universität wien

MAGISTERARBEIT / MASTER'S THESIS

Titel der Magisterarbeit / Title of the Master's Thesis

„PRIMING EFFECTS AND SCIENTIFIC NEWS CONSUMPTION"

Identification and Impact of Textual and Visual Priming Cues on the Perceived Credibility of Online News Articles with a Scientific Topic.

verfasst von / submitted by

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angestrebter akademischer Grad / in partial fulfilment of the requirements for the degree of

Magister der Philosophie (Mag. phil.)

Wien, 2019 / Vienna 2019

Studienkennzahl lt. Studienblatt / degree programme code as it appears on the student record sheet:	UA 066 841
Studienrichtung lt. Studienblatt / degree programme as it appears on the student record sheet:	Magisterstudium Publizistik- und Kommunikationswissenschaft
Betreut von / Supervisor:	Univ.-Prof. Homero Gil de Zuniga, PhD

Acknowledgements

I want to thank everyone who contributed to me getting to this point. I want to thank my supervisor, Homero Gil de Zúñiga, for his support and his inspiring and advanced attitude on science and academic university research at the University of Vienna. Being successful in academia is a team effort. Therefore, I would like to thank my collaborators, colleagues and also my students who I worked with over the past years on different projects and tasks. I want to thank my friends and companions for being part of the most stupid ideas, but also the most memorable situations in my life. Having said that, thank you for giving me always the right advice and support when it really mattered. Finally, I want to thank my parents for never letting me down and always supporting me with their love and all other things in every way possible: financially, emotionally and with the best pierogi and pickled cucumbers in the universe. Thank you all for always encouraging me to take a chance in the pursuit of my dreams. I love you and owe you everything.

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1. Introduction

"The most essential gift for a good writer is a built-in, shockproof, shit detector. This is the writer's radar and all great writers have had it."

Ernest Hemingway, 1954

Primed by the news?

Hemingway's words are not only important to the writer, but also for the reader. In times when fake news or purposeful misinformation have grown to powerful and even democracy-endangering threats, strong media literacy skills are among the most important attributes a responsible citizen should develop. In a democracy, it is essential for the society as a whole, hence for individuals themselves, to base decisions on rational reflections which should also be based on as many facts as possible; or, in other words: the opportunity for unbiased, manipulation-free news consumption, must be preferred over a consumption of biased content, purposefully or accidentally manipulated content. But, do fake news in general, or maybe just the discussion about fake news, alter or even bypass our media literacy skills? Do we consume informative content differently, and are we more skeptical because of the long and exhausting 2016 Presidential Campaign in the United States of America? The impact of the media, related to this development and future dealings, is extremely important as media consumption changed rapidly since the Internet Era, Web 2.0 and, of course, Social Media. Social Media, in particular, has become central to the way people experience news (Hermida, Fletcher, Korell, & Logan, 2012).

Fake News

Referring to the fake news debate around Donald Trump and Hillary Clinton's presidential campaigns for the 2016 U.S. Presidential Elections, previous research stated that both political campaigns used "online news media to frame their message about the other candidate using false or fictitious information" (Chatfield, Reddick, & Choi, 2017, p.9) – also known as "Fake News". They could prove that "text analytics results indicated that although the negative frames against Trump far outnumbered those against Hillary Clinton, weak frames of unverifiable misinformation might have failed to influence the mass audience, leaving them to the power of Trump's direct political communications via Twitter" (Chatfield, Reddick, & Choi, 2017, p.9). Remarkable within this context is also

the fact that "the top-performing fake election news stories on Facebook generated more engagement than the top stories from major news outlets such as *The New York Times*, *Washington Post*, [..] and others" (Silverman, 2016). Fake news, of course, is not a new phenomenon. Within this work it is assumed that this noisy Fake News discussion, particularly the framing of the public's understanding of this term by Donald Trump himself, potentially led to him winning the U.S. Presidential Elections. Some of the reasons might be that the audiences got manipulated by the term itself, or the awareness for the consumption of "alternative facts" has risen. Of course, finding direct causal relations is impossible as this is a multi-dimensional construct. Nevertheless, big data research by Hunt Alcott and Matthew Gentzkow, (2017) of the 2016 U.S. presidential campaign on fake news revealed that three times more fake pro-Trump articles appeared than pro-Clinton articles, and also that the average pro-Trump article was shared more often on Facebook than the average pro-Clinton article (Allcott & Gentzkow, 2017).

Talking about democracy itself, it is a fact that a political right-shift could be measured after economic crises in the past, such as the 2007/2008 crisis (Funke, Schularick, & Trebesch, 2016). An upcoming economic crisis is solely a matter of time, as we are now in the longest phase of economic expansion since the beginning of the 19th century.

Message Credibility and Priming

Of course, news consumption and the rise of fake news or misinformation are very closely related to concepts of trust and credibility of the media. There is a great variety of indicators of credibility in news articles. Consequently, perception of credibility in news articles is neither a new nor revolutionary topic. However, as communication and technology steadily develops and rapidly changes, the news consumption behavior also changes. The literature review on this topic exposed significant research gaps when focusing on the perception of message credibility that can be altered by priming cues or may induce framing effects. Actual papers on these topics describe research limitations in the potential effects of these myriad indicators as well as limitations in understanding of their applicability. Furthermore, there was a lack of reliable methods or models to measure only certain aspects of the perception of message credibility until the research of Appelman & Sundar "Measuring Message Credibility: Construction and Validation of an Exclusive Scale" in 2015. One very recent experimental study related to the actual work is van Duyn and Collier's "Priming and Fake News: The Effects of Elite Discourse on Evaluations of News Media" (2018). In their work, it was proven that frequent discussion of fake news in

elite discourses may affect whether individuals trust news media and discussed how evaluation standards changed.

Scientific News

The impact of credibility on the consumption of news, in particular news on scientific progress, shall be addressed in this work. The reason is that scientific news is strongly fact-based and, for the most part, does not tolerate "alternative" interpretations of those measured facts without concrete reasons. Proven scientific facts are considered as common knowledge and provide essential information and also build the basis of decision-making for institutions, organizations, politicians, voters and, of course, the public itself. Recent work "Scientific audiences, misinformation, and fake news" by Scheufele and Krause (2019), revealed serious concerns about public misinformation in the United States of America. Stated by the authors, a very problematic area is citizens' ability of understanding of basic scientific facts and the scientific process. They further emphasize the need for research that treats science communication as a multilevel problem. This research will focus on the perception of credibility of scientific news articles in combination with single visual and textual fake news priming cues in an online news environment. Therefore, the leading research question of this work is:

"Do visual or textual fake news priming cues in online news environments affect the subject's perception of credibility of scientific news articles?"

Methodologically a 2×3 cross-sectional online quasi experiment with selected priming cues among U.S. citizens was conducted to prove possible effects of the priming cues. In addition, an overview of the current state of research on this topic should help other scholars to get a deeper understanding of the hereby involved processes. The goal is therefore to investigate the already discovered influences more deeply and to carry on research in this field.

In summary, this study matters because of its implications for news consumption in a context where FAKE NEWS PRIMING CUES MAY ALTER THE PECEPTION OF CREDIBILITY OF SCIENTIFIC NEWS IN AN ONLINE NEWS PROVIDING ENVIRONMENT.

Keywords: journalism, fake news, misinformation, credibility, scientific news, media literacy, priming, framing, agenda setting.

2. Literature Review

> *"Some kinds of communication on some kinds of issues, brought to the attention to some kinds of people under some kinds of conditions, have some kinds of effects."*
>
> *(Berelson, 1954, as cited in Burkart, 2019, p.135)*

2.1. Trust and Credibility

It is nearly impossible to define trust in the media or to determine if there is a general decline in trust. Since the beginning of the last century studies on these topics provide myriad definitions and measurements for the general term "trust in the media" depending on the particular research. Two reasons for this are the rapid changes in how people consume news and also the emergence and steady development of digital news sources in the age of the internet. Niklas Luhman once simplified the concept of trust as a *complexity-reducing mechanism* that *orientates* on *what has been* and on *what might be.* According to him trust is also strongly related to the term of *familiarity* (Luhmann, 2014). In actual research there is neither an agreed definition (Fisher, 2016) nor a measure (Kohring & Matthes, 2007) (Fisher, 2016) for 'trust' in news media. Caroline Fisher further stated that there is "a growing disconnect between the normative ideal of an informed citizenry and the complex range of influences on perceptions of news credibility in the digital era" (Fisher, 2016, p. 451). During her study she asked the general question if trust in news is even something desirable in an age of uncertainty about the veracity of online information. She also recommends to approach this concept with a differentiated view on different forms of trust and to segregate the concept of trust in different types of credibility which lead to trust. Her particular research states that "the literature can be roughly divided into three areas: message credibility – or trust in the information; source credibility – or trust in the provider of the information; and media credibility, which is also called medium or channel credibility – or trust, in the medium through which the news information is relayed." (Fisher, 2016, p. 454). Nevertheless, previous findings support the assumption that message evaluation and source credibility – in expert sources, but not in biased sources – may influence the credibility assessment and some message factors may also lead to belief change (Slater & Rouner, 1996). Those findings are corresponding with the Elaboration Likelihood Model by Cacioppo & Petty (1986) that outlines two basic routes to persuasion. "One route is based on the thoughtful (though sometimes biased) consideration of

arguments central to the issue, whereas the other is based on affective associations or simple inferences tied to peripheral cues in the persuasion context" (Cacioppo & Petty, 1986, p.162).

The perception of credibility, especially a high level of credibility, in a news providing context is extremely important as people tend to judge attitude-consistent and neutral news sources as more credible than attitude-challenging news sources (Metzger, Hartsell, & Flanagin, 2015). Further those with low levels of trust tend to prefer non-mainstream news sources (Park & Fletcher, 2017) and – most important – that regardless if any news article contains factual or false information, individuals will share it with their network, if they perceive the article as credible (Stefanone, Vollmer, & Covert, 2019). In addition, it has also been proven that trust in the media moderates the effect of citizen news production over online political participation (Ardèvol-Abreu, Hooker, & de Zúñiga, 2017). At this point it is worthy to mention that higher media literacy affects individuals' perceptions of media credibility in a positive way (Vraga, Tully, Akin, & Rojas, 2012). Some even demand that "a more aggressive media literacy training is needed to assuage the negative effects of utilizing non-credible online material" (Cheever & Rokkum, 2015, p. 70). The same lack of media literacy skills and the problem with definitions of credibility was also mentioned by actual work by Scheufele & Krause, 2019. Related explicitly to consumption of scientific news the Committee on the Science of Science Communication (Leshner, 2017) demands that the perception of credibility of scientific news consumption shall be treated as a multilevel problem and further that media coverage can be expected to affect how science communication from other sources is interpreted. The "Research Agenda on Communication Science effectively" points out the fact that "an important question for research is how these processes operate and affect audiences for scientific information in rapidly changing online environments" and that "in this noisy information landscape, scientists have difficulty finding responsible ways to ensure that the public has access to clear and credible evidence" (Leshner, 2017, p.72).

What is Credibility?

As stated before, there is a wide range of definitions for the terms trust, trustworthiness and credibility. In general, the surveys and experiments of Carl Hovland in the late forties and fifties build the beginning of media credibility research. Hovland studied the effects of persuasive stimuli on the changing opinions among World War II soldiers. He recognized several initial factors for persuasive communications in the source (i.e., source credibility), the message and the audience. These factors among others later resulted

in the “standard model of media impact” (Hovland, Lumsdaine, & Sheffield, 1949). In the following years those fundamental researches around Carl Hovland became more and more developed during his Yale-studies which later resulted in Hovland, Janis & et. al.’s “Personality and Persuasibility”. Later considerable works addressing credibility in the media are the works of Günther Bentele (Bentele (a), 1988) and (Bentele (b), 2008) about objectivity and credibility of media. However, the literature on credibility is “plentiful, contradictory, and confused” (Self, 1996, p. 421) and the theoretical approach will therefore focus on current research.

Taking the advent of the internet and social media into account, this study’s theoretical approach will focus on message credibility in online news environments and not on the credibility of the media as a whole. In early studies on online news credibility, Abdulla et.al. (2002) conducted a national telephone survey based on Gaziano and McGrath’s 12-item Likert-type news credibility scale (Gaziano & McGrath , 1986) in which overall respondents rated online news highest in credibility. Referring to this early work even back in 2002, the perception of online news credibility was built upon “trustworthiness”, “timeliness”, and “bias factors” (Abdulla, Garrison, Salwen, & Casey, 2002). Recent studies about web content credibility show that “personal, political, work-related, medical, and health decisions (as well as many others) are frequently made on the basis of information on the Web” and also that “the increasing significance of the information on the Web is coupled with increasingly loud concerns about its credibility” (Wierzbicki, 2018, p. 205). As citizen journalism increases and also news content creation is positively and strongly associated with political participation offline (Ardèvol-Abreu, Hooker, & de Zúñiga, 2017), it can be said that all factors influencing the perceptions of credibility of content – that can be found in the internet – are, and also will be, continuously researched as modern digital media systems develop very fast.

Almost every study reviewed for the actual work measures credibility from different points of view (e.g., *source credibility*, *media credibility*, *social media credibility*, *web credibility, etc.*). In previous research (Vogel, et al., 2015) stated in their literature review on credibility that more research on credibility and trust as an “explanatory variable” and “intervening variable” is desirable, and further, additional studies should be conducted that research the interactions of trust and credibility on different datum levels (Vogel, et al., 2015). Nancy Cheever’s and Jeffrey Rokkum’s intensive research of literature on ‘*Internet Credibility and Digital Media Literacy‘* says that “in general people do evaluate the

credibility of the information they seek, but their skill levels may be lacking" (Cheever & Rokkum, 2015). They conclude that:

"In general people evaluate an online source's credibility by its authors' attributes, but studies show they rely more on the design, look, peer reviews, and source credibility of online information to inform their credibility assessments rather than understanding whether the material has been edited, verified, or vetted through a formal process" (Cheever & Rokkum, 2015, p. 70).

This means that the credibility assessment, as a multidimensional construct, takes the whole appearance of the presented content into account. Returning to credibility in an online news environment, the Stanford Web Credibility Project[1] checklist shall be mentioned. The Stanford Credibility checklist by B.J. Fogg (Fogg, 2002) states the following characteristics websites should have implemented to increase their perception of credibility:

1. Make it easy to verify the accuracy of the information on your site.
2. Show that there is a real organization behind your site.
3. Highlight the expertise in your organization and in the content and services you provide.
4. Show that honest and trustworthy people stand behind your site.
5. Make it easy to contact you.
6. Design your site so it looks professional (or is appropriate for your purpose).
7. Make your site easy to use and useful.
8. Update your site's content often (at least show it has been reviewed recently).
9. Use restraint with any promotional content (e.g., ads, offers).
10. Avoid errors of all types, no matter how small they seem. [2]

A short annotation: Taking a priming stimulus in an online news content environment into consideration (as planned in the current work) none of these characteristics can be applied to a simulated experimental fake news environment created in the experimental design of this study. The background for this is the fact that cofounding variables should be eliminated as much as possible. Although, basic facts, such as point no. 6 and no. 10 will be kept (i.e., "professional look (appropriate for the purpose)" and

[1] http://credibility.stanford.edu

[2] Also available via http://credibility.stanford.edu/guidelines/index.html

"avoiding errors") so as not to decrease the experienced credibility. In the later experiment, an online news environment, as neutral as possible, was created for the purpose of credibility measurement in this current work.

However, as all other recommended measurements for the perception of credibility by Adam Wierzbicki mostly analyze the experienced credibility of the website itself and not how the content is presented within those websites (i.e., message credibility), a different approach to measure this kind of credibility has to be chosen. Actual research by Zhang et. al. (2018) presents an initial set of indicators for the perception of article credibility which were defined by a diverse coalition of experts. Nevertheless, none of the researched indicators included visual indicators or priming cues that might have an impact on the perception of credibility of contents. Their research was based on 16 different *content indicators* (i.e., title representativeness, clickbait title, quotes from outside experts, citation of organizations and studies, calibration of confidence, logical fallacies, inference, tone, etc.) and *context indicators* (i.e., originality, fact-checked, representative citations, reputation of citations, number of ads, number of social calls, spammy ads and placement of ads and social calls) (Zhang, Ranganathan, Metz, & et. al., 2018, p. 3).

Taking previous general theoretical background on credibility into consideration, it is necessary for this study to measure the impact of the priming cues on the perception of the message credibility of the provided texts as other factors that may influence the perceived credibility should be held fixed. Therefore, this work will focus on the concept of message credibility as suggested by recent work by Caroline Fisher (2016) "The trouble with 'trust' in news media". The background is that in the later experimental design there is no possibility for the subjects to draw a conclusion about the source or medium of the provided content in the experimental groups.

Message Credibility and its Measurement

Recent research on credibility measurements state that different measures of media credibility exist for different types of media outlets and that there is a lack of a clear method for measuring credibility at different levels (Appelman & Sundar, 2015). Therefore, they aimed to pose in the first row "a new definition of message credibility in the context of news obtained from media: *"*Message credibility is an individual´s judgement of the veracity of the content of communication*"* (Appelman & Sundar, 2015, p. 5). Additionally, the authors developed a new scale to explicitly measure the concept of perceived message credibility. In their previous literature review of actual measurements for plausible media

credibility studies they found 75 items which could, in the end, be reduced to only three indicators. Following Appelman and Sundar (2015), message credibility can be measured by asking participants to rate how well certain adjectives describe the content provided with the following adjectives: “accurate”, “authentic” and “believable” (Appelman & Sundar, 2015, p. 15). Together, these three adjectives shall measure the later perceived message credibility as they are distinct from concepts of source credibility, general media credibility or other constructs being impractical to implement in this work.

As the later statistical analysis of the data is crucial for this work, a second item battery of statements regarding the text will be implemented in the experiment to measure the perceived message credibility. This item battery is an adaption of the research of Christer Clerwall as there are several significant similarities to the actual study. Clerwall used an experimental methodology where the respondents were subjected to different news articles that were written either by a journalist or were software generated. This study researched the perceived credibility of the provided articles and, in addition, the quality of the content (Clerwall, 2014). All in all, this work’s approach to the definition and measurement of the concept of credibility follows Appelman and Sundar (2015) and defines credibility as “an individual’s judgement of the veracity of the content of communication” and will measure it by the subjects self-reported rating of *accuracy*, *authenticity* and *believability* of the provided articles. Furthermore, also a second item battery inspired by Christer Clerwall with 12 descriptors, should also help to measure the perceived credibility of the scientific news content in the experiment (further information on this can be found in the measures section of this work).

2.2. Fake News and Misinformation

Over 50% of the world’s population use the internet and the provided services (Internet World Stats, 2018). Rising from year to year, almost every printed newspaper also has a developed online news service for the contents they produce. Nowadays it is impossible for a newspaper to rely only on printed versions. Following actual research, the term “fake news” can be seen as a subcategory of misinformation theories and the literature on this topic is neither coherent nor consistent (Zimmermann & Kohring, 2018; Egelhofer & Lecheler, 2019). Zimmermann and Kohring (2018) suggest defining the term of “fake news” as “actual disinformation” which is “communication about intentionally and empirically false information in the context of new and relevant circumstances that

claim to be true"[3] (Zimmermann & Kohring, 2018, p. 526). In their research they further state that this model of "actual disinformation" does not necessarily have to be negatively connotated. Referring to the authors, a construct of exposed disinformation[4] (i.e., the repetitive exposure to corrections of *"*actual disinformation*")* may also lead to improved media literacy due to the fact that the general knowledge about the probability of contents with intentionally spread "actual disinformation" will be kept alive (Zimmermann & Kohring, 2018, p. 538). This idea is similar to the work of Leticia Bode and Emily Vraga (2015) (Bode & Vraga, 2015) who found that a related stories function can significantly reduce misperceptions about a social media post which includes misinformation. Other research on fake news studies between 2003 and 2017 resulted in a typology of fake news which were news satire, news parody, fabrication, manipulation, advertising, and propaganda (Tandoc, Lim, & Ling, 2018). Those typologies were based on the two dimensions "facticity" and "intention" which constitute a continuum from high to low (Tandoc, Lim, & Ling, 2018). On the other hand, an actual study about the fake news framework classifies the term of fake news as a two-dimensional phenomenon (i.e., "fake news genre" and "fake news label") that has to be distinguished towards concepts of false news, falsehoods, bad journalism, general misinformation or simply mistakes in communication (Egelhofer & Lecheler, 2019). After reviewing available studies that define fake news the authors defined dimensions when a message should be studied as fake news. This actual work will follow their definition that fake news are in general "low in facticity", were created with the "intention to deceive" and are "presented in a "journalistic format" (Egelhofer & Lecheler, 2019, p. 3).

Impact of Fake News on Public Opinion

Recent research about cognitive processing of true and false political information examining the impact of source credibility also revealed that "people tend to use political figures as a heuristic to guide evaluation of what is true or false, yet do not necessarily insist on veracity as a prerequisite for supporting political candidates" (Swire, Berinsky, & Lewand, 2017, p. 1). In addition to this, Park and Fletcher (2017) explored "the impact of individual trust in the news media on source preferences and online news participation behavior" (Park & Fletcher, 2017, p. 1282). In their survey with 21,524 respondents

[3] Self-translation from German. Original text: "Schließlich definieren wir aktuelle Desinformation als Kommunikation wissentlich und empirisch falscher Informationen zu neuen und relevanten Sachverhalten mit dem Anspruch auf Wahrheit." (Zimmermann & Kohring, 2018, p. 526)

[4] Self-translation from German. Original text: "aufklärerische Desinformation"

across 11 countries they could prove that “those with low trust in the news media are more likely to prefer non-mainstream news sources, and are more likely to engage in online news participation” (Park & Fletcher, 2017, p. 1282). In general, fake news are in an undeniable relationship with online partisan media (Vargo, Lei Guo, & Amazeen, 2018) and also proof had been found that “partisan media polarize the electorate by taking relatively extreme citizens and making them even more extreme” (Levendusky, 2013, p. 611). Furthermore, as stated before, it can be also said that “low trust in the news may also prompt some consumers to more directly contribute to news production by creating or uploading their own news content, particularly in light of the positive association between interest in the news and online news participation” (Park & Fletcher, 2017, p. 1286). This effect was also confirmed by Ardèvol-Abreu, Hooker, & de Zúñiga, (2017). Generally speaking about the spreading of false news it can be said that:

“Falsehood diffused significantly farther, faster, deeper, and more broadly than the truth in all categories of information, and the effects were more pronounced for false political news than for false news about terrorism, natural disasters, science, urban legends, or financial information.” (Vosoughi, Deb, & Aral, 2018, p. 1146)

Other recent research on this topic, in relation to politics and democracy in a wider sense found that “websites that spread misinformation had a fairly close IAS relationship with fact-based media in covering Trump, but not for the news about Clinton” and that “fake news websites added some noise to an already sensationalized news environment.” (Guo & Vargo, 2018, p. 18). Those findings are corresponding with other research that showed “users mostly tend to select and share content related to a specific narrative and to ignore the rest” and “social homogeneity is the primary driver of content diffusion, and one frequent result is the formation of homogeneous, polarized clusters.” (Del Vicarioa, et al., 2016, p. 558). In media context this concept is known as an *echo chamber*. “Echo chambers exist where information, ideas or beliefs are amplified and reinforced by communication and repetition inside a defined system where competing views are underrepresented” (Sunstein 2001, in: Bakir & McStay, 2017, p. 161). Further, those effects are often accompanied by the so called ‘Hostile Media Phenomenon’, where partisans tend to perceive the media coverage, as being biased against their side “in light of their own divergent views about the objective merits of each side’s case and their corresponding views about the nature of unbiased coverage” (Vallone, Ross, & Lepper, 1985, p. 577).

These and also previous findings suggest on the one side that fake news may have an impact on the general perception of media credibility, and, on the other, that this impact also may have strong effects on how people use the media.

Figure 1: Screenshot of Google Trends "fake news" search requests (temporal progress) (25. August 2019) © Google Inc.

Relating to the general fake news debate other research examined online fact-checking and verification services as a solution to counteract this phenomenon. The scholars interviewed journalists and social media users on the usefulness of fact-checking services. All in all, "the trustworthiness of automatic verification services was considered weak" (Brandtzaeg, Følstad, & Chaparro Domínguez, 2017, p. 1118). Brandtzaeg et.al.'s (2017) study identified three implications for the design of online fact-checking and verification services (i.e., *acknowledge limitations*, *transparency* and *collaborative fact-checking*) to make them more useful and more trusted. In addition, research about individual's news verification behavior moreover states that "fake news awareness is a significant predictor of perceptions of media credibility" (Torres, Gerhart, & Negahban, 2018, p. 3984). Nevertheless, no matter how important or useful fact checking services are, it is recommended to improve media literacy or journalistic standards first as the spread of fake news (see Fig. 1) can be seen more as a symptom rather than the cause.

Referring to the fake news debate around Donald Trump and Hillary Clinton´s presidential campaigns for the 2016 U.S. Presidential Elections previous research stated that both political campaigns used "online news media to frame their message about the other candidate using false or fictitious information" (Chatfield, Reddick, & Choi, 2017,

p. 9), as already mentioned in the introduction. They could also prove that "text analytics results indicated that although the negative frames against Trump far outnumbered those against Hillary Clinton, weak frames of unverifiable misinformation might have failed to influence the mass audience, leaving them to the power of Trump's direct political communications via Twitter" (Chatfield, Reddick, & Choi, 2017, p. 9). This one may infer that the fake news and/or false news, respectively the framing for this term itself, helped Donald Trump win the presidential election as the audiences were somehow manipulated by the term "fake news" or the awareness for the consumption of "alternative facts" has risen. Of course, finding direct causal relations is impossible as this is a multidimensional construct. Nevertheless, big data research of the 2016 U.S. presidential campaign on fake news revealed that three times more fake pro-Trump articles than pro-Clinton articles appeared in this time and also that the average pro-Trump article was shared more on Facebook than the average pro-Clinton article. In total sums this was 7.6 million (Clinton) and 30.3 million (Trump) times, respectively (Allcott & Gentzkow, 2017). Those findings were previously confirmed by similar analysis of Buzzfeed journalist, Craig Silverman, who stated that "the top-performing fake election news stories on Facebook generated more engagement than the top stories from major news outlets such as *The New York Times*, *Washington Post*, [..] and others" (Silverman, 2016, p. 1)

In conclusion, the findings regarding media trust in online news is very important to force further research on the perception of credibility and elements of online news environments that could influence the perceived credibility of the provided content in this environment.

Scientific News and Misinformation

To inform the public about scientific findings or scientific facts related to actual media agenda and general scientific status quo in general will always be a major task for the media. Referring especially to misinformation and fake news within science audiences actual research discussed the impact of misinformation among individual citizens regarding misinformation in a scientific context. They pointed out one very problematic area, which is U.S. citizens' lack of understanding of basic scientific facts and the scientific process more broadly (Scheufele & Krause, 2019). Further, the paper pointed out that the increasingly political environments and fundamental changes in how information is shared by media and audiences as well as the fact that the scientific community still continues to enjoy a great deal of trust, the "public confidence in the press has declined substantively over past decades" (Scheufele & Krause, 2019, p. 7667). Their definition of misinformation

should be taken as basis for the general understanding of misinformation in a scientific context (i.e., "'misinformation' can be broadly defined as information that is incorrect, possibly by accident" (Scheufele & Krause, 2019, p. 7662). In their literature review, they stated that "the line between being misinformed and uninformed – that is simply not knowing – has long been blurry in different literatures" (Scheufele & Krause, 2019, p. 7662) and provided different views on how misinformation among citizens regarding scientific contents might evolve. Further they pointed out the roots and sources of misinformation, among which "conspirational beliefs", the "(in)ability to recognize misinformation" and also as well the "motivation to recognize inaccurate information … or not" were mentioned. In their work the authors also emphasized the need for research that treats science communication as a multilevel problem and also that research deficits related to misinformation and fake news in online communication environments are still persistent (Scheufele & Krause, 2019). Speaking about scientific news, and global warming in particular, it could be shown that only slight efforts have to be made to change people's minds related to the perception of this content. Their study showed that a 400-word description of the mechanisms behind the climate change dramatically reduced ignorance and increased climate change acceptance among the subjects (Ranney, Clark, Reinholz, & Cohen, 2012). Similar findings could also be found by Hmielowski, Feldman, Myers, Leiserowitz, & Maibach, (2014) in their multi-wave survey with 2,497 (2008) and 1,036 (2011) participants where it could be proven that trust in scientists mediates the effect of news media use on perceptions of global warming. Referring to the actual work it could be proved that conservative media use decreases trust in scientists and, conversely, the use of non-conservative media increases trust in scientists (Hmielowski, Feldman, Myers, Leiserowitz, & Maibach, 2014, p. 877).

2.3. Priming & Framing

One of the first acknowledged studies researching the concept of priming was conducted by Stephen Palmer in 1975. In his experiment he demonstrated the influence of prior presentation of visual scenes on the identification of briefly presented drawings of real-world objects. In detail he showed the participants different objects for a short period of time which the participants had to correctly identify. The recognition rate of the objects increased rapidly when appropriate scenes were shown to the subjects prior to the recognition experiment. In summary: Subjects who were "primed" by a kitchen scene before the recognition experiment were later able to recognize those objects which were appropriately associated with the scene significantly better, like a loaf of bread, than the

control group (Palmer, 1975). In later research Domke, Shah, & Wackmann, (1998) found a media and politics related priming effect by showing newspaper articles to two different sub-populations (i.e., evangelical Christians and university undergraduate students). These newspaper articles were written by a former professional journalist and presented the contrasting views of three political candidates on four issues. One of the findings was "that individuals evaluating a political environment which includes a social-moral issue will be more likely to make attributions about candidate integrity than individuals evaluating a political environment which does not include a social-moral issue" (Domke, Shah, & Wackmann, 1998, p. 61). They came to the following conclusion:

"As a result, what issues news media emphasize, and how those issues are covered, may substantially influence which thoughts or ideas come to mind for voters as they evaluate even seemingly unrelated elements of a political environment." (Domke, Shah, & Wackmann, 1998, p. 69)

Corresponding to those findings, which could not be isolated at that time, research increased and the literature on priming effects in a media context is nowadays plentiful and lacks until today generally acknowledged definitions. Previous research suggests that "a focus on how people comprehend media messages and the resulting mental representations provides a better explanation of media priming" (Roskos-Ewoldsen, Roskos-Ewoldsen, & Dillmann Carpentier, 2008, p. 74). It is necessary to distinguish research and corresponding theories on these topics in the further theoretical approach, as "there are similarities and connections between agenda setting, priming, and framing, but they are not identical approaches" (Weaver, 2007, p. 146). Also, recent research finds that the distinction between those is still thin (Beattie, 2019) and speaking about framing the framing concept has "begun to overlap with other media effects models to a point that is dysfunctional" (Cacciatore, Scheufele, & Iyengar, 2015, p. 1) due to its popularity among communication scholars (Cacciatore, Scheufele, & Iyengar, 2015).

Generally speaking, **media priming** can be defined as an effect that is implicated by a forerun stimulus on the reaction of a following stimulus (Schenk, 2002). This effect was proven by Higgins, Bargh, & Lombardi (1985) and mentioned first time in the context of media by Iyengar, Peters, Kinder, & Krosnick (1984) in their work "The Evening News and Presidential Evaluations" where priming effects could be proven (i.e., "experimental manipulations of coverage increase the impact of subjects' ratings of [president] Carter's performance in specific areas on their impressions of his general ability" (Iyengar, Peters, Kinder, & Krosnick, 1984, p. 783)). In all, priming can be described as a cognitive process,

with the brain as an associative network where ideas, concepts, etc. are saved as nodes in a network which are connected with other ideas of this network through semantic paths (Schenk, 2002). Priming further understands the activation of these nodes with external stimuli, if the priming cues are semantically connected to each other. Such an activated node rises the probability that certain ideas, which are subconsciously connected with the stimulus, will become activated. Those activated nodes will work as a filter that may change the further processing of information or evaluation of the ideas (cf. Schenk, 2002). In addition, priming effects may be considered as a temporary accessibility effect that needs a prior activation through applicability to some prior stimulus (Price & Tewksbury,1997, p. 197). Furthermore, the authors see just a small distinction towards **agenda-setting**, which may be the relative emphasis on certain problems or issues, and that priming is the most plausible mechanism behind the agenda-setting effect (Price & Tewksbury,1997, p. 198). Nevertheless, both concepts are salience-based and therefore rise awareness for a certain issue. Actual research confirms this, as "priming is likely only an extension of agenda setting when the priming event is the setting of the agenda" (Dillman Carpentier, 2014, p. 536). As also stated by Schenk, (2002), contrary to priming cues, **framing** effects occur during or immediately after the reception of a media frame and particularly noticeable elements of the message (i.e., salience) can activate certain beliefs or schemes that the audience will consult in the later information processing (i.e., "accessibility-effect" by Price & Tewksbury, 1997). In other words, referring to political discussions: Framing effects result from schema activation or modification and can be found in how information is processed and made sense of, how people talk about an issue, and how they form political evaluations (Zhongdang & Kosicki, 2003). Nevertheless, taking the actual work into consideration, research on past framing studies says that "textual elements were treated as the main constituents of frames, rather than visuals […]. Only 5% had directly coded visuals (3% as the main discourse unit), and 83% completely neglected visuals" (Matthes, 2009, p. 355).

As the current work will focus only on single visual and textual fake news primes that shall be perceived only on a subliminal level and also do not have any obvious contextual overlaps with actual political agenda, the research in the field of single primes should be taken into further consideration. Previous research on priming effects in an information environment confirmed that priming effects are not merely a function of changes in the volume of news coverage about a given topic, but also further priming effects can produce changes in the applicability of relevant knowledge constructs (Althaus & Kim, 2006). The authors conclude that priming effects in this area tend to be short-lived and are

largely disappearing within minutes or hours of exposure to the priming stimulus. Previous research (in the context of framing) showed that changes in one item in the research design, in which the subjects were exposed to the same articles, led to substantial changes in the attitude towards the contents. In a recent study only the word "baby" was substituted by "fetus" in a text about partial-birth abortion what in the later questionnaire increased or decreased support for banning partial-birth abortion among the subjects (Simon & Jerit, 2007). A considerable study by Baumgartner & Wirth, (2012) exposed that affective states induced by a news article influence how subsequent articles are processed and which information is learned. They found out that participants who read an initial positive article recalled more positive than negative information from six subsequent news articles. Vice versa, participants who read an initial negative article recalled more negative information than positive information from subsequent news messages. Nevertheless, as the sample size of their research was very small (N=87) and also very young (age range was 16 to 20 years, M = 17) further research has to be conducted. In addition, Baumgartner & Wirth mentioned the limitations of their study as they did not control for arousal. As stated by them and also found out by Lang, Park, Sanders-Jackson, Wilson, & Zheng, (2007) a high level of arousal may confound the findings in the later experimental setting. Similar to Lang et. al., (2007) also Porter, Brinke, Riley, & Baker, (2014) examined priming effects and the relation between emotion and susceptibility to misinformation. They found strong support for the hypothesis that emotion generally influences susceptibility to misinformation, what is called the Paradoxical Negative Emotion (PNE) hypothesis. This PNE hypothesis "posits that negative information will be well remembered over time, but will also be associated with a greater susceptibility to the distorting influence of misinformation relative to other emotional events" (Porter, Taylor & ten Brinke, 2008, p. 1431). Corresponding findings were found prior the Bush/Obama U.S. presidential elections. It could be shown that priming had a significant effect on the subject's candidate choice when they were primed to think about George W. Bush and the war in Iraq before being asked for their favorized candidate in the later election. Data revealed that this prior "priming significantly aided the candidacy of eventual Democratic nominee Barack Obama, more than doubling his support, and hurt then Republican front-runner Rudy Giuliani, cutting his support almost in half." (Cassino & Erisen, 2010, p. 372).

As stated before, theories on the concept of framing are widespread and nowadays there are more theories about framing than about agenda setting or priming (Weaver, 2007). In recent research, framing was described in the simplest way as "the process by which facts are packed into a narrative" (Beattie, 2019, p. 185). In detail, framing effects "can

occur by the presentation of new information, the way new information is packed into a narrative or, most commonly, a combination" (Beattie, 2019, p. 186). Further it can be said about framing effects that they "seem to include a broader range of cognitive processes – such as moral evaluations, causal reasoning, appeals to principles, and recommendations for treatment of problems" (Weaver, 2007, p. 146) and in summation, those long-term nodes were only activated by the prime as suggested by Schenk (2002).

While the experiment of the current study will use a picture of Donald Trump with a "fake news" lettering on it, it may arouse some participants with a very negative attitude towards Donald Trump. As the experimental setting also includes a textual priming stimulus without mentioning Donald Trump, later analysis of the data may address the control for arousal in the additional findings section. Further reflection on this possible confounding variable will be discussed in the final section of this study.

Primed by an Article?

Following the work of Bar & Biederman visual priming effects can be, on the one hand, measured on a very subliminal level. In their experiments, subjects were flashed so briefly with masked pictures of objects where only 13.5% of them could be named by the participants. When the pictures were shown later again naming accuracy increased to 34.5% (Bar & Biederman, 1998). On the other hand recent research also found out that visual priming (i.e., elite discourse about fake news) will lead to a significant drop in the ability to distinguish fake news articles from real news articles and further a significant main effect of the priming treatment on overall media trust by the subjects (van Duyn & Collier, 2018). Van Duyn & Collier, (2018) recommended to focus more on article content and examine different combinations to see "if the presence of a single fake article in combination with real articles is evaluated differently after being primed" (van Duyn & Collier, 2018, p. 21). In addition to this, other research found that priming can be well-measured. A recent study showed that the ability to recognize an article as an ad increased only by using a prior prime about native advertising (Wu, Huang, Roubing, & Sevick Bor, 2016, p. 1499).

It was also recently recommended by scholars that a new type of priming effect (i.e., the referral effect), which states that unique features of the referring channel affect user behavior (Bar-Gill, Inbar, & Reichman, 2017) should be taken into consideration.

To sum it up, visual media framing and also visual priming is occurring (Scheufele B., 2003) and its impact deserves further research. Corresponding to this, it will be assumed

that an exposition of the subject to a fake news priming cue, in visual or textual form, will activate a semantic connection within the subject and lead to a more skeptical news consumption than without a priming cue. That means the subjects may rate the provided scientific articles as less credible due to these priming cues. Furthermore, a different information-seeking behavior in combination with a general decrease in the perceived credibility of scientific news contents in online news environments is expected.

For this reason, and summarizing the literature review, it is asked “Do visual or textual fake news priming cues in online news environments have an impact on the perception of credibility of scientific news articles on subjects with a populist attitude?” (RQ1) and also “Do visual or textual fake news priming cues affect the subject’s information-seeking behavior?” (RQ2). To further measure general effects, it is also asked “Do visual or textual fake news priming cues in online news environments have a stronger impact on subjects’ perception of credibility who read a scientific article or a journalistic article?” (RQ3) and, finally, “Do visual or textual fake news priming cues in online news environments affect the subject’s perception of credibility of scientific news articles in general?” (RQ4).

3. Hypotheses and Research Questions

Based on the theoretical approach in the previous chapter the following research questions and hypotheses shall be examined in the current work.

3.1. RQ 1 – Priming and the Perception of Credibility by Populists

RQ1: Do visual or textual fake news priming cues in online news environments have an impact on the perception of credibility of scientific news articles on subjects with a populist attitude?

H1.a: The stronger the populist attitudes of the subject, the less trustworthy the scientific news articles will be perceived within the *visual fake news priming* stimulus group.

H1.b: The stronger the populist attitudes of the subject, the less trustworthy the scientific news articles will be perceived within the *textual fake news priming* stimulus group.

Independent variable$_{1.a}$: exposition to visual fake news priming cue

Independent variable$_{1.b}$: exposition to textual fake news priming cue

Covariate $_{1.a/1.b}$: populist attitude

Dependent variable: perceived credibility of the scientific news articles

The corresponding null hypothesis is:

H1.0: Exposition to a visual or textual priming cue will have no effect on the perceived credibility of the scientific news articles, regardless of the populist attitudes of the subject.

3.2. RQ 2 – Priming and Information-Seeking Behavior

RQ2: Do visual or textual fake news priming cues affect the subject's information-seeking behavior?

H2.1: Among those subjects in the fake news condition, those exposed to the *visual fake news priming* cue will prefer less credible sources for information-seeking.

H2.b: Among those subjects in the fake news condition, those exposed to the *textual fake news priming* cue will prefer less credible sources for information-seeking.

Independent variable$_{2.a}$: exposition to visual fake news priming cue

Independent variable$_{2.b}$: exposition to textual fake news priming cue

Dependent variable: favor for less credible sources for information-seeking

The corresponding null hypothesis is:

H2.0: Exposure to a visual or textual fake news priming cue will have no effect on the information-seeking behavior.

3.3. RQ 3 – Priming and the Perception of Credibility of Different Scientific Articles

RQ3: Do visual or textual fake news priming cues in online news environments have a stronger impact on subjects' perception of credibility who read a scientific article or a journalistic article?

H3.a: Among the subjects who are in the *visual fake news condition*, those exposed to the journalistic article will perceive the provided content as less credible.

H3.b: Among the subjects who are in the *textual fake news condition*, those exposed to the journalistic article will perceive the provided content as less credible.

Independent variable$_{3.a}$: exposition to visual fake news priming cue

Independent variable$_{3.b}$: exposition to textual fake news priming cue

Dependent variable$_{3.a}$: perceived credibility of the journalistic article

Dependent variable$_{3.b}$: perceived credibility of the scientific article

The corresponding null hypothesis is:

H3.0: Exposure to a visual or textual fake news priming cue will have no effect on the perception of credibility of the scientific articles, regardless if it is a journalistic or scientific article.

3.4. RQ 4 – Priming and the Perception of Credibility of Scientific Articles in General

RQ4: Do visual or textual fake news priming cues in online news environments affect the subject's perception of credibility of scientific news articles in general?

H4.a: Those subjects exposed to a *visual fake news priming cue* will perceive the credibility of the provided articles as less trustworthy.

H4.b: Those subjects exposed to a *textual fake news priming cue* will perceive the credibility of the provided articles as less trustworthy.

Independent variable$_{4.a}$: exposition to visual fake news priming cue

Independent variable$_{4.b}$: exposition to textual fake news priming cue

Dependent variable$_{4.a/4.b}$: perceived credibility of both scientific articles

The corresponding null hypothesis is:

H4.0: Exposition to a visual or textual fake news priming cue will have no effect on the perception of credibility of the scientific articles.

4. Method

> *"We're running the most dangerous experiment in history right now, which is to see how much carbon dioxide the atmosphere ... can handle before there is an environmental catastrophe"*
>
> *Elon Musk, 2013*[5]

According to the theoretical approach, the hypotheses and research questions assume a particular causal direction. Namely that fake news priming cues directly influence the perceived credibility of online news content or that priming cues will lead to a different information seeking behavior.

The obvious method is a cross-sectional online quasi experiment to measure the assumed effects of the priming cues. This experiment is completed by a questionnaire on the self-reported data about demographics, information-seeking behavior, the political attitudes and perception of the credibility of the provided content.

4.1. Pretest

A pretest was conducted from July 25, 2019 until August 10, 2019 through online surveys (used platform: SoSciSurvey). This first pretest was performed to exclude any possible misleading questions, and to test the perception of the stimulus material. Participants for the pretest were recruited among friends, family and friends of friends. These participants participated voluntarily with no compensation. In addition, a second pretest was conducted via Amazon's Mechanical Turk (MTurk). This test run was performed on August 21, 2019 ($N = 20$) to gather first datasets, and in order to determine the technological requirements of the setting and as well as gather feedbacks from the participants.

All together 35 subjects took part in the two pretest settings. Almost all annotations regarded spell-checking and one subject demanded more gender choices. This annotation was ignored as gender only matters for descriptive reasons of the sample. Another pretest

[5] Interview between Elon Musk and Chris Woodyard for USA today on April 22nd, 2013 available online https://eu.usatoday.com/story/money/business/2013/04/17/elon-musk-tesla-spacex-icon/2076641/ (last accessed by this work: 20th August, 2019, 4:45pm CET)

participant remarked that the information-seeking questions (*QINF1*) "wouldn´t seek further information on the provided topic on economic special interest media like 'Financial Times' or 'Wall Street Journal'". Due to the fact that both media sources also cover scientific topics, there was no reason to take them out in the later questionnaire. In the end the time it took the subjects to finalize the questionnaire was measured to calculate a fair compensation amount for later MTurk participants.

4.2. Materials

The stimulus material consisted of two different news articles, differing in length and quality, discussing a scientific topic. Both texts were real journalistic texts discussing the 2019 study "Contrail cirrus radiative forcing for future air traffic" by Lisa Bock and Ulrike Burkhardt, published in the journal "*Atmospheric Chemistry and Physics*" (Bock & Burkhardt, 2019). Due to better distinction in the later analysis, the respective texts will be later referred to as *journalistic* article or *scientific* article, although both texts should be described correctly as "journalistic articles discussing a scientific topic". The texts have been chosen because of their slightly controversial topic on environmental changes, caused by contrails and increased air traffic. They were deliberately chosen to be perceived as less credible or controversial by the subjects, since the perception of credibility of the texts is the epitome of the experiment and analysis. It was expected that the topic will awake memories of "chemtrail conspiracy theories" and, therefore, a broader range of the precepted credibility should be measured.

Scientific Articles

The first (journalistic) article was originally written by Doyle Rice for the newspaper *USA Today* and published on the website of the newspaper on June 27th 2019, (no publishing time provided) with the headline: "Global warming is only going to get worse. One reason: Those cloud trails airplanes leave behind in the sky". The whole text body contained 321 words.[6]

The second (scientific) article was originally written by Michael Le Page for the weekly science and technology magazine *New Scientist* and published on the website of

[6] Accessible online via https://eu.usatoday.com/story/news/nation/2019/06/27/contrails-worsen-global-warming-study-says/1573689001/ (last accessed by this work: 3rd August 2019, 9:14 pm CET)

the magazine on June, 27th 2019, 8:01 AM with the Headline: "It turns out planes are even worse for the climate than we thought". The whole text body contained 625 words.[7]

Comparing the text bodies, the scientific article in *New Scientist* contained 1.95 times more words than the journalistic article in *USA Today*. This is due to the fact that the NEW SCIENTIST article provided more information on the discussed study.

Priming Cues

The visual priming stimulus consisted of just one image, which was located in the "Editor's Picks" area, next to the text the participants read.

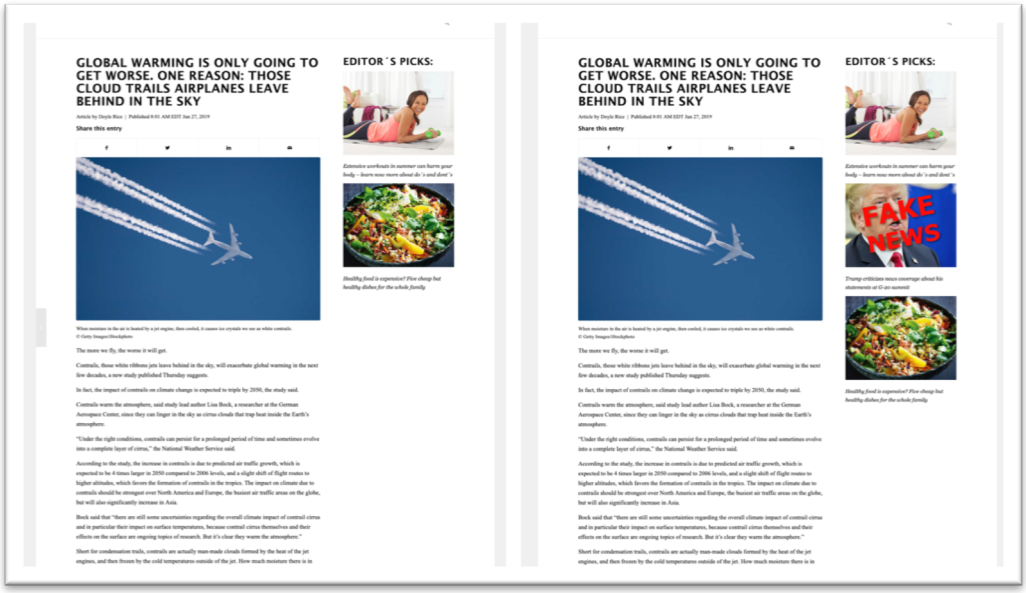


Figure 2: Control group (left) and visual priming group (right) in comparison

There was an image of President Donald Trump with big red "fake news" lettering on it (Fig. 14 in Appendix). This visual prime was part of the "Editor's Picks" area, next to the scientific and journalistic texts. The textual priming cue consisted of a single key sentence from the original *journalistic* article, which was added in the last third part of the text, after a slight adaption. This sentence was not part in the control group text:

*"There's nothing nefarious about contrails, though conspiracy theorists and **fake news media call them "chemtrails"**, claiming that airplanes are spraying toxic chemicals from airplanes."(Adaption of the sentence from USA today article by Doyle Rice[7])*

[7] Accessible online via https://eu.usatoday.com/story/news/nation/2019/06/27/contrails-worsen-global-warming-study-says/1573689001/ (last access by this work: 3rd August 2019, 9:16 PM CET)

The control group setting was completely free of any fake news wordings or any images of Donald Trump.

4.3. Design

The experiment should measure if an exposure to textual/visual fake-news primes leads to a lower rating of overall credibility, impartially of the style of the online news environment. To test the hypotheses, the participants were randomly assigned in one of the 2 (text: scientific vs. journalistic) × 3 (priming: visual cue vs. textual cue vs. no priming cue) groups. Participants were told that the study was interested in their opinion about an article without mentioning the contents of the article. Priming manipulation happened right after the participants completed the first page, which requested to be filled out with demographic data. The participants were presented with one of both articles, scientific or journalistic, about climate change caused by the increase of air traffic, in combination with different priming cues in a self-developed online news environment. The texts were displayed in a typical two-third/one-third layout, also containing a "service infotainment area" with further article recommendations (i.e., "Editor´s Picks"). This setting is not uncommon as shown by Bernhard, (2012) who researched the design of newspapers and how users perceived political information depending on the degree of the used infotainment features. It could be found that articles with more infotainment features were read more often (Bernhard, 2012). The whole experimental setting did not contain any logos or further misleading elements to reduce confounding variables.

The two neutral "Editor's Picks" had "healthy cheap dishes for the whole family" and "healthy workouts in summer" as topics, with matching pictures. The supportive "Editor's Picks" topics were chosen deliberately so as to not further confound the subject's bias in terms of politics, science, global warming or other controversial topics.

After reading the article, comprehensive questions about the content of the article were asked to control if the participants read the articles and understood the contents. On the following page, several rating questions about the articles perceived credibility, the source preference for further information-seeking on this topic, as well as questions about the subject's media consumption were asked. On the next page questions to measure political populist attitude followed, and on the last page a manipulation check where subjects in the fake news conditions were asked if they could remember the images of the "Editor's Picks" content (see "Manipulation check" section). At the final page of the

questionnaire, the participants obtained a “proof of work code”, which rewarded them USD $0.25 for completing the study.

4.4. Measures

Message Credibility

As stated in the literature review, message credibility within the experiment was measured by the method proposed by Appelman & Sundar (2015). After the articles, participants had to rate how well certain adjectives described the provided content on a five-star scale as recommended by Wierzbicki (2018) for the correct methodological approach for this measurement. Those ratable adjectives are: *accurate*, *authentic* and *believable*. In addition, a further measurement of credibility was inspired by the work of Christer Clerwall (2014). After slight adaptions it should also measure the perceived credibility of the text. Participants rated statements regarding their perception of the articles. In the end, also a self-developed five-point Likert scale item battery with general statements on the perception of the text was used for additional studies and also for more flexibility within the later statistical analysis of the data. The background for this is the fact that different measure methods require different approaches. Even though the Likert Scale is one of the most popular rating scales in social sciences, the later statistical analysis may be difficult as a typical Likert Scale cannot be interpreted as cardinal scale. As stated by Susan Jamieson in her work “Likert scales: how to (ab)use them”, (2004) response categories in Likert scales have a rank order, but the intervals between values cannot be presumed equal, which means the scale has to be interpreted as an ordinal scale. Taking this into consideration, it can be said that if the wrong statistical technique is used, the researcher increases the chance of coming to the wrong conclusion about the significance (or otherwise) of his research (Jamieson, 2004). (For a detailed overview on all variables with their statements please refer to “Variables” in the appendix).

Credibility “STAR”

Three items measured perceptions of the credibility of the texts as “accurate” (T204_01), “authentic” (T204_02) and “believable” (T204_03) on a five-star rating scale, inspired by Appelman & Sundar (2015). These items were combined, and a new variable CRED_STAR has been computed.

Credibility "LIKERT"

Twelve items measured perceptions of the credibility by the rating of statements about the text credibility, inspired by Christer Clerwall (2014), on a six-item Likert Scale from "*strongly disagree*" to "*strongly agree*". A selection of five items was combined (T202_01, T202_03, T202_08, T202_10, T202_12). In the end a new variable CRED_LIKERT has been computed.

General article comprehension

Eight items measured the general comprehension of the article by the rating of statements on a five-item Likert Scale from "*strongly disagree*" to "*strongly agree*" and, in addition, "*don't know*". Variables T105_01, T105_02 and T105_06 were reverse coded before computing. These items were combined, and a new variable TEXT_COMP has been computed.

To sum it up, these five-point Likert Scale item battery and the five-star rating of the three adjectives should measure the perceived message credibility and guarantee a high level of flexibility in the later methodological analysis of this variable. In addition, a general measure for text comprehension and perception should guarantee most flexibility in later analysis.

Populist Attitude

Populist attitude of the subjects was measured by items presented by Akkerman et. al.. In their study among Dutch citizens with 586 respondents performed in November 2011 it could be proven that populist attitudes can be measured by their items POP1-5 and Pop7 (Cronbach´s = .82). Using these items "a significant correlation between populist attitudes and the intention to vote for populist political parties" (p. 21) could be found. This was the case "for both the right-wing populist PVV and the left-wing populist SP" (p. 21) in the Netherlands (Akkerman, Mude, & Zaslove, 2013).

Six items measured the populist attitude by the rating of statements on a five-item Likert Scale from "*strongly disagree*" to "*strongly agree*" and, in addition, "*don´t know*". These items were combined, and a new variable POL_ATT was computed.

Information-seeking score

Information seeking was measured by the chosen preference for further information on the topic of the articles by the subjects. The participants were asked "*Which media channels you know personally would you choose to get more information on the topic of the text?*" and could rate their decision on a five-item Likert Scale ranging from "*definitely not*" to "*for sure*" and, in addition, "I *don't know this media*".

The items used to measure high quality media preference were: *The Washington Post (USA), The New York Times (USA), Bloomberg (UK), The Times (UK)* and *BBC (UK)*. A variable MEDIA_HI has been computed for reliability tests.

The items used to measure low quality media preference were: *New York Post (USA), FOX News (USA), Breitbart (USA), Daily Express (UK)* and *Russia Today (RUS)*. A variable MEDIA_LO was computed for reliability tests.

Finally, a MEDIA_SCORE variable was computed, which contained the mentioned items, that should provide data on the assumption "the lower the score, the higher the preference for low quality media" and vice versa.

Summary of Cronbach´s Alpha, mean, ranges and standard deviations:

Variable	No. of items	Cronbach's Alpha	*M*	Range	*SD*
CRED_STAR	3	.896	3.783	1 to 5	1.00236
CRED_LIKERT	5	.847	4.51	1 to 6	.936
POL_ATT	6	.714	3.826	1 to 5	.612
TEXT_COMP	8	.847	2.075	1 to 5	.75
MEDIA_HI	5	.843	2.928	1 to 5	.946
MEDIA_LO	5	.795	2.167	1 to 5	.686
MEDIA_SCORE	10	.855	2.467	1 to 5	.763

Table 1: General overview for the computed variables

Overall the created variables used for later measurements can be described as acceptable ($0.7 \leq \alpha < 0.8$) up to good ($0.8 \leq \alpha < 0.9$).

4.5. Manipulation Check

Due to the nature of the experimental setting, the manipulation check was conducted at the end. As priming effects may occur on a subliminal level (Bar & Biederman, 1998), the perception of the priming stimuli of this experiment in all groups should be measured. Furthermore, relating to Hoewe, it can be said that if the manipulation check fails in the later interpretation of the results this does not necessarily "suggest that participants were not aware of the subtleties of the stimulus they encountered. It also does not allow the researcher to rule out that some other portion of the stimulus caused the observed effect" (Hoewe, 2017, p.1). The manipulation check is to help find evidence for possible confounding variables in the later interpretation of the results as also recommended by Hoewe (2017).

Figure 3: Manipulation check for visual priming cues (SoSciSurvey preview mode)

The manipulation check was performed on the next-to-last page where the subjects were asked to select all images, they were able to remember from the first page (Fig. 3). All used pictures were mixed with additional pictures which were not part of the study. Those in the visual prime condition who correctly identified the correct picture sets (i.e., plane, yoga, food and fake news) indicated that the fake news prime was successful.

The plotted table results for the manipulation check imply that the manipulation check was successful (Fig. 4 in Appendix). The picture of Donald Trump with the fake news lettering was correctly recognized and checked only within the visual priming cue groups. Due to the obvious results no further statistical analysis was performed.

For the textual priming cue, the adaption of the same method was proved ineffective in a first test. It was described as impractical, inconvenient and tedious by the testing partners to read and recognize different text snippets with the correct wordings in a slightly altered sentence. Thus, a simple solution has been chosen, and the questionnaire asked the participants directly, if they had an idea about the subject of the survey. The later examination of the data unfortunately did not provide the expected results, as the statements were confusing and not interpretable in the intended way.

5. Results

5.1. Sample and Data Gathering

The sample was gathered via Amazon's Mechanical Turk, as it was shown by Buhrmester, Kwang & Gosling that "MTurk is a potential mechanism for conducting research in psychology and other social sciences and survey or experiments via MTurk yielded generally promising findings" and "the quality of data provided by MTurk met or exceeded the psychometric standards associated with published research" (Buhrmester, Kwang, & Gosling, 2011, p. 5). Nevertheless, the gathered sample is not representative for the U.S. population.

The first study (study_1) was conducted on August 22, 2019 with (N = 360) participants. The previous MTurk workers who were part of the pretest were excluded from participation. After the first view of the data, it turned out that it was necessary to add more data samples to improve the quality of the data and to reach at least 50 participants for each group. The second batch of the study was also conducted on August 22, 2019 with (N = 360) participants and also with unbiased MTurk workers only (i.e., former study participants were excluded). The preview of the collected data required a third batch that was performed on August 23, 2019 (N = 100) also under exclusion of MTurk workers who participated previously.

The final data consisted of N = 433 valid questionnaires. The average age was almost 41 years (M = 40.71, SD = 13.5) within a range from 18 to 81 years. Among the participants, 247 were females (57%) and 186 males (43%). Overall, the educational background of the sample can be described as high. The majority of the subjects reported to have a "University degree" (53.8%) followed by 16.9% who held a "Vocational secondary certification (completion of specialized secondary school/college)" and 8.8% who have a "General Certificate of secondary education".

The majority of the participants preferred online channels as their primary information source (64.9%), followed by television (25.9%), radio (4.6%) and – surprisingly – newspapers at last (3.7%). The time spent informing themselves about current events was with 43.7% "less than 1 hour" per day, also 43.7% "1-3 hours" per day, only 8.8%, who "do not inform themselves about the news every day" and 4.8%, who spend "more than three hours per day" informing themselves.

All subjects were residents of the United States of America and randomly assigned to one of six experimental groups (scientific text $N = 182$; journalistic text $N = 251$). After completing the study and providing the correct "proof of work code" (displayed on the last page of the survey) every MTurk participant received a compensation of USD $0.25. The overall costs of USD $294.00 were self-funded by the author of this work.

5.2. Data Cleaning

The cleansing of the data consisted of several steps to improve the validity and reliability of the completely submitted questionnaires ($N = 806$) after those two batches. Questionnaires were rated as complete, if the survey was submitted by a MTurk worker with the correct randomly assigned "proof of work code" at the final page of the questionnaire. The average processing time of the questionnaire was 450 seconds or 7 minutes and 30 seconds ($M = 450{,}17$; $SD = 202{,}87$). Due to the different lengths of the texts, the data had to be split, which resulted in different processing times for both groups ($M = 470{,}96$; $SD = 221{,}15$ for the longer scientific text and $M = 431{,}44$; $SD = 183{,}11$ for the shorter, journalistic text). In the groups, all cases with a processing time of less than 250 seconds (248 seconds) were deleted. Thus, 124 participants were deleted due to not achieving the required minimum processing time.

The remaining 683 cases were controlled for proper reading of the text by two questions regarding the contents of the text (i.e., *T_103:"What is the main cause for global warming mentioned in the text?"*, correct answer: *"Increasing air traffic and contrails"* and T_106: *"Which types of CLOUDS can develop that are causing the mentioned global warming effects?"*, correct answer *"Cirrus clouds"*). Each case that answered one of those questions wrong was also excluded from the later analysis to assure that the subject read the text with the necessary attention (i.e., *T_103*: -162 and *T_106*: -86). Deleting the cases with false answers resulted in a sum of valid cases of $N = 435$. Two more cases were also excluded due to a reported age of 14 years. Amazon's MTurk workers must be 18 years or older to register as a worker. Consequently, the final dataset contained $N = 433$ valid cases.

The remaining experimental group sizes were:

Text	Priming	Label	*N* (valid cases)
Scientific	No priming (Control)	(Control_S)	58
Scientific	Visual	(Visual_S)	66
Scientific	Textual	(Textual_S)	58
Journalistic	No priming (Control)	(Control_J)	89
Journalistic	Visual	(Visual_J)	77
Journalistic	Textual	(Textual_J)	85

Table 2: Valid cases by group

5.3. Statistical Analysis

To test our hypotheses, between-groups comparisons as independent samples T-test (between two groups) and ANOVA (between more than two groups) are in line for the analysis. A separate ANCOVA was conducted for the covariate of populist attitude in RQ1. The mean scores within the groups are summarized in Table 3.

Variable / Group	CRED_STAR		CRED_LIKERT		POL_ATT		TEXT_COMP		MEDIA_HI		MEDIA_LO	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
CONTROL_S	3.88	.830	4.50	.662	3.78	.609	2.43	.737	2.84	1.063	1.84	.686
VISUAL_S	3.83	1.020	4.49	.960	3.78	.672	2.41	.794	2.90	.894	2.23	.806
TEXTUAL_S	3.82	.886	4.50	.812	3.74	.529	2.96	.932	2.96	.932	2.14	.783
CONTROL_J	3.64	1.193	4.55	1.107	3.94	.603	1.83	.740	2.90	.953	2.29	.928
VISUAL_J	3.85	1.020	4.46	1.00	3.77	.677	1.88	.635	2.98	.971	2.22	.752
TEXTUAL_J	3.74	.946	4.54	.918	3.87	.558	1.79	.600	2.97	.939	2.10	.895

Table 3: Mean scores and standard deviations within the groups.

RQ1: "Do visual or textual fake news priming cues in online news environments have an impact on the perception of credibility of scientific news articles on subjects with a populist attitude?"

Before conducting the ANCOVA, it has been tested if the relationship between the covariate POL_ATT and the dependent variable was linear. An ANOVA revealed a *p*-value of .345, and, therefore, independency can be assumed. Tests for homogeneity of variances (Shapiro-Wilk) revealed a non-optimal distribution of normality within the groups Visual_S ($p = .030$) and Control_J ($p = .045$). Nevertheless, the visual data interpretation did not reveal strong deviations from a normal distribution (see Fig. 5, 6 and 7 in the Appendix). Tests for homogeneity of regression slopes revealed a *p*-value of .373 (Group × POL_ATT) (see Fig.8 in the Appendix). Thus, the interaction terms are not significant

and this precondition is also fulfilled. Some outliers could be measured within the groups (see Fig.9 in the Appendix). In summary, the dataset is not optimal to perform an ANCOVA, but is considered as acceptable for the needs of this work.

Testing H1.a and H1.b among this sample by an ANCOVA did not provide support for the hypotheses. No significant main effect of populist attitude (POL_ATT) on the perception of credibility of the articles could be found between the groups ($F = .873$, $p = .499$, partial $\eta 2 = .012$), (see Fig. 10 in the Appendix).

In other words, subjects' populist attitudes had no influence on the perception of the article's credibility between the groups. Due to this, the null hypothesis "Exposition to a visual or textual priming cue will have no effect on the perceived credibility of the scientific news articles, regardless of the populist attitudes of the subject" cannot be rejected.

RQ2: "Do visual or textual fake news priming cues affect the subject's information-seeking behavior?"

Testing H2.a and H2.b among this sample did not provide support for the hypotheses corresponding to RQ2. T-tests for independent samples showed no significant differences between the *control* and *visual prime* groups as well as between the *control* and *textual prime* groups using MEDIA_SCORE as measure of changes in information-seeking behavior. Therefore, the null hypothesis cannot be rejected.

Variable/ between-group	**MEDIA_SCORE**					
	t	*p (two-tailed)*	$M_{control}$	$SD_{control}$	M_{group}	SD_{group}
Control_ – visual_	(118) -1.299	.196	2.36	.790	2.54	.704
Control_ – textual_	(111) -.931	.363	2.36	.790	2.45	.800

Table 4: T-test results between the groups with MEDIA_SCORE as measurement

RQ3: *"Do visual or textual fake news priming cues in online news environments have a stronger impact on subjects' perception of credibility who read a scientific article or a journalistic article?"*

Testing H3.a and H3.b among this sample did not provide support for the hypotheses corresponding to RQ3. T-tests for independent samples showed no significant differences between the *control* and *visual prime* group as well as between the *control* and *textual prime* group. There also was no significant difference between the scientific article or the journalistic article using CRED_STAR or CRED_LIKERT as measure of changes in the perceived credibility. Therefore, the null hypothesis cannot be rejected.

Article / between-group	Scientific article		Journalistic article	
	t	*p (two-tailed)*	*t*	*p (two-tailed)*
Control_ – visual_	(122) .303	.830	(164) -1.201	.231
Control_ – textual_	(114) .397	.692	(172) -.592	.554

Table 5: T-test results between the groups with CRED_STAR as measurement

Article / between-group	Scientific article		Journalistic article	
	t	*p (two-tailed)*	*t*	*p (two-tailed)*
Control_ – visual_	(108) .064	.949	(146) .493	.623
Control_ – textual_	(102) -.023	.982	(154).055	.957

Table 6: T-test results between the groups with CRED_LIKERT as measurement

RQ4: *"Do visual or textual fake news priming cues in online news environments affect the subject's perception of credibility in general?"*

Testing H4.a and H4.b among this sample did not provide support for the hypotheses corresponding to RQ4. T-tests for independent samples showed no significant differences between the *control* and *visual prime* group or between the *control* and *textual prime* group. Therefore, the null hypothesis cannot be rejected.

Article / between group	Perception of article credibility (both articles)	
	t	*p (two-tailed)*
Control_ – visual_	(288) -.854	.394
Control_ – textual_	(288) -.295	.768

Table 7: T-test results between the groups with CRED_STAR as measurement

Article / between group	Perception of article credibility (both articles)	
	t	*p (two-tailed)*
Control_ – visual_	(256) .452	.652
Control_ – textual_	(258) .043	.966

Table 8: T-test results between the groups with CRED_LIKERT as measurement

5.4. Additional Analysis

Although preceding analysis could not measure any significant main effects of the assumed hypotheses some other effects could be found within the dataset. A significant statistical coherence, not causality, between some of the used variables could be observed and outlined in the following.

Information-seeking behavior and perception of credibility

There is a measurable main effect between the perception of credibility (CRED_LIKERT) of the texts and the information-seeking behavior (MEDIA_SCORE) F(32,137) = 2,102, p = .002. This effect could also be measured within the MEDIA_HI F(19,128) = 4,286, p = .000 and MEDIA_LO F(16,156) = 1,960, p = .019 groups. For further analysis the variable CRED_LIKERT has been recoded into a new variable CRED_LO_HI and separated into two ranges ("low credibility" and "high credibility") whilst splitting the results in half by the mean of CRED_LIKERT (M = 4,36). Although the overall credibility of the scientific articles can be considered as high a statistically significant coherence could be measured F(1,122) = 6,399, p = 0.013. This can be interpreted that subjects who reported a higher media score (i.e., consummation of high-quality media for further information on this topic) experienced the scientific articles as more credible (see Fig. 11 in Appendix). Those findings are coherent with the work of Park & Fletcher (2017) and Vraga, Tully, Akin, & Rojas (2012).

Populist attitude and perception of credibility

Within the data it could be shown that there is a significant statistic connection between the measured populist attitude (POL_ATT) and the perception of credibility of the scientific articles. For this test POL_ATT has been recoded into POL_LO_HI, by again separating the variable into two ranges ("politics low" and "politics high") whilst splitting the results in half by the mean of POL_ATT (M = 3,83). The results revealed a significant coherence between those variables F(1,299) = 605,126, p = .000, (see Fig. 12 in Appendix). These results can be interpreted in such a way that those subjects with a high populist score (i.e., people who tend to vote for a populist party) also perceived the scientific texts as less credible (see Fig. 13 in Appendix). Those findings are corresponding with the findings of Akkerman, Mude, & Zaslove (2013) and Hmielowski, Feldman, Myers, Leiserowitz, & Maibach (2014).

6. Discussion

The current study investigated the theories behind textual and visual fake news priming cues in online news environments and their possible effects on the perception of credibility of scientific news. No main effects or interaction effects could be measured within the collected data sample. Although minor tendencies without statistical significance within the mean comparisons were observed, the statistical analyses provided no support for all of the hypotheses examined in this study. In relation to the fake news topic, and its potential threats to democracy, some might be pleased about the actual findings that no effects of such primes could be measured despite the assumptions based on the literature review. A closer look at the current work and the concomitant method should help to better understand the findings and its results.

This study is limited by multiple factors. In general, there are inherent challenges regarding the reliability of experimental settings, if subliminal effects on an individual level should be measured. This limitation is based on the nature of the performed study that it cannot be tested whether the measured or not measured effects persist beyond the experimental setting. Of course, it should be mentioned that this limitation would also be relevant, if the findings confirmed the assumed effects. The methodical setting and the way of data acquisition via Amazon's Mechanical Turk made the final dataset exceedingly problematic to analyze and interpret. Most important in this context is that about 15% of the cases had to be deleted due to insufficient processing time by the participating MTurk workers. In addition, another 37% were excluded from later analysis of the remaining 682 subjects because of the subjects not answering the control questions correctly. Even though the sample for each experimental group was higher than 50, the assumed effects could not be measured. One of the reasons may be that MTurk workers did not complete the study with the necessary diligence. As MTurk workers get paid by task and not by time, the MTurks likely attempt to process more tasks in short periods of time. The actual study used a relatively high compensation amount (USD $0.25) in relation to the previously estimated task length of approximately 8-10 minutes based on the recommendations by Buhrmester, Kwang, & Gosling (2011). Following their research even at low compensation rates, payment levels should not affect data quality. Recent research by van Duyn & Collier (2018), however, successfully measured the impact of priming effects within the context of exposure to fake news primes with a smaller sample (N = 299) that was also recruited via Amazon´s Mechanical Turk. The second factor presumably confounding the data, was the non-representative, highly educated sample with 53.8% of the subjects holding an

University Degree (van Duyn & Collier: 43.5% with four-year college degree or more). The literature states that education and training in high-media literacy skills (Vraga, Tully, Akin, & Rojas, 2012) (Bode & Vraga, 2015) (Cheever & Rokkum, 2015) (Scheufele & Krause, 2019) or science literacy skills (Leshner, 2017) may counter steer the general fake news problem. In addition, it shall be mentioned that the news consumption behavior of the sample can be seen on a high level. More than 60% preferred the internet as their first information source with over 40% spending between 1-3 hours a day consuming news. Measuring the perceived credibility of scientific news is not optimal within a sample like this, as there is an inherent correlation between higher education and scientific knowledge. These data of the gathered sample correspond with the overall high mean scores in the perceived credibility of the scientific articles, regardless of their type ($M_{CRED\_STAR} > 3.64$, $M_{CRED\_LIKERT} > 4.46$). This suggests that the subjects showed no measurable effects due to their high educational level, intensive news consumption behavior and also the overall high assessment of the scientific articles in terms of credibility.

Despite its limitations, this study is not without its strengths. Although the sample was not optimal, the literature review strongly supports the assumed effects and gives an actual overview about current research on this topic. Fake News is still a prevailing problem that polarizes society and causes echo chambers and filter bubbles. Some implications for further research emerged for the Fake News phenomenon in all its complexity. Further research should focus on broader investigation of all its aspects to help communication scholars to better understand the mechanisms and effects behind it. In addition, the actual study included exposure to two scientific news articles on the same topic within an educated sample combined with subtle priming cues. Future research may therefore, on the one hand, research more controversial scientific topics that do not score high in the perception of credibility, and, on the other hand, focus on research on other important topics as well (e.g., political topics) and examine the potential impacts of fake news, in direct or indirect ways, on the perception of credibility. In addition, this study did not control for arousal as recommended by Lang et.al., (2007) and Porter et.al. (2014). A high level of arousal may confound the findings in the later experimental setting and also the fact that emotion generally influences susceptibility to misinformation (Lang et.al., 2007; Porter et.al., 2014). This plays a key role in measuring priming effects. Further studies should also research this connection between Fake News and the Paradoxical Negative Emotion (PNE) hypothesis. Nevertheless, this studies additional analysis could in the end replicate some previous findings regarding general media consumption and the perception of credibility, as shown by Park & Fletcher (2017) or Vraga, Tully, Akin, & Rojas (2012) and also replicate the

findings about populist attitudes and the perception of credibility as shown by Akkerman, Mude, & Zaslove, (2013).

Overall, in the light of actual developments, the research on the impacts of fake news in a scientific context is particularly important, as it is known that especially partisan media can polarize the electorate by taking relatively extreme citizens and making them even more extreme (Levendusky, 2013). Additionally, the public's lack in ability of understanding basic scientific facts and the scientific process itself (Scheufele & Krause, 2019) make this even more important in today's climate. As stated in the introduction, news about actual scientific findings is essential for all kinds of decision-making processes. In the near future several pathbreaking decisions have to be made about global climate warming, energy transition and immigration to name but a few. One must hope that those decisions will be made based on unbiased, scientific facts with all decision makers having a, as Hemingway put it, "*built-in, shockproof, shit detector*".

Funding

This research was self-funded by the author of this work.

8. Appendix

8.1. Abstract (English)

In these times, Fake News and purposeful misinformation have grown so powerful that they threaten to endanger democracy. It is essential for individuals to base decisions on unbiased, manipulation-free facts. This study investigated the theories behind textual and visual fake news priming cues in online news environments and their possible effects on the perception of credibility of scientific news. In addition, a 2×3 cross-sectional online quasi experiment among U.S. citizens was conducted via Amazon's Mechanical Turk to prove potential effects of selected fake news priming cues. The experiment exposed the subjects (N = 436) to one of two scientific news articles about the same topic combined with subtle priming cues in a visual or textual form. No main effects or interaction effects could be measured within the collected data, despite the assumptions based on the literature review. Additional analysis confirmed previous findings about the coherence between populist attitudes, information-seeking behavior and the perception of credibility. Despite its limitations, this study gives an overview about current research on the topic of Fake News and also its direct or indirect impact on public opinion.

8.2. Abstract (Deutsch)

In Zeiten, in denen ‚Fake News' oder zielgerichtete Desinformation zu demokratiegefährdenden Bedrohungen herangewachsen sind, ist es essentiell geworden die eigenen Entscheidungen unvoreingenommen und faktenbasierend zu treffen, bestenfalls gänzlich frei von Manipulation. Die vorliegende Studie untersucht die Theorien hinter dem Phänomen ‚Fake News' – in Verbindung mit visuellen und textlichen Priming Reizen – sowie die potenziellen Effekte auf die Wahrnehmung der Glaubwürdigkeit von wissenschaftlichen Nachrichteninhalten. Um diese Effekte zu messen, wurde ein randomisiertes 2×3 online quasi Experiment unter US-StaatsbürgerInnen (N = 436) durchgeführt. Die StudienteilnehmerInnen wurden via Amazon's Mechanical Turk rekrutiert und per Zufallsgenerator in eine der drei Gruppen zugeteilt (Kontrollgruppe, visuelles Priming, textliches Priming). Im weiteren Verlauf des Experiments wurde die wahrgenommene Glaubwürdigkeit von jeweils einem von zwei wissenschaftlichen Nachrichtenartikeln zum selben Thema getestet. Trotz eindeutiger Hinweise in der Literatur konnte keine der aufgestellten Hypothesen nachgewiesen und auch keine weiteren Nebeneffekte festgestellt werden. Zusätzliche Untersuchungen des Datensatzes bestätigten

jedoch Untersuchungsergebnisse vorheriger Studien zur Wirkung von populistischer Einstellung, oder dem Informationsverhalten, im Zusammenhang mit der Wahrnehmung von Glaubwürdigkeit. Trotz ihrer methodischen Einschränkungen gibt die vorliegende Studie eine umfangreiche Übersicht über den aktuellen Stand der Forschung zum Thema ‚Fake News' sowie Aufschluss über die direkten und indirekten Auswirkungen von ‚Fake News' auf die öffentliche Meinung.

8.3. Plots of Statistical Analysis

MC_trump_visual

random: Code drawn			Frequency	Percent	Valid Percent	Cumulative Percent
control_S	Valid	Not checked	56	96,6	96,6	96,6
		Checked	2	3,4	3,4	100,0
		Total	58	100,0	100,0	
visual_S	Valid	Not checked	34	51,5	51,5	51,5
		Checked	32	48,5	48,5	100,0
		Total	66	100,0	100,0	
textual_S	Valid	Not checked	57	98,3	98,3	98,3
		Checked	1	1,7	1,7	100,0
		Total	58	100,0	100,0	
control_J	Valid	Not checked	87	97,8	97,8	97,8
		Checked	2	2,2	2,2	100,0
		Total	89	100,0	100,0	
visual_J	Valid	Not checked	24	31,2	31,2	31,2
		Checked	53	68,8	68,8	100,0
		Total	77	100,0	100,0	
textual_J	Valid	Not checked	84	98,8	98,8	98,8
		Checked	1	1,2	1,2	100,0
		Total	85	100,0	100,0	

Figure 4: Table with within group frequencies for the visual fake news prime

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	random: Code drawn	Statistic	df	Sig.	Statistic	df	Sig.
POL_ATT	control_v1	,134	53	,018	,960	53	,075
	visual_v1	,116	60	,043	,956	60	,030
	textual_v1	,094	51	,200*	,977	51	,407
	control_v2	,103	83	,029	,969	83	,045
	visual_v2	,066	72	,200*	,978	72	,226
	textual_v2	,089	80	,177	,981	80	,297

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Figure 5: Results from the tests of normality from ANCOVA

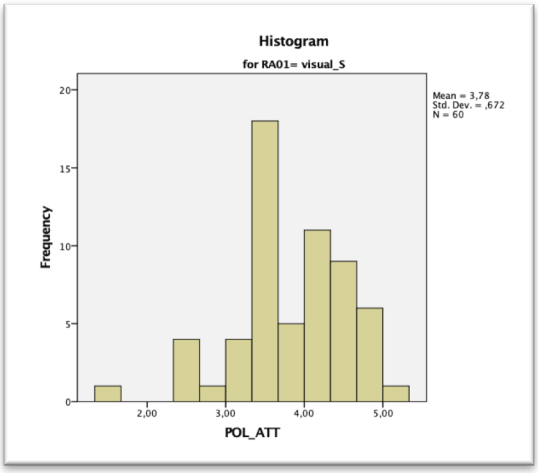


Figure 6: Frequencies of POL_ATT within the group Visual_S (tests for normality)

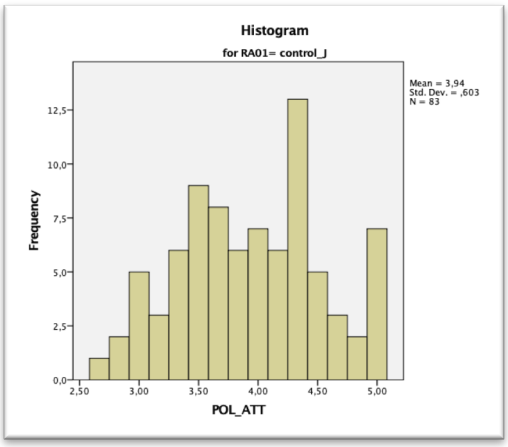


Figure 7: Frequencies of POL_ATT within the group control_J (tests for normality)

Tests of Between-Subjects Effects

Dependent Variable: CRED_LIKERT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	9,779[a]	11	,889	1,197	,287	,036
Intercept	131,125	1	131,125	176,576	,000	,334
RA01	3,843	5	,769	1,035	,397	,014
POL_ATT	1,205	1	1,205	1,623	,204	,005
RA01 * POL_ATT	3,996	5	,799	1,076	,373	,015
Error	261,394	352	,743			
Total	7258,063	364				
Corrected Total	271,174	363				

a. R Squared = ,036 (Adjusted R Squared = ,006)

Figure 8: Results from the homogeneity of regression tests for ANCOVA

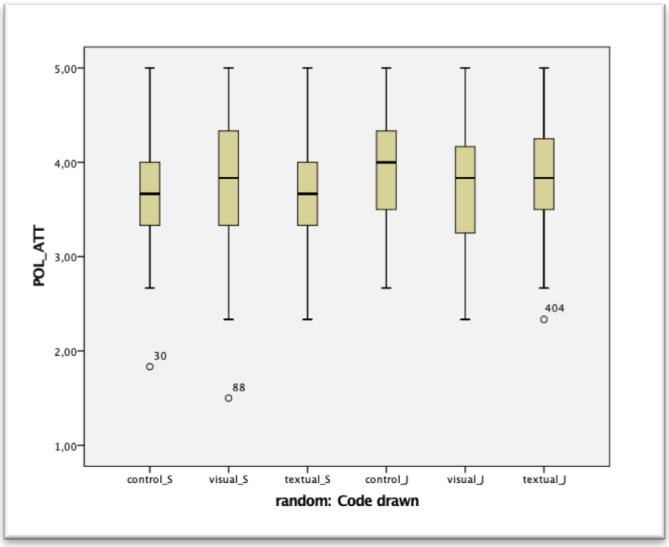


Figure 9: Box-plots with outliners of POL_ATT within the groups

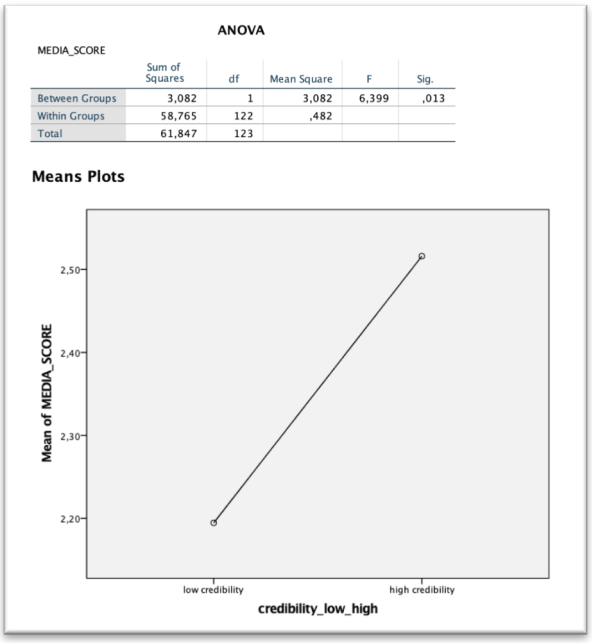
Tests of Between-Subjects Effects

Dependent Variable: CRED_LIKERT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5,784[a]	6	,964	1,297	,258	,021
Intercept	133,380	1	133,380	179,422	,000	,334
POL_ATT	1,945	1	1,945	2,617	,107	,007
RA01	3,244	5	,649	,873	,499	,012
Error	265,390	357	,743			
Total	7258,063	364				
Corrected Total	271,174	363				

a. R Squared = ,021 (Adjusted R Squared = ,005)

Figure 10: Results ANCOVA to test H1.a and H1.b



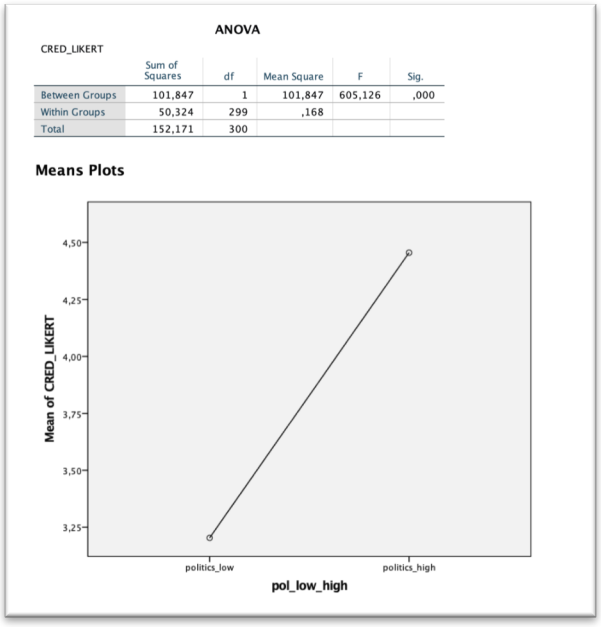
ANOVA

MEDIA_SCORE

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,082	1	3,082	6,399	,013
Within Groups	58,765	122	,482		
Total	61,847	123			

Means Plots

Figure 11: Results ANOVA (additional analysis for credibility and media score)



ANOVA

CRED_LIKERT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	101,847	1	101,847	605,126	,000
Within Groups	50,324	299	,168		
Total	152,171	300			

Means Plots

Figure 12: Results ANOVA (additional analysis for credibility and populist attitude)

credibility_low_high * pol_low_high Crosstabulation

			pol_low_high		
			politics_low	politics_high	Total
credibility_low_high	low credibility	Count	95	81	176
		Expected Count	55,5	120,5	176,0
	high credibility	Count	0	125	125
		Expected Count	39,5	85,5	125,0
Total		Count	95	206	301
		Expected Count	95,0	206,0	301,0

Figure 13: Crosstabs overview (additional analysis for credibility and populist attitude)

8.4. Used Variables and their Encoding

Presented in chronological order as the participants filled out the questionnaire.

P 01			**DEMOGRAPHICS**
Qst	**SD01**	**Sex**	
Ttl			What is your gender?
Itm		SD01_01	female
Itm		SD01_02	male
Qst	**SD11**	**Age**	
Ttl			How old are you?
Itm		SD11_01	Please type in your age in years
Qst	**SD10**	**Education**	
Ttl			What is the highest level of education you have completed?
Itm		SD10_01	Still in school
Itm		SD10_02	Finished school with no qualifications
Itm		SD10_03	Secondary school-leaving certificate/Junior High Diploma
Itm		SD10_04	General Certificate of Secondary Education (GCSEs)
Itm		SD10_06	Vocational secondary certification (completion of specialized secondary school/college)
Itm		SD10_07	A-levels/International Baccalaureate, subject-related higher education entrance qualification
Itm		SD10_08	University degree
Itm		SD10_09	Other school-leaving qualification:
Qst	**SD08**	**Country**	
Ttl			Which is the country, you're currently living?
Ins			(Please start typing and choose the recommended country)
P 02			**Random assignment to CONTROL / VISUAL PRIME / TEXTUAL PRIME and SCIENTIFC or JOURNALISTIC TEXT**
Qst	RA01	random	
P 03			**Comprehension**
Qst	T107	Comprehend_DEVICE	
Ttl			On which device you are participating in this study?
Itm		T107_01	Desktop (PC,MAC)
Itm		T107_02	Desktop (LINUX/UNIX)
Itm		T107_03	Desktop (other)
Itm		T107_04	Mobile (Smartphone: iPhone/Android)

Itm		T107_05	Mobile (Tablet: iPad or other)
Itm		T107_06	Mobile (other)

Qst T103 Comprehend_T_CONTRAILS

Ttl		What is the main cause for global warming mentioned in the text?
Ins		Please select the correct answer
Itm	T103_01	Decreasing air traffic and contrails
Itm	T103_02	Increasing air traffic and chemtrails
Itm	T103_03	Increasing air traffic and contrails
Itm	T103_04	Decreasing air traffic and chemtrails

Qst T106 Comprehend_T_CIRRUS

Ttl		Which types of CLOUDS can develop that are causing the mentioned global warming effects?
Ins		Please select the correct answer
Itm	T106_01	Stratocumulus clouds
Itm	T106_02	Cumulus Clouds
Itm	T106_03	Cumulonimbus clouds
Itm	T106_04	Cirrus clouds

Qst T105 comp_understand

Ttl		Please rate the following statements as accurate and as honest as possible depending on your own perception.
Ins		Please keep also in mind that there are NO FALSE answers.
Val		1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree, -1=don't know, -9=Not answered
Itm	T105_01	I fully understood the information in the text
Itm	T105_02	I read the whole text from beginning to the end
Itm	T105_03	Sometimes I skipped some sentences
Itm	T105_04	I read the text just briefly
Itm	T105_05	Some of the information were hard to understand
Itm	T105_06	I think the text was very easy to understand
Itm	T105_07	It took me some effort to follow the author
Itm	T105_08	Not every aspect was easy understandable

Qst T204 CRED_1

Ttl		Please also rate your personal perception of the text based on the following adjectives on a 5-star scale!
Val		1=, 2=, 3=, 4=, 5=, -9=Not answered
Itm	T204_01	The text is accurate
Itm	T204_02	The text is authentic
Itm	T204_03	The text is believable

P 04 Credibility & Media

Qst T202 CRED_2

Ttl		Please read the following statements carefully and choose an answer depending on your own perception of the text.
Val		1=strongly disagree, 2=disagree, 3=slightly disagree, 4=slightly agree, 5=agree, 6=strongly agree, -1=don't know, ...
Itm	T202_01	The text is objective
Itm	T202_02	I trust the provided information in the text
Itm	T202_03	The text is accurate
Itm	T202_04	I think the text is boring
Itm	T202_05	The text is interesting
Itm	T202_06	The text was pleasant to read
Itm	T202_07	The provided information are clear
Itm	T202_08	The text is informative
Itm	T202_09	The text is well written
Itm	T202_10	The information in the text is useful
Itm	T202_11	I think the text is descriptive
Itm	T202_12	I think the provided information are coherent

Qst T203 channel_further_news

Ttl		Which media channels you know personally would you choose to get more information on the topic of the text?
Ins		If you don´t know a media channel, feel free to mark “I don’t know this media”
Val		1=definitely not, 2=no, 3=maybe, 4=yes, 5=for sure, -1=I don't know this media, -9=Not answered
Itm	T203_01	Washington Post (newspaper, USA)
Itm	T203_02	New York Times (newspaper, USA)
Itm	T203_03	New York Post (newspaper, USA)
Itm	T203_04	The Sun (newspaper, UK)
Itm	T203_05	Fox news (TV, USA)
Itm	T203_06	Bloomberg (TV, UK)
Itm	T203_07	ARD (TV, GER)
Itm	T203_08	Zeit (newspaper, GER)
Itm	T203_09	Bild Zeitung (newspaper, GER)
Itm	T203_10	Daily Express (newspaper, UK)
Itm	T203_11	The Times (newspaper, UK)
Itm	T203_12	Financial Times (newspaper, UK)
Itm	T203_13	Wall Street Journal (newspaper, USA)
Itm	T203_14	BBC (TV, UK)
Itm	T203_15	Buzzfeed (online)
Itm	T203_16	Reddit (online)
Itm	T203_17	Wikipedia (online)
Itm	T203_18	Süddeutsche Zeitung (newspaper, GER)
Itm	T203_19	Breitbart (online, USA)
Itm	T203_20	Russia Today (TV, online, RUS)
Itm	T203_21	Al Jazeera (TV, Quatar)
Itm	T203_22	The Times of India (newspaper, IND)

Qst	**Y201**	**media_consumption**	
Ttl			How much time do you spend on news consumption per day?
Itm		Y201_01	I do not inform myself about the news every day
Itm		Y201_02	less than 1 hour
Itm		Y201_03	1-3 hours
Itm		Y201_04	more than three hours per day

Qst	**Y202**	**media_consumption**	
Ttl			Which media channel do you prefer to to stay informed about current events and public affairs?
Itm		Y202_01	Television
Itm		Y202_02	Newspaper
Itm		Y202_03	Radio
Itm		Y202_04	Online
Itm		Y202_R1	other

P 05 Populist Attitude

Qst	Y102	POL_ATITUDE	
Ttl			Please read the following statements carefully and tell us how much they match your personal views.
Val			1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree, -1=don't know, -9=Not answered
Itm		Y102_01	The politicians in the parliaments need to follow the will of the people
Itm		Y102_02	The people, and not politicians, should make our most important policy decisions
Itm		Y102_03	The political differences between the elite and the people are larger than the differences among the people
Itm		Y102_04	I would rather be represented by a citizen than by a specialized politician.
Itm		Y102_05	Elected officials talk too much and take too little action.
Itm		Y102_07	What people call “compromise” in politics is really just selling out on one’s principles.

P 06 Manipulation check textual

Qst	MC02		
Ttl			What do you think was the true purpose of this survey?
Ins			Feel free to share your thoughts with us
Itm		MC02_01	

P 07 Manipulation check visual

Qst	MC01		
Ttl			Last question: Remember the first page? Please select all images you can remember seeing there!
Val			1=Not checked, 2=Checked
Itm		MC01_01	<img src="https://www.####.##/survey/test/mc/mc_01.jpg" alt="yes" class="img-responsive-width" style="max-height: 120px;">
Itm		MC01_02	<img src="https://www.####.##/survey/test/mc/mc_02.jpg" alt="no" class="img-responsive-width" style="max-height: 120px;">
Itm		MC01_03	<img src="https://www.####.##/survey/test/mc/mc_03.jpg" alt="yes" class="img-responsive-width" style="max-height: 120px;">

Itm		MC01_04	<img src="https://www.####.##/survey/test/mc/mc_04.jpg" alt="no" class="img-responsive-width" style="max-height: 120px;">
Itm		MC01_05	<img src="https://www.####.##/survey/test/mc/mc_05.jpg" alt="no" class="img-responsive-width" style="max-height: 120px;">
Itm		MC01_06	<img src="https://www.####.##/survey/test/mc/mc_06.jpg" alt="yes" class="img-responsive-width" style="max-height: 120px;">
Itm		MC01_07	<img src="https://www.####.##/survey/test/mc/mc_07.jpg" alt="no" class="img-responsive-width" style="max-height: 120px;">
Itm		MC01_08	<img src="https://www.####.##/survey/test/mc/mc_08.jpg" alt="yes" class="img-responsive-width" style="max-height: 120px;">
Itm		MC01_09	<img src="https://www.####.##/survey/test/mc/mc_09.jpg" alt="no" class="img-responsive-width" style="max-height: 120px;">
Itm		MC01_10	<img src="https://www.####.##/survey/test/mc/mc_10.jpg" alt="no" class="img-responsive-width" style="max-height: 120px;">
Itm		MC01_11	<img src="https://www.####.##/survey/test/mc/mc_11.jpg" alt="yes" class="img-responsive-width" style="max-height: 120px;">
Itm		MC01_12	<img src="https://www.####.##/survey/test/mc/mc_12.jpg" alt="no" class="img-responsive-width" style="max-height: 120px;">

P 08 Amazon’s Mechanical Turk code displayed

Qst	RA02	mturkcode

Figure 14: Used visual Fake News prime in the "Editor’s Pics" area

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