# The Priming of Scepticism and its possible role in detecting Fake and Real News about Climate Change

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#### Abstract

The topic of fake news gained a lot of attention in recent years and displays an increasing danger for society now and in the future. Gaining more insight into concepts which could play a role in peoples trust level in real or fake news can be valuable in developing methods for combating the spread of fake news. The aim of this study was to measure the impact the priming of scepticism could have on the level of scepticism of participants and their ability to differentiate real from fake news, with the focus on news about climate change. In order to do this participants (N=114) took part in a study in which they were put in two conditions and were either exposed to a scepticism primer or not exposed to said primer and had to fill out a set of questionnaires. The participants ability to differentiate real and fake news from each other was measured by having them read several news articles, some of which were real news articles and some of which were fake and having them answer a few questions about the news articles. Furthermore, the participants had to fill out a questionnaire which measured their level of scepticism. The study revealed that participants in the priming condition had a higher level of scepticism. However, the priming had no significant effect on their ability to differentiate real from fake news. Additionally, it was not possible to establish a correlation between the concept of scepticism and the ability to differentiate real from fake news.

#### Introduction

While being an existing phenomenon for a long time already in human history the topic of fake news has seen an increase in interest over the recent years. Especially during the US-presidential elections of 2016 it was a thoroughly discussed topic that had important impacts on the course of the election (Burkhardt, 2017). Also, with the rise of the internet in the last decades, fake news have found a platform to be spread around in dimensions which had never been possible before. However, the impacts on society, which the spread of fake news has can be detrimental due to the fact that they are able to alter the opinion of large parts of the population on topics like politics, global warming or medicinal topics like vaccinations (Spohr, 2017). In order to act against the possible impact of fake news this study investigates possible variables which could play a role in decreasing the effect and trustworthiness of fake news on people and tries to develop methods on how to counteract fake news, by enabling people to properly identify fake news.

#### Defining fake news and attributes of fake news

Before defining the term 'fake news' it would be wise to define the term news. News can be defined as 'A news item or news report, i.e., a text or discourse on radio, on TV or in the newspaper, in which new information is given about recent events' (Dijk, 2009). Furthermore, fake news can be defined as 'fabricated information that mimics news media content in form but not in organizational process or intent' (Lazer et al. 2018). These news can be spread through different ways on social media, be it through sharing of videos, news from news websites or through sharing of information obtained from news sources on social media.

The term fake news is used in various different ways by different figures of the public. It can include different types of fabricated information. According to one definition it can include the types 'Serious Fabrications', news which can include false or exaggerated information with the intention to catch the attention of the reader and make him or her believe the received information, 'Large-Scale Hoaxes', which are made up stories that are picked up and later reported by other people or 'Humorous Fakes', which are information, that are not produced with the intention to be taken seriously, like in the case of satire (Rubin, Chen, Conroy, 2015). For clarities sake, this paper will only include fake news, which are defined as Serious Fabrications and are made up with the intention to be taken seriously.

#### Spread of fake news

One of the main reasons why fake news were able to be spread around in the extend they are was the emergence and the rise of the use of social media. By 2016 Facebook had 1,79 billion monthly users while Twitter had around 317 million monthly users (Mansfield, 2016). Also, in a study from 2018 around 45% of US-Teenagers who took part in the study indicated that they are connected to the internet on a nearly constant basis (Anderson, Jiang, 2018). Social media therefore has become an omni-present and time-consuming aspect in the life of many people.

Around 62 % of US-adults indicate that they read news from social media (Allcott & Gentzkow, 2017), which makes social media an important source of news. The websites Facebook and Twitter are the most used websites when it comes to online news. However, these websites can include, next to 'real news' also a large amount of fake news. The fact is that among the real news which are consumed online by the people, there is also a significant part of fake news.

There are different ways how fake news are spread on social media. One way how this is possible is through sharing by people or through the use of bot accounts - software programmes which are posting fake news on social media. Through the different channels of sharing it is possible to share a large amount fake news, which by their presence, can reach a larger number of people (Ratkiewicz, Conover, Meiss, Goncalves, Flammini, & Menczer, 2011).

The spread of fake news can also be explained trough the Two-Step flow of Influence model. According to that model, information from news or other sources do not gain the biggest reach by directly reaching the public. Often, they first reach important people, so called influencers, which are able to reach and influence a large number of people in turn. These so-called influencers receive their news from different kinds of sources, but have a huge influence on social media and share their views on social media which in turn can have an impact on their followers online (Nisbet & Kotcher, 2009).

Due to political polarizations it is easy to create fake information which can appeal to a specific political view and is easily believed by members of this political affiliation. Fake news which are congruent with a specific view, be it something politically related or related to for example global warming can be delivered to people who are easily ready to believe these news, confirming their biases. Also most people appear to have something called naïve realism: they believe to have a better and more accurate understanding about reality and believe other people whose opinions differ from them to be ignorant and misinformed (Cook, Smallman, 2008; Robinson, Keltner, Ward, & Ross, 1995). Furthermore, there is also the phenomenon that people, who are repeatedly exposed to a certain type of fake news develop the tendency to perceive these news to be more believable. This tendency can appear, even if it is incongruent with the political view of the person who is exposed to the news (Pennycook, Cannon & Rand, 2018). Therefore, fake news can be influential in changing the opinions of people towards lies by both confirming but also changing their views.

#### Differences of, perception in and differentiation of real and fake news

Fake news and real news tend to be different in certain aspects. Analysis of these aspects can be effective in discriminating fake and real news from each other. Fake and real news seem to differ in aspects like content, language and style. Also, when both are compared fake news articles appear to be written in a more simple langue and the articles are less dense in information. In general, fake news are perceived to be more similar to satire or hoaxes than too real news (Horne & Adalı, 2017).

It is known that different types of demographics and people with different characteristics perceive and have a different likelihood of correctly being able to differentiate real and fake news. One characteristic which plays an important role for example is the preferred way of thinking of people. There are two ways of how people are convinced of different positions, namely the central and the peripheral way. In the central way, people need to put in large amounts of focus and cognitive work in order to disseminate and understand the information, which is needed more for real news articles than for fake news. On the other hand, the peripheral route requires less focus and energy and is especially activated when reading fake news articles (Horne & Adalı, 2017). Related to that, it has been found out that people who have higher critical thinking skills and therefore a higher tendency to use the central route more than the peripheral route, are better in detecting fake news than people who score lower on critical thinking (Pennycook & Rand, 2019)

When looking at age for example, it is known that the tendency to trust fake news grows with age. That means that older people are more likely to believe in fake news than younger people. When it comes to gender, it can be seen that women have a higher tendency to trust fake news than men. Personality traits also seem to be correlating with the ability to discriminate fake news from real news. For example, the traits agreeableness and extraversion are positively correlating with the ability to correctly identify real news as real (Shu, Wang & Liu, 2018).

#### **Climate change**

As mentioned before, Fake news can be made up about many different topics. However, one of the most relevant and most discussed topics for many years was climate change. Climate change is a topic which is often present in the news and in the politics and has therefore a lot of presence in the life of people. It is perceived to be a phenomenon which has already many years ago, according to the majority of scientists been proven to exist. However, there are still many people which claim the opposite and go against the scientific consensus (Bolsen & Druckman, 2015).

There are different types of groups which play a role in advertising the view that climate change is not a man-made phenomenon. Examples of these are conservative think tank's (CTT's), big corporations, the media or politicians. These groups have an influence on the public, by criticising the view of a man-made climate change through media, political campaigns or other ways (Dryzek, Norgaard, & Schlosberg, 2011).

#### Scepticism

As described before, there are several personality aspects which can play a role in the ability to discriminate fake from real news. One of which, that could possibly play a role in assessing that is scepticism. Scepticism can be defined as 'any philosophical theory that challenges a significant class of common-sense beliefs' (Huemer, 2001, p.18). It therefore describes the act of being doubtful of and possibly deciding to not believe pre-existing concepts or information. Scepticism as a concept has many similarities to analytical and critical thinking, because they all include a deeper level of thinking and analysis of information, not believing information at face value. But while there are already studies which deal with fake news receptivity and ways of information processing and critical thinking there are no studies which deal with scepticism itself and its relationship with fake news and its possible role in the differentiation of real and fake news.

In relation to global warming, scepticism is often mentioned together with climate change sceptics (Antilla,2005). In this case being sceptical is associated with being critical towards the thought of a man-made global warming. However, scepticism can be applied to many different topics, therefore besides being applied to being sceptical towards climate change, it can also mean that being sceptical means that someone is more critical and less likely to believe in fake news, due to the fact that being sceptical encourages people to not accept given information at face value and to question the authenticity and truthfulness of this

information.

There were studies which showed that manipulations can influence critical thinking of people and in turn decreased their trust in fake news (Lutzke, Drummond, Slovic & Árvai, 2019). However, there are no studies which tackle the question if such a manipulation is able to increase people's level of scepticism and have an influence in their trust in real and fake news and in turn their ability to differentiate real from fake news. Critical thinking and scepticism are two concepts, which are likely to play a similar role in the way people deal with fake news, because of which it can be expected that of a manipulation, which warns people of fake news should increase their level of scepticism and their ability to differentiate real from fake news. Therefore, the first research question 'can the priming of scepticism be influential in increasing the level of scepticism?' arises. The complementary hypothesis to that question is that 'participants exposed to a scepticism primer have a higher level of scepticism' (H1).

On the other hand it should also be expected that people who are primed about the possibility of fake news should increase their skill of correctly detecting fake and real news, due to the fact that they have been warned and their attention has been brought to the topic of fake news, which should make them pay more attention to possible cues of fake news in fake news articles. Therefore, the second research question is 'can the priming of scepticism be influential in increasing the ability to identify real from fake news?' The hypothesis for this research question would be that 'participants exposed to a scepticism primer should have a higher level of accuracy of correctly identifying real and fake news' (H2).

In turn it should also be the case that a high level of scepticism, independent of the priming, should correlate with the ability to correctly identify real and fake news, due to the fact that sceptical thinking inherently pushes people to question given information and therefore should help people in detecting wrong information and right information correctly easier. Therefore, a correlation between scepticism and the ability to differentiate fake from real news should exist. The third research question can be formulated as 'is there a correlation between the level of scepticism and the ability to correctly identify fake and real news?' The hypothesis for this research question would be that 'there is a correlation between the level of scepticism and the ability to differentiate real from fake news' (H3).

#### Methods

#### Design

The design of the study is a between-subjects design, where each participant is exposed to one of two possible conditions, being either the normal-disclaimer or the enhanced disclaimer condition, where they encountered a short text, which informed them about the steps they have to take in the following parts of the study. The enhanced disclaimer included, as shown in the 'manipulation' part of this text, additional information which warns them of the possibilities of unreliable and not trustworthy information in the following news articles, which was supposed to increase their level of scepticism. Except for the disclaimer, the participants had to read the same news articles, answer the same questions about the news articles and had to fill out the same scepticism questionnaire.

#### **Participants**

The sample of participants consisted of a convenience sample recruited through means of Sona-systems and through sharing of the study on social media. In this study 139 participants took part out of which 114 completed the study and accepted the informed consent. 20 participants did not complete the questionnaire and 5 participants did not accept the informed consent. Therefore, in total 25 participants had to be excluded. The participants were automatically randomly assigned to one of the two conditions at the beginning of the study when entering the website, with a chance of 50% to be assigned to one of the two conditions. Of the participants 59 were assigned to the normal-disclaimer condition of the questionnaire, while 55 were assigned to the enhanced-disclaimer condition.

Of the participants 33 (28,9%) were male and 81 (71,1%) were female. Furthermore 83 (72,8%) participants were of German, 14 (12,3%) participants of Dutch and 17 (14,9%) participants were of different origin, with the most prevalent being nationalities being Greece, Turkey, and the United States. The mean age of the participants was 21,4 with a standard deviation of 3,4 and ranged from 18 to 40.

#### Materials

This study included four stimuli in the form of social media posts with a short comment about the news articles, which was shown on the left half of the page the participants was looking at, and their corresponding news articles, which was on the right side. Of the four news articles, two were used in the study in their original form, albeit shortened, due to the fact that the full articles were several pages long and would not have the appropriate length for the study. The two fake news articles were changed in a way to resemble fake news, according to the description of the characteristics of fake news by Horne & Adalı (2017).

The fake news included characteristics like a shorter length, a higher use of adjectives and a more aggressive and extreme (either extreme positive or extreme negative) way of writing. These characteristics were included in order to simulate the look of a legitimate fake news article, while still not being too obviously fake.

All the stimuli consisted of real looking Facebook posts and news articles. The posts included two articles which were belonging to public figures (journalist 'Thom Hartmann' and author 'Michael E. Mann') and two organisations (the research institute 'The Earth Institute America' and the environmental organisation '350.org'). Of these articles the ones by Michael E. Mann and 350.org were not changed and stayed in their original form as real news articles.

One of the real articles, the one by Michael E. Mann dealt with the topic of the large damage a small number of companies do to the environment (namely that 20 companies create one third of the greenhouse gas emissions according to the article). The other real article, by 350.org dealt with the topic that of the 50 largest private sector banks, only 24 have made sustainable finance commitments.

The first fake-news article, posted by Thom Hartmann dealt with the effects of the Amazon fires of 2019. The article was changed by including inflated statistics about the effect of the fires and false claims about the involvement of the government and farmers in the fires. Additionally, the Original poster of the article, an organization called 'Rainforest Alliance' was changed to Thom Hartman through the use of Microsoft paint, by cutting off the post of the original article and inserting it on a different real post made by Thom Hartman in order to make it look like it was posted on Thom Hartman's Facebook page.

The last fake news article was posted by 'The Earth Institute'. In its original version it dealt with the topic of the dying salmon population due to the effect of global warming on the Alaskan sea. However, the text was changed in major ways, making it about the fictional effects of radiation on the Japanese sea and the local salmon population.

The articles were edited through the use of the 'inspect element' tool in Google Chrome. This tool makes it possible to change the text and pictures on websites but at the same time having them keep their original look. This tool was used in order to maximize the realistic look of the posts and news articles and in order prevent as much as possible for participants to discover the deceptive nature of the study.

#### Instruments

The survey furthermore included the Hurtt Professional Scepticism Scale (HPSS) (Hurtt, 2010), which was used to measure scepticism. The HPSS consists of 30 items for which the test-takers have to indicate on each item on a likert-scale to what level they agree with the concurrent statement. The likert-scale consisted of a six-point scale where the scores can reach levels between 'strongly disagree and strongly agree'. Depending on the item, the scoring on a particular level can mean both either having a high level and therefore getting a high score on scepticism or having a low level and therefore having a low score on scepticism. The HPSS had a good level of internal consistency with a Cronbachs' alpha of 0.86.

Furthermore, the participants had to fill out the 'Trust in truthfulness scale' which consists of five seven-point likert scale questions about the content of the news articles. The scale included answer possibilities ranging from the levels 'strongly disagree' to 'strongly agree'. The five questions all began with the statement 'The post can be described as' and followed with the statements 'Trustworthy', 'Accurate', 'Content, which I like', 'Content, which entails important information' and 'Overall good content'. The items 'Trustworthy' and 'Accurate' were both used in order to measure the level of trust in the post. These questions were used and combined to form a single item 'trust in truthfulness'. They are in particularly useful in measuring message credibility according to the research of Appelman and Sundar (2015) and were because of that included in this study in order to calculate the participants ability to correctly detect real and fake news. A high level of belief in message credibility means in this situation that an article was perceived to include real information and therefore meant that the participant detected an article as real. The opposite goes for fake news articles.

The other 3 questions of this scale were disregarded from the analysis because they only posed as dummy-question which were used to disguise the intention of the other items, by diversifying the types of questions and not limiting them to only questions about message credibility. While the 3 dummy questions could have been used to gain further information about the participants opinions about the articles, they could not be clearly put into factors by use of a factor analysis. An internal consistency analysis for the 'trust in truthfulness' scale showed that the Cronbach's alpha for the trust in truthfulness scale was overall good reaching from scores between 0.76 to 0.90. Therefore, there is high internal consistency for this item among the different news articles. The 'trust in truthfulness scale' was converted into the 'Accuracy in correctly identifying real and fake news scale' by reversing the items in the fake news articles.

#### Procedure

The Study was approved by the ethics committee of the Behavioural, Management and Social sciences faculty of the university of Twente. Participants had to access their survey online either by directly visiting the website of the survey or through Sona Systems. Sona Systems is a website used by different universities, including the university of Twente, where students can one hand publish their own studies in search of participants and fill out online surveys of other students in exchange for credit points. At the beginning of the survey the participants encountered an introductory text, which gave them information about the content of the study and information about the data protection guidelines regarding the data that will be collected during the study. Furthermore, participants had to accept the guidelines in order to be able to further proceed.

In the next step the participants had to fill out their personal information. This includes their country of origin (the Netherlands, Germany or a different origin), their age and their gender (male, female or other).

In the following the participants encountered one of the two possible disclaimers: either the normal or the enhanced disclaimer, which gave them information, albeit different for each type of disclaimer, on how to continue with the rest of the survey.

#### Manipulation

In the following there are the two disclaimers used in the study in their original form in which they were presented to the participants filling out the study. The additional text in the enhanced disclaimer aims to increase the participants level of scepticism by having them read the news article texts more thoroughly, having them pay more attention to the trustworthiness of the text and not taking the given information at face value.

#### **Normal Disclaimer**

#### Information

Please read through the following four social media posts and news articles and answer the questions below them according to your first impression of the articles.

#### **Enhanced Disclaimer**

#### Information

Please read through the following four social media posts and news articles and answer the questions below them according to your first impression of the articles.

When reading the news articles please pay attention to the trustworthiness and level of professionalism in the writing style of the texts. Paying close attention to these aspects can help you gain a better impression of these texts.

In the next step, the participants had to mark the continue button in order to be able to continue. The continue button was included in order to keep them on the disclaimer page for longer in order to further ensure that they read the information text and do not skip through.

After that the participants had to read the four news articles and for each one had to answer the five questions regarding their opinions of the articles.

Furthermore, the participants encountered another information screen, which informed them that they would have to fill out a questionnaire on information processing. They again had to press on a continue button, even though reading the information text this time was not as crucial as with the disclaimer, because it does not include any special information. However, the continue button was still included in order to keep consistency in the survey. The questionnaire which consisted of a total of 30 items, was split in two parts consisting of 15 question each. This was done in order to make answering the questions more convenient for the participants, by having them fill out less at once.

Finally, after the questionnaire, the debriefing followed. The debriefing gave the participants information about the deceptive nature of the study and the reasons for the use of the deception, the real purpose of the study and information about the specific contents After reading the debriefing the participants again had to indicate if they still were giving consent to or withdrawing their consent for their data to be used.

#### Data analysis

For the data analysis the software IBM SPSS Statistics 24 was used. Before doing the statistical analysis, first of all it was assessed if the dataset is suitable for the statistical analysis. This included the deletion of all participants, who did not finish the questionnaire, withdrew the informed consent or did not fulfil the criteria for inclusion into the dataset. After adjusting the dataset certain demographic variables of the participants like distribution of country of origin, distribution of gender and statistics regarding the age of the participants were calculated .

Furthermore certain items of the HPSS had to be reversed in order for the scores to have the same meaning overall, due to the fact that certain items had a reverse scoring. After that the average scepticism scores of the participants were calculated. The same was done with the different items of the news-article questionnaire.

The first research question 'can the priming of scepticism be influential in increasing the level of scepticism?' was assessed by calculating the average scores of scepticism for both participant groups (normal and enhanced disclaimer) and comparing them with the help of a one tailed t-test.

In order to answer the second research question 'can the priming of scepticism be influential in increasing the ability to identify real from fake news?' the score of 'accuracy in correctly identifying real and fake news' was calculated. This was done by combining the scores of the 'trust in truthfulness' items of the news article questionnaires scores of both real news articles and both reverse scores of the fake news articles. After that a one tailed t-test was done in order to calculate differences in scores in the 'accuracy in correctly identifying real and fake news' between the two groups were existing.

The third research question 'is there a correlation between the level of scepticism and the ability to correctly identify fake and real news?' was answered by making a Pearson correlational analysis with the scepticism scores and the 'accuracy in correctly identifying real and fake news' scores of the full sample.

#### Results

#### **Descriptives**

In the Following there are the average scores of the HPSS, both for the 'normal disclaimer' condition and the 'enhanced disclaimer' condition for every item and also the mean score of all participants independent of the condition they were belonging to in the study. As shown in table 1, the mean score on the HPSS for the 'Normal disclaimer' condition was 4.40, while the mean score on the HPSS for the 'Enhanced disclaimer' condition was 4.59. The mean score including all participants independent of their condition was 4.49.

Items	Mean (SD)	Mean (SD)	Mean (SD) Total
	Normal disclaimer	Enhanced	
		disclaimer	
1. I often accept other people's	3.98 (1.14)	4.00 (1.12)	3.99 (1.12)
explanations without further thought. *			
2. I feel good about myself.	4.34 (1.09)	4.69 (0.69)	4.51 (0.93)
3. I wait to decide on issues until I can get	4.47 (0.88)	4.65 (0.87)	4.56 (0.87)
more information			
4. The prospect of learning excites me	4.90 (0.71)	4.51 (1.02)	4.71 (0.89)
5. I am interested in what causes people to	5.61 (0.59)	5.55 (0.63)	5.58 (0.61)
behave the way that they do.			
6. I am confident of my abilities	4.29 (1.00)	4.31 (0.81)	4.30 (0.91)
7. I often reject statements unless I have	4.05 (1.09)	3.82 (0.86)	3.94 (0.99)
proof that they are true.			
8. Discovering new information is fun.	5.10 (0.61)	4.84 (0.74)	4.97 (0.68)
9. I take my time when making decisions.	4.37 (1.08)	4.49 (1.07)	4.43 (1.07)
10. I tend to immediately accept what	4.44 (1.07)	4.35 (0.91)	4.39 (0.99)
other people tell me. *			
11. Other people's behavior does not	5.10 (0.92)	4.80 (1.06)	4.96 (1.00)
interest me. *			
12. I am self-assured.	3.90 (0.98)	4.05 (0.78)	3.97 (0.89)
13. My friends tell me that I usually	3.75 (1.21)	3.96 (1.14)	3.85 (1.18)
question things that I see or hear			
14. I like to understand the reason for	5.46 (0.73)	5.31 (0.74)	5.39 (0.73)

Table 1. Scores of the HPSS

other people's behavior.	5 00 (0 79)	4 60 (1 06)	4 81 (0 95)
16. I usually accept things I see, read, or	3.93 (1.19)	3.33 (1.40)	3.64 (1.32)
hear at face value *	2 02 (1 10)	2.00.(1.25)	2.07.(1.22)
<ol> <li>17. I do not feel sure of myself. *</li> <li>18. I usually notice inconsistencies in</li> </ol>	3.93 (1.19) 4.34 (1.11)	3.80 (1.25) 4.91 (1.14)	3.87 (1.22) 4.61 (1.16)
explanations.			
19. Most often I agree with what the	3.51 (1.04)	3.11 (1.05)	3.32 (1.06)
others in my group think. * 20. I dislike having to make decisions	4.25 (1.27)	5.15 (1.50)	4.68 (1.45)
quickly.		/	
<ul><li>21. I have confidence in myself.</li><li>22. I do not like to decide until I've</li></ul>	4.10 (1.09) 4 27 (1 11)	5.35 (0.97) 5 16 (1 18)	4.70 (1.20) 4 70 (1.23)
looked at all of the readily available	/ ()		
information.			
23. I like searching for knowledge.	4.63 (1.08)	5.44 (1.20)	5.02 (1.20)
24. I frequently question things that I see	4.17 (1.00)	4.93 (1.23)	4.54 (1.18)
or hear. 25. It is easy for other people to convince	3.81 (1.07)	3.75 (1.29)	3.78 (1.18)
me. * 26. I seldom consider why people behave	4.29 (1.46)	4.02 (1.73)	4.16 (1.59)
in a certain way. *			
27. I like to ensure that I've considered	4.29 (0.93)	5.20 (1.13)	4.73 (1.12)
most available information before making			
a decision			
28. I enjoy trying to determine if what I	4.19 (0.94)	4.87 (1.19)	4.52 (1.11)
read or hear is true.			
29. I relish learning.	4.36 (0.98)	4.84 (1.24)	4.59 (1.14)
so. The actions people take and the	3.03 (0.90)	3.09 (1.00)	3.40 (1.07)
reasons for those actions are fascinating.	4 40 (0 46)	4 50 (0 40)	4 40 (0 49)
wican scores of an items	4.40 (0.40)	4.37 (0.47)	4.49 (0.48)

\*these scores had to be recoded due to the fact that they were reverse scores

Furthermore, in table 2 are the scores of the item 'Accuracy in correctly identifying real and fake news'. The mean score for accuracy in identifying real and fake news for the 'Normal disclaimer' condition was 3.92 and for the 'Enhanced disclaimer' condition it was 4.01. These scores were obtained by modifying the scores of the item 'trust in truthfulness'.

Table 2. Scores for 'Accuracy in correctly identifying real and fake news' per condition

'Normal disclaimer'	'Enhanced disclaimer'
3.92 (0.75)	4.01 (0.64)

#### Hypothesis testing

As can be seen in table 1, the mean score in the HPSS in the 'enhanced disclaimer' condition was higher than in the 'normal disclaimer' condition. A one-sided independent t-test revealed that there was a significant difference in the mean levels of scepticism between participants in the 'normal disclaimer' and the 'enhanced disclaimer' condition [t=-2.17, d.f.=112; p=0.02]. Therefore, the hypothesis that 'participants exposed to a scepticism primer have a higher level of scepticism' (H1) was accepted.

Furthermore, even though, according to table 2 the score for the accuracy of correctly identifying real and fake news was slightly higher on the 'enhanced disclaimer' condition when compared to the 'normal disclaimer condition, a one-sided independent t-test revealed that there are no significant differences in the mean scores of accuracy of correctly identifying real and fake news between both groups [t=-0.67, d.f.=112; p=0.25]. Furthermore, two additional t-tests were conducted measuring possible differences between the two groups, one including only the results from the real news articles and one including only the results from the fake news articles. Again, both t-tests revealed no differences between the conditions 'normal disclaimer' and 'enhanced disclaimer' [(t=0.39, d.f=112; p=0.35); (t=1,00, d.f.=112; p=0.16)]. The hypothesis that 'participants exposed to a scepticism primer should have a higher level of accuracy of correctly identifying real and fake news' (H2) was therefore rejected.

Finally a Pearson correlational analysis was conducted measuring the correlation between the level of scepticism of the participants and their accuracy in correctly identifying real and fake news. The analysis revealed no significant correlation between the two scores (r=0.14, N=114; p=0.13). Therefore, the third hypothesis that 'there is a correlation between the level of scepticism and the ability to differentiate real from fake news' (H3) was rejected.

#### Discussion

#### Conclusion

This study aimed to investigate the degree of relationship which scepticism and the ability to correctly differentiate real from fake news could have with each other and the effect

which the priming of scepticism could have on these concepts. In order to do this, participants of this study were divided into two groups, in which they were either exposed to a disclaimer, which was supposed to prime them for scepticism, or were not exposed to said disclaimer. Additionally, the participants had to fill out questionnaires, which were supposed to measure their level of scepticism and their ability to differentiate real from fake news.

The first hypothesis suggested that the participants of the two conditions differ in their levels of scepticism from each other. After the analysis, it became apparent that there is indeed a difference in their level of scepticism, with the level of scepticism being higher for the participants, which were exposed to the scepticism primer, because of which the first hypothesis was accepted and it can be assumed that priming scepticism of participants indeed raises their level of scepticism.

Hypothesis 2 suggested that the participants of the two groups differ from each other in their ability to differentiate real from fake news. However, the analysis revealed that there are no significant differences between these two groups, because of which it cannot be assumed that the priming of scepticism increases the ability to differentiate real from fake news.

It went similar for the third hypothesis, according to which there is a correlation between the level of scepticism of participants and their ability to differentiate the real from the fake news. However, this time, similar to the second hypothesis, there was no correlation to be found, because of which it cannot be established that the concept of scepticism and the ability to differentiate real and fake news from each other are correlating in any form.

#### **Theoretical Implications**

This study was done in order to find ways to implement interventions which help to combat the spread of fake news by changing people's scepticism level and making them more sensitive to the level of truthfulness of news information they encounter online, through the use of a primer. The study was able to yield further knowledge about the influence that primers could have on the level of scepticism of people, however at the same time it was not possible to further show an existing effect that a primer could have on the level of trust and the ability to differentiate real and fake news, as was initially hypothesized. The results differed strongly from the study of Lutzke et al (2019), which showed that the priming of critical thinking can decrease the level of trust in fake news, therefore giving them the expected results, something which cannot be said about this study. The difference in the

results was not expected due to the fact that scepticism and critical thinking are similar concepts and because the two studies were done in a similar manner. Further research would be necessary to find out if any possible connections between these concepts do exist.

However on the other hand it was shown that the priming of scepticism can have a significant effect on the scepticism level of people. This result is an indicator for the value, which primers in the form of disclaimers can have, due to the effect they can have on people in having them change their opinions or other aspect of their personality. The results of this study built an interesting basis for future research on similar topics.

#### Strengths, limitations, recommendations and suggestions for future research

The study had certain strongpoints and weaknesses, which influenced its overall quality. One strongpoint was for example that the HPSS and the 'Trust in truthfulness scale' had good qualities like a high level of internal consistency, which made them good measures for this study. Additionally, the study included good ways of deception, like labelling the HPSS as an 'information processing questionnaire' or by including dummy questions next the 'trust in truthfulness scale' in order to hide the real intention of the study. Furthermore, the study also included topics which were relevant for that time, like global warming, especially in the context of the Amazon fires of 2019, which happened shortly before this study was done and which one of the news articles dealt with.

However, there are certain points, which could have negatively impacted the quality of the study. Firstly, one aspect which made it harder for participants to fill it out was the fact that the texts of the news articles were displayed as rather small, with a lower resolution then it would have been for example with a news article on an actual news website, which made them hard to read. This was due to the fact that the news articles were screenshotted from their original source and then inserted into the online study. Due to these steps the quality and as a result the readability of the articles decreased.

Additionally, the articles were also rather long in their length. While it is normal, especially for real news articles, but also for fake news articles to have a certain amount of length, the fact that the participants had to read several articles and had to answer questions about them could have caused them to lose their attention while participating in the study, which in turn could have lead them to be less careful while filling out the study. Additionally, the questionnaires, especially the HPSS with its 30 items were rather long to fill out.

Furthermore, the effectiveness of the disclaimer is questionable. While there was a

difference between the primer and no-primer participants with regards to their level of scepticism, this difference was not apparent when looking at their ability to discriminate real from fake news. One explanation for this could have been that using a scepticism primer could have potential in increasing the ability to differentiate real from fake news, similar to the study of Lutzke et. al (2019), however it could be that the primer used in this study should be modified in order to have a stronger effect on the participants. On the other hand, it could also be the case that scepticism indeed plays a smaller role in people's ability to differentiate real from fake news than expected. Further research into that could be valuable.

Moving on from this study, there are different kinds of topics where further research can be done. One field where further research could be reasonable would be what role other personality characteristics besides scepticism could play in people's level of trust and their ability to differentiate real and fake news from each other. There are studies which investigate the relationship between critical thinking and fake news like the study by Lutzke et. al. (2019), however future research could concentrate on other personality characteristics which can possibly play a role in people's effectiveness in differentiating real and fake news from each other.

Furthermore future research could also include adaptations of the current study with regards to the primer which was used. Other research could for example include different types of primers, like audio-visual primers, which give the participants more than one type of sensory stimulation and can therefore have a different level of effect on them, resulting in possibly different results.

Also while the HPSS was a good and appropriate instrument to measure scepticism, the question arises if the use of an instrument which specifically measures news scepticism would be a better measurement when doing future research, resulting in more accurate result rather than when using the HPSS which measures a rather general type of scepticism.

All in all, further research in the area of the use of primers that serve to change personality characteristics and have the purpose to increase people's ability to correctly identify real and fake news could be helpful in gaining more help developing interventions which aim to combat the negative effects of fake news on society.

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#### Appendix

#### Appendix A Introductory text to the study

#### Introduction

You are being invited to participate in a research study titled "Preferences in Social Media Content in the Context of Climate Change and the Importance of Information Processing". This study is conducted by Emre Hussein Oglu as part of his bachelor thesis for the study program Psychology with specialization in Conflict Risk and Safety at the University of Twente.

The purpose of this study is to assess the preferences people have in social media pages either of individuals or organizations which share news about climate change. For this, you have to read and afterwards rate social media posts and news articles about climate change. These articles are posted on Facebook either by pages owned by public figures or owned by organizations. Furthermore, this study serves to assess the way people process and react towards new knowledge and information through a questionnaire.

The survey will take you approximately 15 minutes to complete. Your participation is entirely voluntary and you can withdraw at any given time.

We believe there are no known risks associated with participating in this study. However, as with any online related activity, the risk of a breach is always possible.

Your answers in this study will be treated with confidentiality. All data will be anonymized and safely stored. Personally, identifiably data (such as email address) will be removed from the datafile. All uses of records and data will be subject to the standard data use policy of the faculty of Behavioral, Management and Social Sciences.

Contact details for further information:

Emre Hussein Oglu (e.chouseinoglouorhusseinoglu@student.utwente.nl)

I understand the information provided and would like to proceed with the survey

O Yes

O No

## Appendix B Questions regarding demographics of the participants

What is your country of origin?

The Netherlands
Germany
Other

How old are you?
Please indicate your gender

Male
Female

Appendix C Normal disclaimer in normal disclaimer condition

#### Information

O Other

Please read through the following four social media posts and news articles and answer the questions below them according to your first impression of the articles.

O Continue

#### Appendix D Enhanced disclaimer in enhanced disclaimer condition

#### Enhanced disclaimer

#### Information

Please read through the following four social media posts and news articles and answer the questions below them according to your first impression of the articles.

# When reading the news articles please pay attention to the trustworthiness and level of professionalism in the writing style of the texts. Paying close attention to these aspects can help you gain a better impression of these texts.

O Continue

Create a Page

### Appendix E. First article (real news)



Majority of world's largest private banks don't have sustainable finance commitment  $A_{rac{majority}{commitments}}$  of the world's largest private-sector banks have not made sustainable investment commitments to finance a low-carbon future.

As global populations express concern about climate change, banks are ramping up pledges commitments to sustainable projects. Just last month, at the United Nations Climate Summit, more than 50 financial institutions with \$2.9 trillion worth of <u>assets</u> announced that they would assess and share the emissions impact of their transactions.

Even so, bank action on sustainable commitments lags far behind what is needed to avoid climate catastrophe, the World Resources Institute said in findings released Thursday.

Of the 50 largest private-sector banks in the world, only 24 have made sustainable finance commitments. Some banks -- led by the Bank of Montreal, which in June pledged \$400 billion Canadian dollars (\$300.24 billion USD) -- have pledged hundreds of billions of dollars in sustainable finance commitments.

But these funds were often spread over a series of years, meaning that the annual contributions from the banks were far lower.

U.S. giants Citigroup and Goldman Sachs have pledged \$100 billion and \$150 billion respectively, but their annual contributions amounted to \$10 billion and \$10.71 billion per year. These annual amounts were far below the total each bank gave in fossil fuel financing in 2018, according to a report from the Rainforest Action Network. Citi provided over \$43.2 billion in fossil fuel financing last year, while Bank of America provided over \$33.7 billion.

#### Appendix F second article (fake news)



A s thick plumes of smoke blanketed Brazil's most populous city Sao Paulo, global attention turned to the cause.

The Amazon, known as the lungs of the earth, which produces 20% of the world's oxygen, is currently burning in what shockingly looks like the biggest forest fire in the last 30 years.

This is a global tragedy. Lit by farmers, in pure self-interest, the fires rages through villages, destroyed complete ecosystems and has already destroyed more than 40 percent of the Amazon rain forest area. It is pumping tonnes of climate-warming pollution into the atmosphere.

The Brazilian government, which has been criticised for winding back protections of the Amazon, sent in the army and slapped a temporary ban on fires used to clear land.

But one month on, the fires are still burning, while apparently no one in the world bats an eye. It is not clear what will happen if we do not stop this tragedy. The world stays silent while the 'Lungs of the Earth' are being destroyed

### Appendix G third article (fake news)



#### By Carly Roth for Glacierhub

Dead carcasses of chum salmon are filling the beaches at Japans coast, where the nuclear contamination still kills millions of fish each year. Environmentalists are shocked while watching in horror at what looks like a battlefield.

Experts say that more than half of the salmon population will die within the next 25 years. The results will reach catastrophic levels if the mass extinction is not stopped. Shockingly, Japanese authorities are doing barely anything to stop the massive deaths of Fish across their coasts.

'It looks just like a war zone' says one of the environmentalists 'This needs to stop now'. The deaths and contamination of millions of fish will likely cause huge problems for the local environment and economy. Thousand of fishers will most likely lose their jobs due to decreasing population of healthy fish in the oceans.

Scientist are still baffled on how to solve this problem. There are still no reliable methods to clean the waters from the contamination, it will most likely take a long time before we can save the Salmon population.' Not much hope is left along the people of Japan. It seems like they will have to deal with this problem for a long time





#### d View on Twitte

#### Upcoming Events

Book Talk: George Beebe, "The Russia Trap: How Our Shadow War with Russia Could Spiral into Nuclear Catastrophe" (Thomas Dunne Books: September 3, 2019)

Ending Poverty through Multilateral Cooperation: Global actions and local impacts.

#### Topics

-

Topics Select Category

## Appendix H forth article (real news)



#### By Karen Savage

More than one-third of all global carbon emissions since 1965 can be attributed to the 20 largest fossil fuel companies, according to newly released research.

Several companies facing climate liability suits in the U.S.—including Chevron, Exxon, BP, Shell, ConocoPhillips and Total—are among the most prolific carbon emitters, according to the data. The new research by Richard Heede, director of the <u>Climate Accountability Institute</u>, was released Wednesday via <u>The Guardian</u>.

The data is arguably the most complete to date because it includes emissions released when the fossil fuel companies' products are used by consumers and incorporates the most recent emissions data.

Emissions data reported by industry typically includes voluntary reporting of its operational emissions, but not emissions created by the use of its products.

"Insofar as operational emissions comprise roughly 12 percent of a company's total, on average, and their produced carbon about 88 percent, and given that they have undisputed responsibility for producing and marketing those products to global consumers with the knowledge that their use will accelerate climate change, then these companies bear substantial responsibility for climate damages commensurate with their production and should be held accountable for such." Heede said.

The research covers the <u>period</u> from 1965-the point at which researchers say companies and governments were fully aware of the catastrophic effect carbon emissions have on the global climate-through 2017, the latest year for which data is available.

It shows that during this period, the companies not only continued to operate as usual, but <u>increased</u> their production, marketing and sales of fossil fuels, a finding that Ann Carlson, co-director of the UCLA School of Law's Emmett Institute on Climate Change and the Environment, said stands out.

# Appendix I questions asked about the news articles

## The post can be described as

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Trustworthy	0	0	0	0	0	0	0
Accurate	0	0	0	0	0	0	0
Content, which I like	0	0	0	0	0	0	0
Content, which entails important information	0	0	0	0	0	0	0
Overall good content	0	0	0	0	0	0	0

# Appendix J HPSS, first half

Please indicate to which extent you agree with the following statements.

	Strongly Disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly Agree
1. I often accept other people's explanations without further thought.	0	0	0	0	0	0
2. I feel good about myself.	0	0	0	0	0	0
3. I wait to decide on issues until I can get more information.	0	0	0	0	0	0
4. The prospect of learning excites me.	0	0	0	0	0	0
5. I am interested in what causes people to behave the way that they do.	0	0	0	0	0	0
6. I am confident of my abilities.	0	0	0	0	0	0
7. I often reject statements unless I have proof that they are true.	0	0	0	0	0	0
8. Discovering new information is fun.	0	0	0	0	0	0
9. I take my time when making decisions.	0	0	0	0	0	0
10. I tend to immediately accept what other people tell me.	0	0	0	0	0	0
11. Other people's behavior does not interest me.	0	0	0	0	0	0
12. I am self-assured.	0	0	0	0	0	0
13. My friends tell me that I usually question things that I see or hear.	0	0	0	0	0	0
14. I like to understand the reason for other people's behavior.	0	0	0	0	0	0
15. I think that learning is exciting.	0	0	0	0	0	0

# Appendix K HPSS, second half

Please indicate to which extent you agree with the following statements.

	Strongly Disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly Agree
16. I usually accept things I see, read, or hear at face value.	0	0	0	0	0	0
17. I do not feel sure of myself.	0	0	0	0	0	0
18. I usually notice inconsistencies in explanations.	0	0	0	0	0	0
19. Most often I agree with what the others in my group think.	0	0	0	0	0	0
20. I dislike having to make decisions quickly.	0	0	0	0	0	0
21. I have confidence in myself.	0	0	0	0	0	0
22. I do not like to decide until I've looked at all of the readily available information.	0	0	0	0	0	0
23. I like searching for knowledge.	0	0	0	0	0	0
24. I frequently question things that I see or hear.	0	0	0	0	0	0
25. It is easy for other people to convince me.	0	0	0	0	0	0
26. I seldom consider why people behave in a certain way.	0	0	0	0	0	0
27. I like to ensure that I've considered most available information before making a decision.	0	0	0	0	0	0
28. I enjoy trying to determine if what I read or hear is true.	0	0	0	0	0	0
29. I relish learning.	0	0	0	0	0	0
<ol> <li>The actions people take and the reasons for those actions are fascinating.</li> </ol>	0	0	0	0	0	0

### Appendix L debriefing of the survey

#### Debriefing

Thank you for your participation.

Hereby I have to inform you that **the real purpose of this study was disguised from you.** The actual aim of this study was to asses the ability of participants to differentiate real from fake news and to find out if scepticism can be a possible moderator in that regard. Of the four presented social media posts two (post 2, which was about the Amazonas fires and post 3, which was about Salmon flooding the Japanese coast) actually included inaccurate information, e.g. exaggerated statistical numbers (in the case of post 2) or completely made-up information (in the case of post 3). Furthermore, half of the participants encountered a disclaimer, which worked as a primer for sceptical thinking and warned them to pay more attention to the trustworthiness and professionalism of the texts. The primer was inserted in order to assess if people who are exposed to this primer actually experience an increase in the level of scepticism and are better at identifying real and fake news when compared to people who were not exposed to that primer.

The reason for the deception was in order to prevent you from actively searching for fake news while rating the individual posts.

After informing you about the deception used in this study I am again asking for your willingness to participate in my study. If you decide to withdraw your consent your data will not be recorded or used in any way.

If you decide to consent, then your data will be used according to the data protection guidelines that you were informed about earlier.

- O I give consent for my data to be used
- O I withdraw my consent, in this case my data shall be deleted and not be used in the statistical analysis