stances and ages. However, little research thus far has actually focused on media coverage of and Twitter communication about the March for Science.

The newsworthiness of science, scientific topics, and the March for Science

The March for Science is a science policy event. Based on the fact that it originated out of a scientific movement and gave a platform to scientists who wanted to reach larger audiences, we treat the march as a topic for science journalism. Given that science journalists write primarily with their audiences in mind, reporting on science often focuses on the most topical issues in medicine, life sciences, and natural sciences; in addition, reporting is frequently focused on scientific and technological advances, future prospects, and applications, largely using a rather positive, uncritical tone [Elmer, Badenschier and Wormer, 2008; Guenther, 2019; Nelkin, 1995]. The same characteristics might apply when reporting about a science movement. Although many studies describe science journalism in detail, only a few deal with the questions of what makes scientific topics newsworthy and what the factors are that determine the journalistic attention and selection of scientific stories for coverage and the emphasis that science journalists give to characteristics of the stories they report on [e.g., Badenschier and Wormer, 2012].

Some topics are clearly more newsworthy than others; hence, they have a higher news value. According to gatekeeping theory [e.g., Shoemaker and Vos, 2009], the more newsworthy a topic, the more likely it is to be selected for news coverage.[1] While the term "news value" has been used to characterize the general newsworthiness of topics, "news factors" have been described as particular characteristics or features of events, and at the same time attributions that journalists emphasize when reporting on an event or topic [Kepplinger, 2008; Schulz, 1976]. This is referred to as the functional and causal model of news factors [Boukes, Jones and Vliegenthart, 2020]. News factors can be identified in documents to make statements about what (attributed) characteristics of events and topics journalists emphasize in their reporting. The idea is that these factors probably also determined journalistic selection of topics in the first place.

Depending on the frequency, combination, and intensity of news factors, a (scientific) topic receives a certain news value, determining the journalistic selection for coverage and subsequent reporting [Guenther, 2019; Maier, Retzbach et al., 2018]. Simply put, the more frequent and the higher the intensity of a news factor and/or combinations of news factors, the more likely a topic is to be selected for coverage. Lippmann [1922] was the first to use the term news value, and Galtung and Ruge [1965] were the first to specify a set of twelve news factors. Since then, research has developed steadily and produced a number of empirical studies [see Harcup and O'Neill, 2017]; however, the questions of how many and which factors should be included in theory and research, remain subject to debate [Trilling, Tolochko and Burscher, 2017]. In addition, science journalism, and the

[1] Gatekeeping emphasizes that issue selection in journalism is based on a variety of factors located at different levels (e.g., individual, organizational) [Shoemaker and Vos, 2009]. Gatekeeping has been applied to science journalism [e.g., Rosen, Guenther and Froehlich, 2016], supporting that news values play an important role for the journalistic selection of and reporting on scientific topics. The fact that journalists are selective professionals is based on the simple notion that they could never publish all scientific stories available [Hansen, 1994].

identification of particular news factors for this specialized journalism, have only recently been considered [Badenschier and Wormer, 2012; Dunwoody, 2014; Guenther, 2019; Ruhrmann, 1997; Ruhrmann and Milde, 2011].

Particular news factors seem to be important in science journalism, which acknowledges that these factors differ, to some degree, from those important in other journalistic beats [Badenschier and Wormer, 2012; Rosen, Guenther and Froehlich, 2016]. While researchers do not always share the same definitions of news factors, some research findings point to the fact that there are common news factors in science reporting: (1) *Relevance* [e.g., Dunwoody, 2014; Ruhrmann, 1997]: issues need to be relevant to the daily life of members of the audience. (2) *Immediacy* [e.g., Badenschier and Wormer, 2012; Ruhrmann, 1997]: issues need to be timely and novel. (3) *Controversy* [e.g., Hansen, 1994]: some researchers believe that controversy is appealing for science journalists. (4) *Reach* [Badenschier and Wormer, 2012; Rosen, Guenther and Froehlich, 2016]: topics should affect a high number of people. (5) *Astonishment* [Dunwoody, 2014; Hansen, 1994; Rosen, Guenther and Froehlich, 2016; Ruhrmann, 1997]: unusual or surprising topics have a high likelihood to be selected and might be especially interesting for audiences. (6) *Geographical proximity* [Rosen, Guenther and Froehlich, 2016]: in some countries, research findings from one's own country or a country that is culturally close are given preference. In total, many of these news factors are similar to those important in other beats.

In empirical investigations, especially the immediacy of a topic, its relevance, its reach, and astonishment were mentioned by science journalists as important news factors and also found frequently in news coverage of science [Badenschier and Wormer, 2012; for health journalism, see Hodgetts et al., 2008; Ruhrmann and Milde, 2011]. However, research studies vary remarkably in number and definitions of news factors [Badenschier and Wormer, 2012; Büchi, 2017; Hansen, 1994; Hodgetts et al., 2008; Rosen, Guenther and Froehlich, 2016; Ruhrmann, 1997]. Nevertheless, theoretically, these factors are able to determine journalistic selection and coverage of scientific topics because they define newsworthiness in science journalism.

Identifying news factors in science journalism remains a research area deserving of further attention [see Rosen, Guenther and Froehlich, 2016]. Moreover, while studies have looked at science journalism in general [e.g., Badenschier and Wormer, 2012], there is a range of diverse scientific topics in the media. Hence, research findings for science journalism in general might not apply to all specific scientific events, such as the March for Science. Since the present study is interested in the newsworthiness of the March for Science, the first research question (RQ) regards the frequency of single news factors, in order to analyze what characteristics of the March for Science were emphasized by science journalists.

RQ1: *Which news factors can be identified in journalistic (online) reporting on the 2018 March for Science?*

News factor frequency can be extended by news factor intensity [Badenschier and Wormer, 2012; Maier, Retzbach et al., 2018; Schulz, 1976]. News factors can occur in varying intensities [Kepplinger, 2008; Maier and Ruhrmann, 2008]; for instance, the number of people affected (news factor: reach) can be small, medium, or high. Hence, for the intensity of single news factors as indicators of newsworthiness, we ask a second research question.

RQ2: *What is the intensity of the identified news factors in journalistic (online) reporting on the 2018 March for Science?*

Furthermore, news factors occur in varying combinations, and some combinations of news factors reach a higher news value than others [Galtung and Ruge, 1965; Maier, Retzbach et al., 2018; Schulz, 1976]. Consequently, the third RQ is:

RQ3: *What combinations of news factors can be identified in journalistic (online) reporting on the 2018 March for Science?*

For Shoemaker and Cohen [2006], news factors are not important only in journalism; many of them can be seen as general criteria of relevance for people [see also Galtung and Ruge, 1965]: they determine what people think is interesting, what they talk about, and what they perceive as significant for society. The underlying assumption is that people share a general interest in information, i.e., new and relevant items that have not been shared before. If we extend the narrow definition of news factors in journalism to a broader definition of news factors as criteria of public relevance, then we can apply this theoretical framework to social media communication about science. Veltri and Atanasova [2017] already highlighted that the study of social media demands adopting and extending existing theoretical frameworks that can potentially include content- and behavior-related perspectives [see also Trilling, Tolochko and Burscher, 2017]. This has, however, scarcely been examined by researchers [Büchi, 2017]. Investigating news factors in journalism and in Twitter communication is an attempt to extend narrow theories that look only at journalistic coverage.

Both journalistic and Twitter communication serve as indicators of the public discourse about an issue [e.g., Mondragon, Gil de Montes and Valencia, 2017; Shan et al., 2014]. The debate is ongoing about the question of the degree to which journalistic and Twitter communication about science is similar or different [e.g., Büchi, 2017; Veltri, 2012]. Since both traditional media and Twitter potentially influence each other, e.g., as intermedia agenda-setters [Shan et al., 2014; Wang and Guo, 2018], they both contribute to science communication. Often, it has been reported that Twitter activity peaks similar to news coverage about issues because Twitter users rely on sources they trust, which include traditional media; however, it has also been reported that content varies [Mondragon, Gil de Montes and Valencia, 2017], which could potentially mean that they do not share the same concept of newsworthiness.

Social media function differently from journalism. Technically, there are new opportunities because social media provide two-way, one-to-many, and many-to-many communication pathways [Büchi, 2017; Wang and Guo, 2018], including the fact that anyone can, potentially, participate in real time [Mondragon, Gil de Montes and Valencia, 2017]. Social media — unlike most traditional media — also provide more opportunities for dialogic communication and participation [Jahng and Lee, 2018]. Social media communication has often been described as one of interactive, rapid information production [Shan et al., 2014]. Not only journalists, scientists, and communicators but also audiences are now simultaneously science-content producers and audiences. Social media communication about science is a form of communication largely uninfluenced by professional journalists who act as gatekeepers [Guenther, 2019]; hence, it is unfiltered communication. Scientists and other actors can use these tools as a form of more direct communication to various audiences. Comparing journalistic and Twitter communication about the March for Science, as planned in the present study, is interesting based on the fact that different authors and audiences are involved — factors that shape any type of communication. Research has already established that Twitter extends public science communication by additional voices and contextualization [e.g., Büchi, 2017; Shan et al., 2014].

To compare emphasis given by science journalists to an event such as the March for Science to how users have discussed the issue on Twitter, the fourth RQ is:

RQ4: *What differences in news factor (a) frequency, (b) intensity, and (c) combinations can be found between journalistic (online) reporting on the 2018 March for Science and Twitter communication about #marchforscience?*

For journalism, some studies create a link between news factor frequency/intensity and prominence given to a story, with prominence usually measured by story length and position [e.g., Boukes, Jones and Vliegenthart, 2020]. Since information provided on social media such as Twitter is usually shorter than journalistic reporting, we propose the following hypothesis (H):

H1: *News factor frequencies and intensities will be lower in Twitter communication about #marchforscience compared to journalistic (online) reporting on the 2018 March for Science.*

For social media communication about science, there are initial research findings that can be reinterpreted in line with news factor frequency and intensity, as well as the combination of news factors. For instance, the news factor controversy can be important for Twitter communication [e.g., Gastrow, 2015]. The fact that media reporting and Twitter communication about scientific topics often follow similar patterns [e.g., Büchi, 2017] can also be related to the logic of news values.

Furthermore, news value theory has also been applied to audiences, for instance, in studies explaining news selection by audiences [e.g., Eilders, 2006; see also Kepplinger, 2008]. Social media data offer the opportunity to study aspects of how audiences deal with information [Veltri and Atanasova, 2017], for instance, regarding engagement behavior, which is present through indicators such as likes, shares, and comments [e.g., Brossard, 2013]. Although engagement is a personal behavior, on an aggregated level, message content characteristics such as news factors and general newsworthiness might be able to predict engagement behavior on social media [e.g., Diakopoulos and Zubiaga, 2014]. For instance, it has been found that content with a negative or emotional value has a greater chance of being shared on social media [Veltri and Atanasova, 2017]. Findings such as this support the assumption that news factors might predict engagement behavior on social media [for findings outside the field of science communication, see Diakopoulos and Zubiaga, 2014; Trilling, Tolochko and Burscher, 2017].[2] Harcup and O'Neill [2017] refer to *shareability*, when they ask which news factors affect the sharing on social medial.[3] Hence, the fifth RQ is:

RQ5: *Which news factors correlate with social media engagement (likes, comments, and retweets) in the context of tweets about #marchforscience?*

The research literature is too sparse for a prediction of what factors might be correlated with social media engagement, especially regarding science journalism. However, based on the fact that single studies provide evidence of a fit between news value theory and engagement on social media, we propose:

H2: *The frequency and intensity of news factors will predict social media engagement on Twitter about #marchforscience.*

Method

Research design

To answer RQs 1–5 and to test the Hs, systematic, comparative content analyses were conducted using codebooks informed by the research literature. Included for the content analyses were print and online newspapers as they are among the most-accessed sources of scientific information for laypersons in Germany [e.g., Eurobarometer, 2013]. We also included Twitter communication about #marchforscience, acknowledging that individuals increasingly get their scientific information via social media [Brossard, 2013]. While print and online newspapers serve as an indicator for what characteristics about the March for Science were emphasized by science journalists, Twitter communication can be seen as an indicator for aspects about the issue that were publicly communicated by various actors/users.

Samples

The sample for the print and online media included German (quality and tabloid) daily newspapers, weekly newspapers, and news magazines that reported on the March for Science during the period from April 9 to 19, 2018.[4] This period

[2]Findings seem to be mixed. Stories are re-shared on social media at a higher rate when they refer to socially deviant events [i.e., the violation of social or legal norms; Diakopoulos and Zubiaga, 2014], or when they are entertaining, contain elements of surprise, or are bad news [Harcup and O'Neill, 2017]. Furthermore, Trilling, Tolochko and Burscher [2017] found that news factors such as proximity, conflict, and positivity predicted the frequency with which an article was shared on social network sites.

[3]Related to this, journalists, who observe how audiences react, might then also predict engagement behavior in the future; shareability then becomes a relevant news factor [Harcup and O'Neill, 2017].

[4]To achieve a representative base, we included all national newspapers, as well as regional and local newspapers from all 16 federal states and major cities like Berlin, Hamburg, Munich, and Cologne. We also included all cities and regions with events linked to the 2018 March for Science. We further included one national weekly newspaper and three national news magazines.

considers that the actual event, i.e., the march, took place on April 14; consequently, five days before and five days after that event were taken into consideration. The full sample was identified using the keywords "march for science" as well as the German words "Marsch" (march) and "Wissenschaft" (science) in newspaper databases (e.g., Wiso), academic databases (e.g., LexisNexis), and in online archives of the newspapers. Since this did not guarantee a sufficient and correct selection, all articles were checked manually for their relevance. The search and the check identified $N = 164$ articles. After deleting the same articles that appeared in different media, the final sample size was $N = 86$.

Of these articles, most ($n = 29$; 34%) were published on April 14, the day of the march. During the five days before the event, 33 articles (38%) were published, while another 24 (28%) were published afterward (see Figure 1). In the sample, there are articles from 21 regional newspapers ($n = 57$; 63%), four quality daily newspapers ($n = 16$; 19%), two tabloid daily newspapers ($n = 3$; 4%), two weekly newspapers ($n = 8$; 9%), and two weekly news magazines ($n = 2$; 2%). A slight majority of articles were published in online media ($n = 45$; 52%), and most of the articles mentioned the name of a journalist as the author ($n = 41$; 48%), while 19 articles (22%) mentioned a press agency, and 26 (30%) did not indicate authorship. On average, an article was 338 words (SD = 288.58) in length. The majority of articles was found on local and regional news pages ($n = 30$; 35%); 24 articles were found on pages and sections dedicated to science (28%); and 8 articles were in the political section (9%).

The sample for Twitter communication included all tweets that used the hashtag #marchforscience during the same period as for the print and online newspapers (April 9–19, 2018). We used the R package "twitteR" to identify relevant tweets; the package provides an interface to the Twitter web Application Programming Interface (API) [Gentry, 2016]. We received a database, containing the tweets and

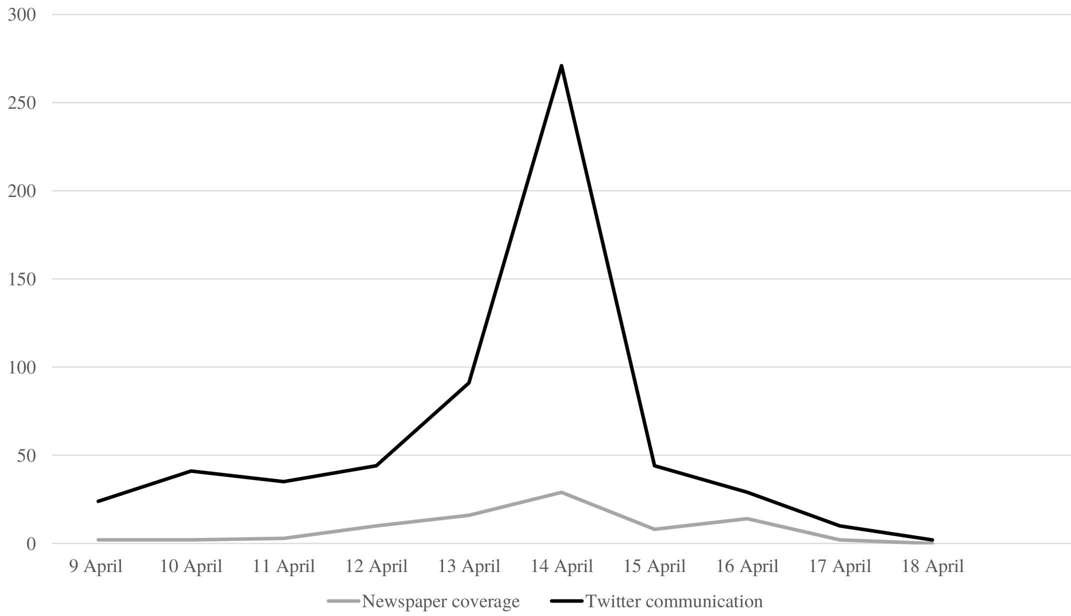

Figure 1. Frequency of journalistic reports about the March for Science and Twitter communication about #marchforscience.

basic information (e.g., account names, information about retweets/replies, and a link to the original post). We decided to include tweets in German language only in order to capture Twitter communication in Germany. The search criteria yielded a full sample of $N = 935$ tweets, of which $N = 591$ were considered for the analysis after deleting tweets that appeared more than once and checking that all tweets provided proper links to the original Twitter post.[5]

Of the tweets, almost half were posted on April 14 ($n = 271$; 46%); 235 (40%) were posted before that date; and 85 (14%) were posted afterward (see Figure 1). On average, a tweet was 23 words (SD = 9.53) long. Among the tweets, a minority was retweets/replies ($n = 130$; 22%). Most tweets were posted by March for Science organizers ($n = 188$; 32%), public figures ($n = 164$; 28%), or scientists ($n = 140$; 24%); fewer tweets stemmed from media/journalists ($n = 60$; 10%), politicians ($n = 35$; 6%), or citizens ($n = 4$; 1%).[6] Regarding tweet metrics, on average, a tweet in the sample received 13 likes (SD = 30.01), five retweets (SD = 10.99), and one comment (SD = 6.85). The tweets, on average, had two post characteristics (SD = 1.05): most postings contained further hashtags ($n = 380$; 64%) next to #marchforscience, pictures ($n = 278$; 47%), or links ($n = 274$; 47%).

Quantitative content analysis of media and Twitter content

The codebooks used to analyze the newsworthiness of media and Twitter communication about the March for Science were divided into formal and content-specific categories.

Formal categories were manifest variables collected for the articles or tweets. For the print and online media, this included the publication date; the type of media, i.e., whether it was print or online; the author of the article; the length; and the news section in which it appeared. For tweets, this included publication date; length of the tweet; tweet characteristics (reply, retweet, etc.); account information (account owner, type of account owner [scientists, politician, etc.]); account metrics (e.g., numbers of followers); tweet metrics (number of likes, retweets, and comments); and post characteristics (e.g., picture(s), link(s), and hashtag(s)).

Content-specific categories related to topics and news factors. For both the print and online media and the tweets, we collected the topics covered, the time frame mentioned, and occurring actors (e.g., scientists, politicians, demonstrators). We also collected ten news factors[7] with varying intensities as based on the research literature [e.g., Badenschier and Wormer, 2012; Rosen, Guenther and Froehlich, 2016] using Likert-type scales [Kepplinger, 2008; Schulz, 1976]: relevance; influence

[5]The database that we received after using the twitteR package was not sufficient enough for coding, mainly because tweet content was cut after approximately 100 characters. We used the links to the original Twitter posts provided and then coded content. However, this had the disadvantage that some links did not work, which most likely is a reflection of tweets or Twitter accounts being deleted.

[6]We also collected information about the Twitter accounts. On average, the account owners of the sampled tweets had 6,999 followers (SD = 32 372.57); they followed 659 other accounts (SD = 1 045.46); and the accounts had posted 10,527 tweets already (SD = 35 886.69). Most accounts were created in 2017 ($n = 182$; 31%).

[7]We excluded some common news factors such as all proximity news factors, as well as immediacy, follow-up, and composition because we only investigated one topic, in one country, over a short period of time. Due to their misfit, we also excluded factors such as aggression, entertainment, or sexuality/erotic.

of occurring groups or persons; prominence of occurring actors; personalization; reach; astonishment; positive outcomes; negative outcomes; controversy; and demonstration. We specially defined these news factors for the March for Science. The descriptions of the categories can be found in Tables 4 and 5. In cases in which there were news factors with varying intensities, the highest possible intensity was coded. For a single article or tweet, all occurring news factors were collected.

Four experienced coders coded the articles and tweets after several intensive training sessions. Intercoder reliability was calculated according to Cohen's Kappa (κ) for 16 articles and 50 tweets. The following satisfactory results were obtained (articles/tweets): formal categories ($\kappa = .91/\kappa = .97$), topics ($\kappa = .87/\kappa = .86$), time frames ($\kappa = .93/\kappa = .94$), occurring actors ($\kappa = .94/\kappa = .97$), and news factors ($\kappa = .87/\kappa = .91$). The lowest value for a single variable was $\kappa = .67$; hence, all values reached sufficient scores.

Results

Comparing topics, time frames, and occurring actors in journalistic coverage and Twitter communication revealed that, for these categories, there were differences between the two types of communication (see Table 1). Almost all variables collected were more frequent in journalistic coverage. Journalistic reports more often showed neutral, factual reporting of events surrounding the march, scientific debates, and political debates. Journalistic reports very often referred to the previous year's march and announced the event or reported after the event. On Twitter, tweets were more often focused on the time the actual march happened. For the occurring actors in journalistic reporting, scientists, Donald Trump, other politicians, citizens/demonstrators, and march organizers were mentioned most frequently.

Table 1. Comparing topics, time frames, and occurring actors between journalistic reporting and Twitter communication.

Variables	Journalistic reporting		Twitter communication				
	n	%	n	%	χ^2	df	φ
Topics							
Neutral factual reporting	76	88	324	55	34.95^{***}	1	−.227
Scientific debates	64	74	170	29	69.19^{***}	1	−.320
Political debates	38	44	85	14	44.85^{***}	1	−.257
Time frames							
Previous year's march	62	72	12	2	378.53^{***}	1	−.748
Announcement of the march	44	51	182	31	14.01^{***}	1	−.144
Event is happening	9	11	144	24	8.29^{**}	1	.111
After the event	34	40	62	11	52.04^{***}	1	−.277
Occurring actors							
Scientists	81	94	120	20	196.31^{***}	1	−.538
Politicians	29	34	56	10	40.19^{***}	1	−.244
Donald Trump	49	43	3	1	337.61^{***}	1	−.706
Citizens/demonstrators	58	67	47	8	202.75^{***}	1	−.547
March organizers	35	41	26	4	120.65^{***}	1	−.422

Notes. $^{**} = p < .01$; $^{***}p < .001$.

Table 2. Comparing news factor frequencies and intensities between journalistic reporting and Twitter communication.

News factors	News factor frequencies							News factor intensities					
	Journalistic reporting		Twitter communication					Journalistic reporting		Twitter communication			
	n	%	n	%	χ^2	df	φ	M	SD	M	SD	t	df
Relevance	85	99	375	64	43.16***	1	−.252	3.38	1.15	.95	1.06	18.56***	106.93
Prominence	77	90	158	27	130.65***	1	−.439	2.02	1.11	.32	.59	13.84***	92.16
Personalization	76	88	168	28	117.03***	1	−.416	.97	.45	.44	.75	9.24***	164.21
Influence	75	87	320	54	33.77***	1	−.223	2.07	1.12	.91	.99	9.18***	105.53
Demonstration	66	77	57	10	227.35***	1	−.580	1.43	1.32	.10	.35	9.23***	86.72
Reach	65	76	98	17	142.96***	1	−.460	1.91	1.28	.42	.97	10.37***	99.77
Astonishment	10	12	17	3	15.02**	1	−.149	.12	.32	.03	.18	2.41*	92.99
Controversy	6	7	12	2	7.10*	1	−.102	.07	.256	.02	.141	1.75	92.65
Positive outcomes	4	5	7	1	5.65*	1	−.091	.09	.424	.02	.164	1.65	88.73
Negative outcomes	0	0	2	0	.292	1	.021	.00	.00	.00	.06	−.54	675

Notes. * = $p < .05$; ** = $p < .01$; ***$p < .001$.

Regarding RQ1 (frequency of news factors), on average, about five news factors ($M = 5.40$; SD = 1.43) were found in journalistic reporting on the 2018 March for Science. Most frequent were relevance, prominence, personalization, influence of occurring groups or persons, demonstration, and reach (see Table 2). Hence, these news factors seem to have been emphasized by science journalists; accordingly, these news factors equal the news value of the March for Science. Less frequent were news factors such as astonishment, controversy, and positive outcomes.

Regarding RQ2 (intensity of news factors), for journalistic reporting on the 2018 March for Science, Table 2 shows that relevance, influence of occurring groups or persons, prominence, and reach were the news factors with the highest intensity. With regard to the combination of news factors (RQ3), a principal-component factor analysis with varimax rotation excluding the news factors negative outcomes, astonishment, and demonstration[8] revealed that prominence, personalization, and influence can be combined to a single factor (explaining 43% of variance): this factor groups variables with respect to groups and persons. A second factor (explaining 20% of variance) is created by controversy and relevance (negatively) and hence, concerned with local, conflicting aspects, while a third factor (explaining 15% of variance) is created by positive outcomes and reach, hence, concerned with societal aspects.

In Twitter communication about #marchforscience, on average, there were two news factors ($M = 2.05$; SD = 1.43, see Table 2). Most dominant were relevance, influence of occurring groups or persons, personalization, and prominence. Other news factors occurred less frequently. In total, news factors were more frequently found in journalistic reporting than in communication on Twitter ($t(677) = 20.30$; $df = 675$; $p < .001$), and this was true for all single news factors tested, except negative outcomes (RQ4a). Although the news factors with the highest intensity

[8]Negative outcomes was excluded because it was coded only twice. Astonishment and demonstration were excluded based on low anti-image correlations.

Table 3. Correlations (Pearson's r) between news factors and indicators of engagement with #marchforscience.

	Indicators of engagement					News factor intensities							
	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Number of likes													
2 Number of comments	.843***												
3 Number of retweets	.934***	.738***											
4 News factor frequency	−.050	−.040	−.049										
5 News factor intensity[a]	.006	.015	.008	.794***									
6 Relevance[b]	.037	.039	.042	.222***	.241***								
7 Influence[b]	.025	−.015	.073	.497***	.517***	−.060							
8 Prominence[b]	−.071	−.045	−.076	.692***	.577***	−.115	.436***						
9 Personalization[b]	−.060	−.047	−.063	.663***	.497***	−.151***	.290***	.761***					
10 Reach[b]	.118*	.139**	.097*	.317***	.384***	−.031	.018	.119*	.103				
11 Astonishment[b]	−.030	−.011	−.053	.125*	.252***	.000	.035	−.028	−.011	−.034			
12 Positive outcomes[b]	−.031	−.013	−.035	.127*	.339***	.025	.041	.048	.036	.105*	−.017		
13 Controversy[b]	.043	.019	.048	.020	.260***	−.038	.098*	−.078	−.085*	.012	.042	−.015	
14 Demonstration[b]	.007	−.011	.008	.214***	.330***	.278***	.004	.008	−.086*	.021	−.051	.028	.026

Note. [a] Index based on news factor intensities (z-scores, without news factor negative outcomes); [b] z-standardized; $^{*} = p < .05$; $^{**} = p < .01$; $^{***} p < .001$.

seem similar for journalistic coverage and Twitter communication (RQ4b), in total, they reached a higher intensity in journalistic reporting ($M = 1.21$; SD $= .40$) than in tweets ($M = .32$; SD $= .24$) ($t(677) = 20.14$; $df = 94.25$; $p < .001$). These two findings support H1.

Furthermore, the combination of news factors differed for two out of three factors (RQ4c). Running a principal-component factor analysis with varimax rotation excluding the news factors negative outcomes, positive outcomes, astonishment, and relevance,[9] revealed that there are three distinct factors. Again, prominence, personalization, and influence are a single factor (explaining 38% of variance). As seen before, this factor groups variables with respect to groups and persons — something similarly observed for science reporting on the march. A second factor (explaining 18% of variance) comprises of controversy and demonstration; hence, grouping aspects of conflict and activism. The third factor (explaining 17% of variance) is based on a single news factor: reach.

Regarding RQ5, correlations between the news factors and social media engagement were tested (see Table 3). The results showed that there were no correlations between two indices based on news factor frequencies and intensities with social media engagement, disproving H2. When testing individual news factors, only the news factor reach weakly and positively correlated with liking, commenting, and retweeting on Twitter.

Discussion

The present study analyzed the newsworthiness of the 2018 March for Science in journalistic reporting and Twitter communication. Both were defined as indicators of public discourses about the issue [see Veltri, 2012] because both reach substantial numbers of audiences [Trilling, Tolochko and Burscher, 2017]. Although there

[9] This was also related to low anti-image correlations.

seemed to be many similarities between journalistic and Twitter content, the results showed that news factors were more frequently found and reached higher intensities in journalistic coverage than in Twitter communication. News factors also varied between journalistic reporting and communication on Twitter with respect to their combinations.

What made the march a newsworthy topic for coverage and Twitter communication in Germany — based on the findings of this study — was its (global) relevance, the fact that prominent people such as the American president and a demonstration were involved, personalization and influence of occurring actors such as organizers and scientists, as well as its reach, i.e., the huge number of people affected. However, journalists did not predominantly stress the degree of astonishment or controversy of the march, nor its positive or negative outcomes, although this finding could be topic-specific. For instance, Badenschier and Wormer [2012] found that astonishment and controversy were among the most important news factors in science journalism. Nevertheless, the prominence of relevance and reach identified in the present study is supported by international literature [Guenther, 2019; Hansen, 1994; Hodgetts et al., 2008; Rosen, Guenther and Froehlich, 2016; Ruhrmann, 1997]. Reach also was the only news factor (weakly) correlating with Twitter engagement. As a result, reach seemed to be the only news factor that positively influenced newsworthiness in the sense that more responses/engagement were triggered. When Harcup and O'Neill [2017] define shareability, then they refer to story characteristics that trigger exactly this: engagement on social media. For the March for Science, this was neither entertaining, surprising, nor bad news — it was its magnitude, defined here as number of people affected by the march.

The present study, to some degree, supports research findings that highlight the similarities between journalistic and Twitter communication about science, especially regarding peaks of attention [see also Büchi, 2017; Veltri, 2012]. In the present study, not only peaks of attention but also the frequencies and intensities of news factors were similar. At the same time, since intensities and combinations of news factors varied, the study also supports findings highlighting differences between journalistic and Twitter communication [see also Mondragon, Gil de Montes and Valencia, 2017]. Various actors or stakeholders, not only professional journalists, create content on Twitter in a surrounding limiting the use of characters; naturally, one would expect the content between journalistic reporting and Twitter communication to vary.

The present study applied news value theory to the study of Twitter content. The outcomes of this study are an attempt to investigate social media content using reputable theories, such as those developed in journalism theory. The link between news values and social media content was previously established in the broader literature [e.g., Diakopoulos and Zubiaga, 2014; Harcup and O'Neill, 2017; Trilling, Tolochko and Burscher, 2017], but certainly needs to be developed further. Frequencies, intensities, and effect sizes for the parts of this study focusing on Twitter content are all low or weak. The reason for this could be that for a long time, theories in public communication have rooted in journalism, but nowadays, in communication environments including a variety of actors and stakeholders, they might need to be developed further. Defining news factors as criteria of public relevance might mean developing these criteria by more closely focusing on communicators and their audiences, while focusing less on journalists. This is an important point for future research. Based on that, engagement behavior on social media — which was generally low in the present study — might be explained by other criteria. It is also certainly true that Twitter is an elite medium (as much as the March for Science is an issue for the rather educated). To further test news value theory, an extension to different social media and topics is encouraged.

The present study also has a number of other limitations that lead to potential future research scenarios. We will highlight the main limitations in the following. (1) Samples could be extended by including additional journalistic and social media sources, or even further by hashtags that are used on Twitter. The researchers considered including TV reporting, but the number of TV clips was too low to provide meaningful findings. The decision to include only German-language tweets meant that there is a slight chance that tweets sent from Austria, Switzerland, and other countries in which German is spoken by a minority are part of the sample considered in this study. Furthermore, this decision does not take into account that German users might have tweeted in English. (2) Time periods could be extended as well to allow for investigation of wider time frames. Figure 1, however, shows that, while it might have been beneficial to start earlier, there was certainly not much coverage or Twitter communication after April 18. (3) For the study of news factors in science journalism and social media communication about science, while we think it was beneficial to look at one scientific topic in more detail, this research area needs further development to investigate the news factors important in science journalism and science communication. Hence, a comparison of topics might be a worthwhile extension of this study. (4) The list of ten news factors that has been used in this study, although listed in the research literature [Badenschier and Wormer, 2012; Dunwoody, 2014; Guenther, 2019; Ruhrmann, 1997; Ruhrmann and Milde, 2011], cannot be seen as complete. Scholars are still debating and investigating questions regarding which and how many news factors are relevant for the study of science journalism, if they are different from other journalistic beats at all. (5) In the present study, we treated the March for Science as a topic for science journalism and consequently applied news factors common in science journalism. However, the march is a science policy event and thus also shows characteristics of social and political protest movements. That is why future research could analysis the march in a protest movement framework. (6) Lastly, with reference to Trilling, Tolochko and Burscher [2017], studies investigating social media content could also benefit from including users' characteristics in greater detail.

Nevertheless, this article can be seen as a starting point for more detailed analyses of applying journalistic theories to the study of science communication on social media.

Acknowledgments

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Appendix A. Coding categories and coding procedure for (online) newspaper articles

Table 4. Codebook for journalistic content.

Categories	Coding procedure
Formal categories: please extract all formal categories before coding content-related categories.	
Publication date	In this category, the publication date of the article is coded, using an eight-digit format (YYYYMMDD). Example: an article from 14$^{\text{th}}$ April 2018 is coded as "20180414".
Name of the newspaper	Please openly code the name of the newspaper that published the article.
Type of media	Please code if the article was published in a print or online newspaper. Code "1" for a print newspaper. Code "2" for an online newspaper. Code "3" if this cannot be determined.
Author of the article	Please code who the author of the article is. Code "1" for a journalist. Code "2" for a press agency. Code "3" for authors such as politicians or scientists. Code "4" for any other author. Code "5" if this cannot be determined.
Headline	Please copy and paste the headline of the respective article.
Length (i.e., number of words)	Please openly code the number of words of the respective article as a digit. Headlines and lead have to be included in this count. You should not count the name of the author(s), the dateline, and captions of visuals.
News section	Please code the news section/journalistic beat in which the article was published. Code "1" for the cover page. Code "2" for sections dedicated to science. Code "3" for sections dedicated to health. Code "4" for sections dedicated to politics. Code "5" for sections dedicated to economics. Code "6" for sections dedicated to local and regional news. Code "7" for any other section. Code "8" if this cannot be determined.
Content-related categories: please code content-related categories only after you have read the articles closely. We recommend highlighting relevant paragraphs.	
Topics	Please code all topics that apply. Sometimes headlines and leads already emphasize the main topics of the article. *Neutral factual reporting (about the March for Science)* Code "0" if it does not apply. Code "1" if it applies. *Scientific debates (e.g., debates about science's freedom)* Code "0" if it does not apply. Code "1" if it applies. *Political debates (i.e., a political focus)* Code "0" if it does not apply. Code "1" if it applies.

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Table 4. *Continued from the previous page.*

Categories	Coding procedure
Time frames	Please code all time frames. Be careful: they must be addressed in the article and cannot be assumed based on the date of publication. *Previous year's march (i.e., March for Science 2017)* Code "0" if it does not apply. Code "1" if it applies. *Announcement of the march (i.e., the March for Science 2018 and its events)* Code "0" if it does not apply. Code "1" if it applies. *Event is happening (i.e., when the event takes place)* Code "0" if it does not apply. Code "1" if it applies. *After the event* Code "0" if it does not apply. Code "1" if it applies.
Occurring actors	Please code all occurring actors. Occurring actors are usually linked to (in)direct statements. *Scientific actors* Code "0" if it does not apply. Code "1" if it applies. *Political actors* Code "0" if it does not apply. Code "1" if it applies. *Donald Trump* Code "0" if it does not apply. Code "1" if it applies. *Economic actors* Code "0" if it does not apply. Code "1" if it applies. *Citizens/demonstrators* Code "0" if it does not apply. Code "1" if it applies. *Students* Code "0" if it does not apply. Code "1" if it applies. *Journalists* Code "0" if it does not apply. Code "1" if it applies. *March organizers* Code "0" if it does not apply. Code "1" if it applies. *Others* Code "0" if it does not apply. Code "1" if it applies.

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Table 4. *Continued from the previous page.*

Categories	Coding procedure
News factors	Please code the respective intensities of all news factors. *Relevance (i.e., the significance of the march)* Code "0" if there is no relevance mentioned. Code "1" for little relevance: this applies when a single demonstration or event of the March for Science 2018 is mentioned in one federal state (local focus). Code "2" for medium relevance: this applies when more than one demonstration or event of the March for Science 2018 is mentioned in one federal state (local focus). Code "3" for high relevance: this applies when more than one demonstration or event of the March for Science 2018 is mentioned in at least two federal states (national focus). Code "4" for highest relevance: this applies when demonstrations or events are mentioned in Germany and beyond (international focus). *Influence (i.e., the social power of groups or persons mentioned, also referred to as power elite)* Code "0" if there is no influence applicable. Code "1" for small influence: this applies when only groups or persons are mentioned that carry local or regional power (e.g., a random scientist from a German university, a local politician). Code "2" for medium influence: this applies when groups or persons are mentioned that carry statewide political power (e.g., in a federal state) or national scientific power (e.g., Deutscher Hochschulverband, Hochschulrektorenkonferenz). Code "3" for high influence: this applies when groups or persons are mentioned that carry (inter)national power (e.g., the minister of science, a representative from the European Union). *Prominence (i.e., fame of individual occurring actors, hence their celebrity status)* Code "0" if there are no occurring actors. Code "1" for weak prominence: this applies when only random persons that are not widely known are mentioned. Code "2" for medium prominence: this applies when persons are mentioned that are known nationally, e.g., from sports, politics, science, or economics. Code "3" for high prominence: this applies when persons are mentioned that are known internationally. *Personalization (i.e., the significance of single individuals compared to their institutions/professional functions)* Code "0" if there is no personalization applicable. Code "1" for low personalization: this applies when persons are only mentioned as representatives of their institutions (i.e., in their functional role). Code "2" for high personalization: this applies when persons are not mentioned as representatives of their institutions but as persons with own goals and interest.

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Table 4. *Continued from the previous page.*

Categories	Coding procedure
	Reach (i.e., the number of people affected; magnitude) Code "0" if there is no reach mentioned. Code "1" for weak reach: this applies when it is emphasized that the March for Science only affects scientists, demonstrators, or organizers locally. Code "2" for medium reach: this applies when it is emphasized that the March for Science affects the science system in Germany (i.e., pure science focus). Code "3" for high reach: this applies when it is emphasized that the March for Science affects the whole society and all its members.
	Astonishment (i.e., unusual or surprising events) Code "0" if there is no astonishment mentioned. Code "1" for small astonishment: this applies when events of the March for Science (or single aspects of it) have happened in an outcome that was unpredictable and did exceed expectations. Code "2" for high astonishment: this applies when events of the March for Science (or single aspects of it) were spontaneous and did exceed expectations.
	Positive outcomes (reframed from good news or positivity) Code "0" if there is no positive outcome mentioned. Code "1" for short-term positive outcomes for science based on the March for Science. Code "2" for long-term positive outcomes for science based on the March for Science.
	Negative outcomes (reframed from bad news or negativity) Code "0" if there is no negative outcome mentioned. Code "1" for short-term negative outcomes for science based on the March for Science. Code "2" for long-term negative outcomes for science based on the March for Science.
	Controversy (i.e., conflicting viewpoints) Code "0" if there is no controversy mentioned. Code "1" for little controversy: a depiction of conflicting viewpoints, e.g., solely based on a description. Code "2" for much controversy: a reference to how members of each conflicting party attack each other in (in)direct quotes.
	Demonstration (i.e., the number of people demonstrating and thus showing collective goals) Code "0" if there is no demonstration mentioned. Code "1" for demonstrations that are mentioned without any number of how many people are demonstrating. Code "2" for small demonstration: this applies when the number of demonstrators is mentioned and up to 500 people. Code "3" for medium demonstration: this applies when the number of demonstrators is mentioned to lie between 500 and 1000 people. Code "4" for large demonstration: this applies when the number of demonstrators is mentioned to be over 1.000 people.

Appendix B. Coding categories and coding procedure for Tweets

Table 5. Codebook for Twitter content.

Categories	Coding procedure
Formal categories: please extract all formal categories before coding content-related categories. Use the link provided to open the tweet in a web browser and only then start coding.	
Tweet date	In this category, the date the tweet was posted is coded, using an eight-digit format (YYYYMMDD). Example: a tweet from 14th April 2018 is coded as "20180414".
Tweet content	Please copy and paste the content of the respective tweet.
Length (i.e., number of words)	Please openly code the number of words of the respective tweet as a digit. Hashtags will be considered and counted as word(s), but links will not.
Retweet/Reply	Please code if this an original tweet or a retweet/reply. Code "0" if this is an original tweet. Code "1" if this is a retweet/reply.
Name of account owner	Please copy and paste the name of the respective account tweeting.
Account owner(s)	Please use the account information to determine the owner of the respective account. If more than one apply, use the one that is mentioned first. Code "1" for a scientist or a scientific institution. Code "2" for a politician or a political institution. Code "3" for a March for Science organization or their representatives. Code "4" for media or journalists. Code "5" for citizens. Code "6" for public figures. Code "7" if this cannot be determined.
Number of followers	Please openly code the number of followers of the respective account.
Number of accounts followed	Please openly code the number of accounts that are followed by the respective account.
Number of tweets posted	Please openly code the number of tweets that were posted by this account.
Date the account was created	Please openly code the date the account was created, using a six-digit format (YYYYMM).
Number of likes	Pleases openly code the number of likes the tweet received.
Number of retweets	Pleases openly code the number of retweets the tweet received.
Number of comments	Pleases openly code the number of comments the tweet received.

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Table 5. *Continued from the previous page.*

Categories	Coding procedure
Post characteristics	Please code any of the following post characteristics. *Pictures* Code "0" if it does not apply. Code "1" if it applies. *Links* Code "0" if it does not apply. Code "1" if it applies. *Further hashtags next to #marchforscience* Code "0" if it does not apply. Code "1" if it applies. *Videos* Code "0" if it does not apply. Code "1" if it applies. *GIFs* Code "0" if it does not apply. Code "1" if it applies. *Links to other Twitter accounts* Code "0" if it does not apply. Code "1" if it applies.
Content-related categories: please code content-related categories only after you have read the tweet closely.	
Topics	Please code all topics that apply. *Neutral factual tweet (about the March for Science)* Code "0" if it does not apply. Code "1" if it applies. *Scientific debates (e.g., debates about science's freedom)* Code "0" if it does not apply. Code "1" if it applies. *Political debates (i.e., a political focus)* Code "0" if it does not apply. Code "1" if it applies.
Time frames	Please code all time frames. Be careful: they must be addressed in the tweet and cannot be assumed based on the tweet date. *Previous year's march (i.e., March for Science 2017)* Code "0" if it does not apply. Code "1" if it applies. *Announcement of the march (i.e., the March for Science 2018 and its events)* Code "0" if it does not apply. Code "1" if it applies. *Event is happening (i.e., when the event takes place)* Code "0" if it does not apply. Code "1" if it applies. *After the event* Code "0" if it does not apply. Code "1" if it applies.

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Table 5. *Continued from the previous page.*

Categories	Coding procedure
Actors	Please code all actors who are mentioned or addressed in the tweet. *Scientific actors* Code "0" if it does not apply. Code "1" if it applies. *Political actors* Code "0" if it does not apply. Code "1" if it applies. *Donald Trump* Code "0" if it does not apply. Code "1" if it applies. *Economic actors* Code "0" if it does not apply. Code "1" if it applies. *Citizens/demonstrators* Code "0" if it does not apply. Code "1" if it applies. *Students* Code "0" if it does not apply. Code "1" if it applies. *Journalists* Code "0" if it does not apply. Code "1" if it applies. *March organizers* Code "0" if it does not apply. Code "1" if it applies. *Others* Code "0" if it does not apply. Code "1" if it applies.

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Table 5. *Continued from the previous page.*

Categories	Coding procedure
News factors	Please code the respective intensities of all news factors. *Relevance (i.e., the significance of the march)* Code "0" if there is no relevance mentioned. Code "1" for little relevance: this applies when a single demonstration or event of the March for Science 2018 is mentioned in one federal state (local focus). Code "2" for medium relevance: this applies when more than one demonstration or event of the March for Science 2018 is mentioned in one federal state (local focus). Code "3" for high relevance: this applies when more than one demonstration or event of the March for Science 2018 is mentioned in at least two federal states (national focus). Code "4" for highest relevance: this applies when demonstrations or events are mentioned in Germany and beyond (international focus). *Influence (i.e., the social power of groups or persons mentioned, also referred to as power elite)* Code "0" if there is no influence applicable. Code "1" for small influence: this applies when only groups or persons are mentioned that carry local or regional power (e.g., a random scientist from a German university, a local politician). Code "2" for medium influence: this applies when groups or persons are mentioned that carry statewide political power (e.g., in a federal state) or national scientific power (e.g., Deutscher Hochschulverband, Hochschulrektorenkonferenz). Code "3" for high influence: this applies when groups or persons are mentioned that carry (inter)national power (e.g., the minister of science, a representative from the European Union). *Prominence (i.e., fame of individual actors, hence their celebrity status)* Code "0" if there are no actors. Code "1" for weak prominence: this applies when only random persons are mentioned that are not widely known. Code "2" for medium prominence: this applies when persons are mentioned that are known nationally, e.g., from sports, politics, science, or economics. Code "3" for high prominence: this applies when persons are mentioned that are known internationally. *Personalization (i.e., the significance of single individuals compared to their institutions/professional functions)* Code "0" if there is no personalization applicable. Code "1" for low personalization: this applies when persons are only mentioned as representatives of their institutions (i.e., in their functional role). Code "2" for high personalization: this applies when persons are not mentioned as representatives of their institutions but as persons with own goals and interest.

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Table 5. *Continued from the previous page.*

Categories	Coding procedure
	Reach (i.e., the number of people affected; magnitude) Code "0" if there is no reach mentioned. Code "1" for weak reach: this applies when it is emphasized that the March for Science only affects scientists, demonstrators, or organizers locally. Code "2" for medium reach: this applies when it is emphasized that the March for Science affects the science system in Germany (i.e., pure science focus). Code "3" for high reach: this applies when it is emphasized that the March for Science affects the whole society and all its members.
	Astonishment (i.e., unusual or surprising events) Code "0" if there is no astonishment mentioned. Code "1" for small astonishment: this applies when events of the March for Science (or single aspects of it) have happened in an outcome that was unpredictable and did exceed expectations. Code "2" for high astonishment: this applies when events of the March for Science (or single aspects of it) were spontaneous and did exceed expectations.
	Positive outcomes (reframed from good news or positivity) Code "0" if there is no positive outcome mentioned. Code "1" for short-term positive outcomes for science based on the March for Science. Code "2" for long-term positive outcomes for science based on the March for Science.
	Negative outcomes (reframed from bad news or negativity) Code "0" if there is no negative outcome mentioned. Code "1" for short-term negative outcomes for science based on the March for Science. Code "2" for long-term negative outcomes for science based on the March for Science.
	Controversy (i.e., conflicting viewpoints) Code "0" if there is no controversy mentioned. Code "1" for little controversy: a depiction of conflicting viewpoints, e.g., solely based on a description. Code "2" for much controversy: a reference to how members of each conflicting party attack each other in (in)direct quotes.
	Demonstration (i.e., the number of people demonstrating and thus showing collective goals) Code "0" if there is no demonstration mentioned. Code "1" for demonstrations that are mentioned without any number of how many people are demonstrating. Code "2" for small demonstration: this applies when the number of demonstrators is mentioned and up to 500 people. Code "3" for medium demonstration: this applies when the number of demonstrators is mentioned to lie between 500 and 1000 people. Code "4" for large demonstration: this applies when the number of demonstrators is mentioned to be over 1.000 people.

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