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Fake News and the Individual. Personal Characteristics Which Influence What We Choose to Believe

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ABSTRACT. As the phenomenon of fake news continues to increase and spread throughout the world, there is a need to understand how individual characteristics influence the propensity to believe in fake news. In this systematic review, we performed a search of relevant databases for scientific studies published starting with 2016, the year this term became mainstream, 2024. After applying inclusion and exclusion criteria, we selected ten studies, which showed that higher extraversion is related with an increased belief in fake news, while agreeableness, conscientiousness, and open-mindedness tend to protect against believing in fake news. A heightened state of emotionality (either negative or positive) is another individual characteristic which predisposes people to believe fake news. High intelligence individuals, but especially individuals with high analytical skills, who often use deep reflection (instead of their intuition/gut feeling) when processing information and making decisions, are the most protected when it comes to believing news that is not true.

Keywords: fake news, intelligence, personality, analytic thinking, emotions

I. INTRODUCTION

1. A short history of the Fake News phenomenon

The creation of news events that are simply not true has happened in tabloids and magazines since the last century, but with the advent of the Internet and the proliferation of social media, anyone can create a professional

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looking web page and publish fake news that could reach millions of people (Lazer et al., 2018). However, the term in its current form became mainstream with the US presidential elections in 2016 (Sindermann et al., 2021), when political candidates used it heavily in their discourse and to advance their agendas.

The explosive growth of online social media coupled with the decline of "conventional", reputable news channels, have speeded the transition towards the online information, and with it came the explosion of news stories with questionable validity (Cerf, 2017). Fueled in part by a hyper-pervasive, omnipotent social media, it has reached proportions which could not have been imagined a decade ago. In trying to analyze the emergence, and especially the global acceptance and continued propagation of fake news, it is important to identify the individual characteristics which predispose people to gravitate and ultimately immerse in this phenomenon.

2. Fake News: Definitions and consequences

There are many forms of fake news and the definitions of this phenomenon cover this broad field of existence. Being a special subgenre of misinformation, fake news possesses certain characteristics which differentiate it from other untrue news.

Allcott and Gentzkow define fake news as news in media (both traditional media and social media) presented as facts, but not based on facts (Allcott and Gentzkow, 2017). These researchers exclude from fake news the statements of politicians that are deliberately false, instead classifying them as political manipulation (Ibid.).

Researchers Vargo, Guo and Amazeen (2018) state that fake news is media reports and stories which are not based on facts but are presented as news resembling real news and are distributed to attract attention and produce financial gain. The definition centers on the financial motivation of producing the fake news and the authors note that fake news can appear without the express intent of its creator(s) (Ibid.).

Lazer et al. (2018) posits that fake news is the information that mimics the output of the news media in form, but not in organizational process or intent, thus it is ultimately lacking editorial norms and processes to weed out the untrue in favor of the truth. Therefore, fake news is a subgenre of the broader category of misinformation, representing incorrect information about the state of the world.

Egelhofer and Lecheler sums up the various definitions of fake news and conclude that information needs to show the following characteristics in order to be classified as fake news: low facticity; creation with intention to deceive; presentation in a journalistic format (Egelhofer & Lecheler, 2019).

Fake news has been blamed for a lot of negative things, from influencing the election results in different countries of the world (Neuman, 2018, Parks, 2017), to negatively impacting activist movement (Sydell, 2017, Lewandowsky et al., 2013). The broad consensus is that the fake news is a serious problem, and despite multiple efforts to limit its spread and/or to curtail its negative effects, the phenomenon keeps spreading and increasing (Mitchell, Gottfried, Stocking, Walker and Fedeli, 2019). As a matter of fact, it was found that engagement on social media sites that present unreliable news (computed as likes/shares/ comments on Facebook or Twitter regarding the US top 100 news sources) nearly doubled from 2019 to 2020 (McDonald, 2020). Research has also demonstrated that fake news spreads faster, further and more broadly on Twitter than true stories, and that political fake news reaches more people in a specified period of time than all the other types of false stories (Vosoughi et al., 2018). Moreover, not only fake news spread further and faster, but people being exposed to them usually believe them to be true (Silverman and Singer-Vine, 2016). What is even more troublesome, the action of merely being exposed to a fake news headline increases the later belief in that headline (Pennycook and al., 2018). As such, fake news can sometimes represent a serious threat even to a country's democracy, because citizens can not access factual information to evaluate the public policies and also can not build their preferences using this factual information (Kuklinski et al., 2000).

II. METHOD

1. Eligibility criteria

Papers were restricted to peer reviewed journal papers published since 2016. As we have shown in the introduction, this is the year when the term "fake news" became mainstream, due to the US presidential election taking place in that year. We reckon that was the signal which started an intense scrutiny of the phenomenon of fake news, resulting in an increased number of studies, which analyzed and tried to develop a sound theory about the subject. Papers included were the ones written in English, as we believe the main body of research concerning this subject was done in this language. Moreover, there were instances where articles written in a different language were provided with an English translation for publication in an international journal and they appeared in our search. Therefore, we are confident that the language criteria did not affect the quality of our selection significantly.

2. Search strategy

The search was conducted starting with February 2023. We initially used Google Scholar and ResearchGate. As an index of all articles ever published on the world wide web, Google Scholar provides fully customized searches using a plethora of variables. On the other hand, ResearchGate is the largest academic social network in terms of active users (Matthews, 2016). From here we have obtained many papers directly from the authors. After exhausting this search, a second subsequent search was done at a later date using the articles' references formerly selected from Google Scholar and ResearchGate.

The search was undertaken for papers that explored the relationship between fake news and personal characteristics which prompt the individual to believe/not believe the message presented in so called fake news. The aim was to find relevant papers published in the last eight years that explore a direct causality which is strongly backed by statistical data.

3. Type of studies

Included in the selection were studies with relevant conclusions based on statistical models which addressed the way in which personal characteristics of the individual determine what we choose to believe. The main focus was on randomized controlled studies, but we have also included experimental, correlational and exploratory studies, if they fulfilled the other requirements.

Excluded from the selection were studies which did not address directly the fake news phenomenon, but instead focused on other closely-related variables such as misinformation, direct propaganda or persuasive advertising. Also excluded were studies in which the propensity for the belief in fake news was determined by extraneous factors such as peer group pressure, media consumption or cultural proclivities. Even if some of these extraneous factors were mentioned in the introduction – to better underline the fact that the individual is shaped both by his/her personal determinants and by his/her environment – ultimately solely the studies which included factors intimate to the one's self were included in this systematic review.

Simple literature reviews pertaining to the subject matter were also excluded. In so far as they contained references to other individual studies which satisfied the criteria for inclusion, care was taken to include these studies in this theoretical review.

4. Type of participants

Only studies conducted with adults (age>18 years) were selected. The gender, race or any other demographic information of the participants did not constitute a reason for exclusion.

5. Selection process

The first search was conducted on Google Scholar at scholar.google.com. After selecting the English language, the search after the general query "fake news and individual personal characteristics" yielded 345,000 results. Adding 2016-2023 as a publishing period reduced it to 132,000 results. Selecting only for scientific articles further reduced it to 20,800 results.

This was deemed still too broad, so we started the search again, this time using a Boolean search. We used "Personal character*" OR "Individual differen*" OR "Fake news*" anywhere in the text, for the period 2016-2023, and we got 16,800 results. When we selected only scientific articles, there were 6,410 results. If searching for any of the three terms in the title instead of the whole body of the article, we obtained 325 results.

Research Gate was the second source at www.researchgate.net. For the query "Personal character*" OR "Individual differen*" OR "Fake news*" anywhere in the text, for the period 2016-2023, we got 1000++ results. Even when we added the condition that all results must be scientific articles, we still got 1000++ results. At this point we must mention that each source had different search options, for example ResearchGate had no option of searching for terms just in the title. In the end we conducted the search for "Fake News" AND "Individual", only scientific articles published between 2016-2023. We obtained 22 results.

In total, we screened 347 articles (325 from Google Scholar and 22 from ResearchGate) by title. We excluded 6 due to duplicates and a further 295 due to the title not meeting the above-mentioned criteria. These 295 articles were either not looking for a connection between personal individual characteristics and the propensity to believe in fake news, or analyzing extraneous factors shaping the belief in fake news, or were simply opinion pieces.

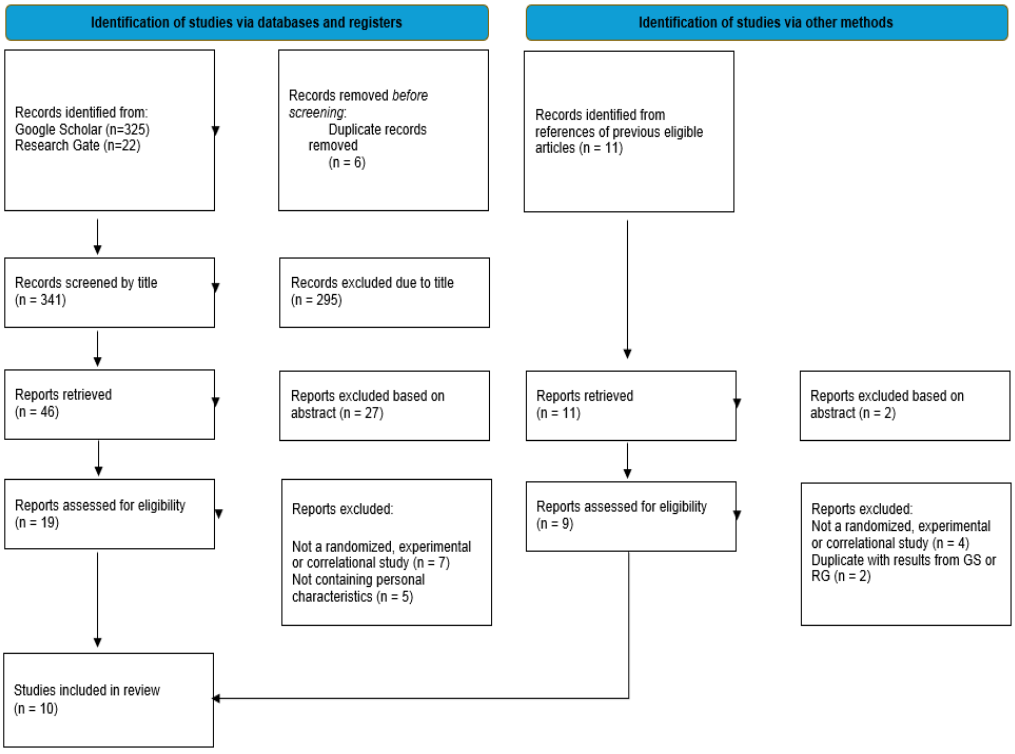
We retrieved the remainder of 46 reports. Of these, 27 were excluded based on the abstract. After assessing the 19 reports left, we eliminated another 7 because they were not a randomized controlled, experimental, correlational or exploratory study. Another 5 were not analyzing the effect of individual personal characteristics on the belief in fake news or used altogether other variables (like news consumption habits or the use of snacking while reading fake news). In the end, in this first stage of the search, we obtained 7 studies to be included in our review which satisfied the above-mentioned conditions.

In the second stage of the search, we screened for articles indicated in the references of the 46 reports that we previously worked with. From these we selected by title 11 reports which we retrieved. We excluded 2 based on the abstract. After assessing for eligibility, we further excluded 4 reports because they were not a randomized controlled, experimental, correlational or exploratory study and 2 reports because they were duplicate of the articles found in the first stage of our search.

In the end, we obtained 10 studies that met all the above-mentioned conditions and could be included in our review.

6. PRISMA diagram of the selection process

The flow diagram of the search process is presented below in a 2020 PRISMA standardized form (Page, McKenzie, Bossuyt, Boutron, Hoffmann, Mulrow, 2021):



III. FINDINGS

1. Fake News, Intelligence and Personality Traits

The most prominent theory of intelligence is the one which divides it into two components: fluid intelligence (gf) and crystalized intelligence (gc) (Brown, 2016; Hebb, 1942). There are different models which have been constructed during the last century exploring the gf-gc divide, and they were all integrated in the Cattell-Horn-Carroll (CHC) theory (McGrew, 2005). According to this theory, fluid intelligence (gf) includes sequential/deductive reasoning (where one starts with a given rule and finds the solution to a new problem) and inductive reasoning (where one discovers the underlying rules) (Flanagan, 2008). On the other hand, crystallized intelligence (gc) can be defined as the "breadth and depth of a person's acquired knowledge of a culture" (Flanagan, 2008, p.373). As such, crystallized knowledge comprises one person's lexical knowledge, general information and information on culture, as the main components (Ibid.).

Probably the most accepted model of personality is the Five-Factor Model or Big Five, in which personality can be described based on five broad domains (Fiske, 1949). These five domains are now widely accepted as being Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism (Goldberg, 1990, Tupes and Christal, 1992).

A 2021 German study published in English conducted by Sindermann, Schmitt, Rozgonjuk, Elhai and Montag analyzed how intelligence – fluid and crystalized intelligence –, as well as personality traits influence the belief in fake news. The study used a convenience sample (free participation of anyone over 18 years old who could read and understand German) of N=530 participants (n=396 men, n=130 women and n=4 non-binary). Mean age was 41.82 years (SD=13.07), with a range from 18 to 78 years. N=259 participants reported a university degree and n=122 reported a high school diploma as their highest educational degree. Most participants reported being employed, n=339 (Sindermann et al., 2021).

In order to assess the propensity of the participants to believe in fake news, they were presented with 29 news headlines, of which 16 included incorrect (not 100% accurate) information (fake news) and 13 included fully accurate information (true news). The topics selected included topics such as national and international politics, economics, health, climate and celebrities. Care was taken to select headlines which were not overall biased in a particular political direction (Sindermann et al., 2021). In order to obtain a tendency to believe in fake news, the authors calculated the number of misclassified fake news headlines as true. Participants' tendencies to disbelieve true news were

measured by the number of misclassified true news headlines as false. Finally, a news discernment score was calculated as the z-score of the accurately classified true news headlines minus the z-score of the misclassified fake news headlines ("hits" – "false alarms") (Ibid.).

The confounding factor of Social Desirability was assessed using The Short Scale on Social Desirability – Gamma, which comprises two scales with three factors each (abbreviation **KSE-G**, based on the German original name of the scale). Scores were from 1 to 5 for each scale, with higher score indicating higher socially desirable responding (Sindermann et al., 2021). Fluid Intelligence was measured with a test comprising ten items, constructed by the International Cognitive Ability Resource (**ICAR**) project (The International Cognitive Resource Team, 2014). Crystalized Intelligence was assessed using the Short Version of the Berlin Test of Crystallized Intelligence (**BEFKI GC-K**, abbreviation of the German name). This test comprises ten items assessing knowledge in 12 domains such as medicine, religion, art and finances (Schipolowski et al., 2014). Personality traits were assessed using the German version of the Big Five Inventory **(BFI**), which allocated a score for each of the five traits, Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism (Rammstedt and Danner, 2017).

Age, gender, education and both KSE-G scales were included as control variables in the main analysis. Education and intelligence might be confounded and social desirability could be associated with personality (Bensch et al., 2019). Descriptive statistics and Pearson Correlations are presented in Annex 1. Regression models were calculated in order to test the association between the three scores derived from the Fake and True News Test (misclassification of fake news, misclassification of true news, news discernment score) and intelligence, as well as personality scores (Sindermann et al., 2021). It was found that the Big Five traits were mostly not associated with misclassifying fake news as true or with misclassifying true news as fake. However, Extraversion had a significant negative association with news discernment, i.e., higher Extraversion is associated with lower abilities to discern truth from fake news (Ibid.). Regarding intelligence, it was found that individuals with higher crystallized intelligence are better at correctly classifying true news, while individuals possessing higher fluid intelligence are more protected against believing fake news (Ibid.). However, these findings must be interpreted with caution, as the authors point to many limitation of their research: participants were presented just with news headlines instead of whole articles; the focus was not on political headlines, so that the answers are not influenced by individual political interest; short measures to assess crystallized and fluid intelligence were used so that the study was kept as short as possible in order to increase participation (limitation evident by the low correlation between gf and gc); the effect sizes found were mostly small; the probability

that some participants checked the headlines online before answering; the sample was not representative of the general German population; and finally, German-specific news headlines limit the generalizability of the present study (Ibid.).

Another study by Wolverton and Stevens (2019) has focused specifically on how personality characteristics could explain the individual's ability to identify fake news. The authors collected the data using a snowball sampling methodology starting with 73 students enrolled in a Management Information Systems course, who were asked to distribute the survey to another person belonging to a different generation. (Wolverton and Stevens, 2019). From the total of 146 possible participants, 117 completed the web-based survey (Ibid.).

Scores for each of the five personality factors were recorded, while the belief in fake news was calculated using a questionnaire with 9 headlines, out of which 5 were fake and 4 true (Wolverton and Stevens, 2019). Besides personality factors, other independent variables included were gender, age and highest educational degree attained. (Ibid.).

Two effect sizes were calculated: η^2 (proportion of variance in the dependent variable that is explained by the independent variable (with ranges of 0 to1) and the effect size index f, with f=sqrt (η^2/ (1- η^2)) (Wolverton and Stevens, 2019). Results are presented in Annex 7 and show that all five personality traits (extraverted, critical/quarrelsome, open to new/complex, sympathetic/warm, disorganized/careless) have at least a medium effect size for correctly identifying disinformation (Ibid.). For other variables, age had a small effect f=0.12, school degree completed had a medium effect f=0.27 and gender had almost no effect with f=0.06 (Ibid.).

Another metric used was the percent of individuals that correctly identified three or more of the five fake news stories (results presented in Annex 7, shows how the trait influences the perceived accuracy of the fake news) (Wolverton and Stevens, 2019). Partially in line with the other studies, it was found that introverted/less critical/not open to new experiences/not sympathetic or warm/disorganized people performed better at identifying disinformation (Ibid.).

A 2022 study by Ahmed and Tan investigated if personality traits influence the perceived accuracy of fake news and its sharing intention, and if cognitive ability further moderates this relationship (Ahmed and Tan, 2022). The authors look at three research objectives to be studied: the way personality traits are associated with the belief in fake news; the way personality traits are associated with the process of fake news sharing; and finally, the way cognitive ability moderates the association between personality traits and a) fake news and b) sharing of this fake news (Ibid.).

There were 750 participants in the study who were selected by Qualtrics and care was taken to match this sample with the general population for age and gender, but the authors admitted that the sample is more educated and earns a higher income than the average US citizen, so generalizing the results of the study to the US population cannot be made (Ahmed and Tan, 2022). Belief in and sharing of fake news was determined using 10 fake news headlines (5 pro-conservative and 5 pro-liberal) which were rated for accuracy (1-not at all accurate, 5-extremely accurate) and for the propensity to be shared (again scored 1 to 5, with 5 representing a higher intention to share) (Ibid.). Then an index of perceived accuracy was calculated by averaging the responses to the five fake news headlines (pro-conservative: M=2.19, SD=1.15, α=0.89; pro-liberal M=2.21, SD=0.89, α=0.79) and also an index of sharing intention by averaging the response to the questions (pro-conservative M=1.61, SD=1.08, α=0.94; pro-liberal M=1.62, SD=1.09, α=0.95) (Ibid.).

The scores for the five personality factors were computed using the Big Five Ten Item Personality Inventory (Gosling et al., 2003). Cognitive ability was determined for each participant using the wordsum test, which shares high variance with general intelligence and is often used to operationalize individual cognitive skills (Brandt and Crawford, 2016). The test presents 10 questions having a target word and the participants must select the closest matching word from five possibilities (i.e., target word "Space", possibilities school/noon/captain/ room/board) (Ibid.). An index of cognitive ability was computed using the answers to this test (M=6.19, SD=2.46, α=0.76) (Ahmed and Tan, 2022).

Four hierarchical regression analyses were used to determine how personality traits influence the perceived accuracy and the inclination for sharing fake news, with the models including demographics and motivational control; furthermore, moderation analysis was conducted to determine the moderating effects of cognitive ability on the relationship between personality traits and perceived accuracy and the inclination for sharing fake news (Ahmed and Tan, 2022). Results for the regression analyses examining the main effects of the predictor variables are presented in Annex 8, Tabel 1.

Regarding the first research objective, the way personality traits are associated with the belief in fake news, it was found that for pro-conservative misinformation, agreeableness (β=-0.124, p<0.01) and extraversion (β=0.081, p<0.05) were significantly related to perceived accuracy (Ahmed and Tan, 2022). Regarding the second research objective, the way personality traits are associated with the propensity of sharing fake news, it was found that agreeableness (pro-conservative: β =-0.120, p<0.01; pro-liberal: β =-0.095, p<0.05) and conscientiousness (pro-conservative: β =-0.131, p<0.001; pro-liberal: β =-0.129, p<0.001) are negatively related to sharing intention (Ibid.).

Moreover, cognitive ability is negatively associated with the perceived accuracy of fake news (pro-conservative: β =-0.206, p<0.001; pro-liberal: β =-0.096, p<0.001) and sharing intention (pro-conservative: β =-0.252, p<0.001; pro-liberal: β =-0.205, p<0.001) (Ibid.).

The third and probably the most important objective of the research, the way cognitive ability moderates the association between personality traits and fake news and sharing of this fake news, it was determined that in the case of pro-conservative fake news, the interaction between cognitive ability and openness was statistically significant (β=-0.474, p<0.05), while for pro-liberal misinformation, the interaction between cognitive ability and conscientiousness (β =0.548, p<0.05), agreeableness (β=0.556, p<0.05), and emotional stability (neuroticism) (β=-0.539, p< 0.05) are statistically significant (Ahmed and Tan, 2022). Regarding the propensity of sharing the fake news, the relationships that are significant are between cognitive ability and openness to experience (pro-conservative: β=-0.470, p <0.05; pro-liberal: β=-0.558, p<0.01), agreeableness (pro-conservative: β=0.526, p<0.01; pro-liberal: β=0.745, p<0.01), and emotional stability (neuroticism) (pro-conservative: β=-0.451, p<0.05; pro-liberal: β =-0.510, p<0.05). (Ibid.).

To sum up, in the case of pro-liberal fake news, individuals with low cognitive ability and higher consciousness, as well as individuals with low cognitive ability and higher agreeableness, are associated with lower belief in fake news; individuals with high cognitive ability and a high degree of emotional stability (low neuroticism) are also associated with a lower belief in pro-liberal fake news (Ahmed and Tan, 2022). Conversely, in the case of pro-conservative fake news, for individuals with low cognitive ability, only higher levels of the trait openness increase the belief of these people in fake news (Ibid.).

The authors identified some limitations to their study: no causal relationship between personality traits or cognitive ability can be inferred on the long-term propensity to believe fake news; the sample used is not truly representative of the US population; as the study used only political fake news, it is possible that in the case of other types of fake news, the results will be quite different (Ahmed and Tan, 2022).

In another study by Sindermann, Elhai, Moshagen and Montag (2020), the authors investigated how personality, ideological attitudes and demographics influence the number of news consumed, the latter being an inverse proxy for the susceptibility to be caught in the so-called “filter bubbles” or “echo chambers”. While not necessarily a direct relationship between filter bubbles and fake news, consuming news just from a singular source (or a small number of sources) can lead to a skewed/predetermined reinforced view of the current events which might

not be the correct one. With the wide proliferation of online news consumption and the advancement of "tailored" news feed programs implemented by social media giants, this danger is more acute than ever.

The term "filter bubble" refers to the consequences of implicit personalization (preselection) of the web pages visited by an individual while surfing the Internet (Thurman and Schifferes, 2012; Zuiderveen, Borgesius et al., 2016). This personalization is done through the use of algorithms which permanently analyze the habits/interests of the individual and then create different sets of information tailored for each of us. This tailored information presents the following problems: people are alone in their bubble and the bubble is invisible, so in general, people do not know it exists; this in turn leads to the belief that the information is unbiased; people enter the filter bubble actively, but eventually they find themselves in one passively (Pariser, 2011). On the other hand, the term "echo chamber" relates to the fact that an individual is exposed to the same information again and again, thus reinforcing one's beliefs and attitudes when the same information is repeated ad nauseam, while the counter attitudes are missing (Jamieson and Cappella, 2008).

The study had a final sample of N=1681 German-speaking participants (n=557 males and n=1124 females), with the mean age of the sample being 34.44 years (SD=15.09), range from 12 to 81 years and median of 33 years (Sindermann et al., 2020). The German version of the Big Five Inventory (BFI) was used to assess the personality traits, while in order to asses the number of different news sources, participants were first asked if they watch/read/listen to news on TV, in print media, on the radio, on online news websites, on their Facebook news feed, on the news feeds of other social networking sites, and then, for every positive answer, they had to further state on the Likert-scale how often they did it (Ibid.).

The regression showed that age (positively), gender (negatively, meaning higher score for males) and Openness (positively) are significant predictors for the number of news sources one individual is prone to using regularly (Sindermann et al., 2020). More specifically, the regression weights indicated that the predicted number of news sources used in total increases by 13% if age increases by one standard deviation, decreases by 19% for being female and increases by 4% if Openness is increased by one standard deviation (Ibid.). For a binomial model predicting the number of news sources consumed by age, gender and the Big Five, see Annex 2.

As limitations to this study, participants were not asked which kind of news sources they consumed, as the content of the news read could be political but also geared towards entertainment; also, the content of news most probably

differs between online and offline sources; the actual existence and size of "echo chambers" and "filter bubbles" could not be investigated but merely presumed; results could not be generalized as they are derived from a German-speaking sample; as the research design was of a correlational nature, it is not possible to prove causal directionality (Sindermann et al., 2020).

A 2021 study by Calvillo, Gracia, Bertrand and Mayers sought to determine the way personality factors and political news consumption predict susceptibility to political fake news. The study had two objectives, first to determine how personality factors are influencing the belief in fake news and second to determine if there is a relationship between news consumption and news discernment (Calvillo et al., 2021).

Participants were selected in two batches from Mechanical Turk (with the prerequisite of being residents in the US) and were provided monetary compensation (N=351, 179 women, 173 men and 1 declined to declare the gender, age 19 to 78 years old, median 37) (Calvillo et al., 2021). Belief in fake news was determined using 24 news headlines with photographs (12 true and 12 false, equally divided between pro-conservative and pro-liberal), which the participants had to rate (1-not at all accurate, 4-very accurate); personality factors were operationalized using the Big Five Inventory-2-S (BFI-2-S, Soto and John, 2017), which has 30 statements which individuals rate on a scale from 1 (disagree strongly) to 5 (agree strongly); news consumption was determined by asking the participants from which sources they obtain their news (a list with 45 sources) and how many hours per week they use that source; finally, participants had to answer questions regarding their age, gender, political party affiliation and political ideology (1-extremely liberal to 7-extremely conservative) (Ibid.).

Descriptive statistics for the variables are presented in Appendix 9, Table 1. The variable news discernment was calculated as the difference between the perceived accuracy of true news and false news encountered; news consumption biased was calculated using the news' source bias rating reported by Allsides.com; number of leanings was determined by placing the news sources in groups based on their political leaning (left, lean left, center, lean right, right) and calculating how many groups an individual used when searching for news (scores 1 to 5) (Calvillo et al., 2021).

The correlation matrix for variables analyzed is presented in Appendix 9, Table 2. Of note is that news discernment is positively correlated with conscientiousness ($p=0.006$), open-mindedness ($p<0.001$) and agreeableness ($p<0.001$), but not significantly correlated with extraversion or negative emotionality (Calvillo et al., 2021). An unexpected finding was that more news consumption was negatively related to news discernment ($p<0.05$) but that appeared to be driven by the consumption of the news that leans right (Ibid.).

A multiple regression was conducted in order to determine the relationship between news discernment, the five personality factors, participants' ideology, and the number of hours reported, the results being presented in Appendix 9, Table 3. The model explained a significant variance in news discernment, $F(7, 345) = 15.80$, $p<0.001$, $R^2 = 0.24$ (Calvillo et al., 2021). Agreeableness, conscientiousness, and open-mindedness were positively related to political news discernment and extraversion, political conservatism and the number of hours participants consume political news were negatively related (Ibid.).

The authors identified as limitations of their studies the following: the sampling of materials, as the headlines used in the study appeared on the Internet prior to their data collection; the sampling of participants was not representative of the general population regarding their personality, ideology and news exposure; there was a strong probability that the news consumption reported was exaggerated, as there were cases with reported over 384 hours/week; finally, the effect sizes presented in the study were small (Calvillo et al., 2021).

2. Fake News and Cognitive Modes of Thinking

There are many cognitive factors which influence if information received is perceived as true or untrue. Almost one century ago it was found that individuals who had been previously exposed to a rumor tended to believe it more if they encountered it a second time (Allport and Lepkin, 1945). Continuing the work on the illusory truth effect, it was found recently that simply reading a fake news headline once is sufficient to increase the later perception of its accuracy, and that in fact the fraction of the participants rating it as accurate doubled after only one prior exposure, while the effects compounded after multiple exposures (Pennycook et al., 2018). The explanation for this mechanism is that repetition encourages rapid and fluent processing, which subsequently creates the belief that the repeated statement is true, and thus, this heuristic plays a great role in accuracy judgements even for highly implausible, partisan or entirely fabricated news stories (Ibid.). However, it was also found that giving the participants reasons to be skeptical/wary of fake news in the form of an explicit warning did decrease later perceptions of fake news (Pennycook et al., 2017). It is therefore important to determine if the tendency to believe in fake news is influenced by the individual's cognitive mode of thinking, namely if one is easily accepting of a wide variety of claims – the so called reflexive open mindedness (Pennycook et al., 2015) or if one is deliberate and questions his/her intuition – the so called reflective open mindedness (Baron, 2018).

The most accepted theory regarding the cognitive mode of thinking is the dual process theory, in which human cognition is divided into autonomous,

intuitive processes (Type 1) and deliberate, analytical processes (Type 2) (De Neys, 2012; Evans & Stanovich, 2013; Kahneman, 2011). Based on recent research, it was found that the propensity to engage in Type I or Type II thinking (that is, relying on gut feeling/intuition versus relying on deliberate reasoning) is associated with a variety of beliefs and behaviors (Pennycook et al., 2015a).

A 2020 study by Pennycook and Rand explored the relationship between fake news, the cognitive mode of thinking, bullshit receptivity and overclaiming. The authors defined bullshit material as being different from lies, in the way that bullshit is constructed without concern for the truth, but with the goals of garnering attention, increasing advertising revenue or achieving social and/or political gain (regardless of its truthfulness) (Pennycook and Rand, 2020). Overclaiming refers to the disposition of individuals for overstating their familiarity/expertise with a certain subject/knowledge, when in fact that piece of knowledge does not exist at all (Ibid.). There is a great deal of evidence that non-analytical (intuitive) individuals tend to be overconfident and rate themselves as being reflective, even if they rely primarily on gut feeling (Pennycook et al., 2017a).

The above-mentioned study started with 447 participants enlisted through Amazon Mechanical Turk, in the end complete data was retrieved for N=402 participants (205 males, 196 females, one did not state the gender) with mean age of 37.7 years (Pennycook and Rand, 2020). In order to quantify the belief in fake news, participants were presented with six news headlines that all have been identified as false by an independent fact checker. The cognitive mode of thinking was calculated using two versions of the Cognitive Reflection Test (CRT), the original worded version by Frederick (2005) (via Shenhav et al., 2012) and the non-numerical CRT from Thomson and Oppenheimer (2016). The bullshit receptivity task was operationalized using ten randomly generated sentences filled with abstract buzzwords (for example, "We are in the midst of a high-frequency blossoming of interconnectedness that will give us access to the quantum soup itself") and had to rate on a 5-point Likert scale the profundity of that statement (Pennycook and Rand, 2020). The overclaiming variable was measured using the method created previously, where the participants had to rate on a 6-points Likert scale (0 – Never heard of, 6 – Very familiar) their familiarity with a set of items which ranged from easy (e.g. "Bible" or "Bill Clinton") to impossible (e.g. the name of a researcher's neighbor) (Paulhus et al., 2003).

The correlations among the variables analyzed in the study can be seen in Annex 3. The perceived accuracy of fake news was positively correlated with receptivity to bullshit and the willingness to overclaim, and correlated negatively with CRT performance (i.e., analytical thinking) (Pennycook and Rand, 2020). The authors then conducted an exploratory factor analysis using the iterated

principal factor method of the four scales and it showed that there was a single factor (eigenvalue = 1.33, 95% of variance explained) onto which all four scales loaded heavily in the expected direction: perceived fake news accuracy = 0.58, CRT = -0.55, bullshit receptivity = 0.51, overclaiming = 0.67 (Ibid., p.7). This shows that there is a common factor underlying these four variables, and the authors concluded that most probably that factor was *reflexive open mindedness*, i.e., the tendency to trust one's intuition and come to a conclusion quickly (Ibid.).

Two limitations were identified in the above-mentioned study. First, the participants were offered just the news headlines and asked to identify if they were fake, so they had no chance of seeing the actual body of the article, in order to be better informed. Thus, the generalizability of the results can not be stated (Pennycook and Rand, 2020). Second, because the participants were specifically asked about the truthfulness of a headline, this could have prompted them to reflect about that matter in a way in which normally they would not do it. It is thus unclear the extent people would believe fake news if not specifically asked to reflect on that matter (Ibid.).

In another study by Bronstein, Pennycook, Bear, Rand and Cannon, the authors studied how the belief in fake news is associated with delusionality, dogmatism, religious fundamentalism and reduced analytic thinking (Bronstein et al., 2018). People who are delusional usually endorse unusual ideas related to conspiracy theories (Dagnall et al., 2015), tend to believe in paranormal phenomena (Pechey and Halligan, 2011), and side with absurd explanations for ambiguous events (Bronstein and Cannon, 2017; Zawadzki et al., 2012). The authors wanted to find out if delusional individuals were more inclined to ascribe truthfulness to fake news, in part because analytic thinking capabilities of these individuals are reduced – either because of a lower cognitive ability or a lower willingness to engage in analytic thinking, favoring instead the type of thinking based on intuition.

Another factor that could increase the belief in fake news is a reduced actively open-minded thinking (**AOT**; Baron, 1985). Actively open-minded thinking refers to the use of evidence (such as opinions of others or information that disconfirms one's beliefs) when an individual is forming or updating its own beliefs (Stanovich and West, 1997) and also to the tendency to actively search for alternative explanations (Campitelli and Gerrans, 2014). Prior studies have demonstrated that reduced AOT is associated with belief in conspiracy theories (Swami et al., 2014) and paranormal phenomena (Svedholm and Lindeman, 2013).

Besides delusionality, the study also explored how dogmatism and religious fundamentalism influence the belief in fake news. Dogmatic people generate less evidence against their judgements in the process of reaching a

conclusion (Davies, 1998) and engage in less analytic reasoning during syllogism evaluation tasks that feature conflicting cues regarding syllogism validity (Martin, 2008). Therefore, the evidence strongly suggests that more dogmatic individuals tend to use less open-minded thinking and engage less in analytical thinking. Religious fundamentalists are another group of individuals which may exhibit these traits, considering that religious fundamentalism is strongly correlated with dogmatism (Altemeyer, 2002).

The study tried to determine if delusion-prone individuals, dogmatic individuals and religious fundamentalist are more inclined to believe fake news and to test if the two inter-related mechanisms of reduced analytic and actively open-minded thinking are contributing to this vulnerability (Bronstein et al., 2018). Participants (over 18 years old and living in the USA) were recruited in two waves via Amazon's Mechanical Turk, with N=948. Belief in fake and real news (carefully selected to be as politically neutral as possible) was determined using 12 fake and 12 real news headlines in random order, which the participants had to rate on a four-point scale (1-Not al all accurate, 4-Very accurate); delusion-like ideation was measured using the 21-question Peters et al. Delusion Inventory (PDI; Peters, Joseph, Day and Garety, 2004, sample question: "Do you ever feel as if there is a conspiracy against you?"); actively open-minded thinking (AOT) was calculated using the version by Stanovich and West, 2007 (example: "A person should always consider new possibilities", 1-Strongly disagree to 6-Strongly agree); analytic thinking was calculated using the Cognitive Reflection Test (CRT; Federick, 2005); dogmatism was measured using the 20-item DOG scale (Altemeyer, 2002, example item: "The things I believe in are so completely true, I could never doubt them" with 1-Strongly disagree and 9-Strongly agree); finally, religious fundamentalism using the 20-item Religious Fundamentalism Scale (Altemeyer and Hunsberger, 1922, sample question: "The basic cause of evil in the world is Satan, who is still constantly and ferociously fighting against God", 1-Strongly disagree, 9-Strongly agree) (Bronstein et al., 2018).

Descriptive statistics and zero-order correlations are presented in Annex 4, Table 1 and Table 2. Delusion ideation, dogmatism and religious fundamentalism were all positively correlated with belief in fake news; on the other hand, delusion ideation, dogmatism, religious fundamentalism and belief in fake news were all negatively correlated with analytic and actively open-minded thinking (belief in real news was positively correlated with analytic and actively open-minded thinking) (Bronstein et al., 2018). Moreover, both cognitive style measures were correlated with media truth discernment (the difference between standardized real and fake news accuracy ratings, as in "hits"-"false alarms") (Ibid.).

Furthermore, a mediation analysis was conducted to test if the relationship between the belief in fake news and delusion ideation, dogmatism and religious fundamentalism could be explained by the mode of thinking (analytic and actively open-minded thinking) (Bronstein et al., 2018). A summary of all the statistics for the regression models in the mediation analysis is presented in Annex 4 - Table 3 and Figures 3, 4, 5. Results showed that delusional individuals, dogmatic individuals and religious fundamentalists are more inclined to believe fake news, and these relationships can be partially explained by the individuals' cognitive mode of thinking, i.e., by exhibiting reduced engagement in actively open-minded thinking and in analytic thinking (Ibid.).

A 2021 study, more specialized, by Calvillo, Rutchick and Garcia, looked at the factors that could have influenced the belief in fake news about voter fraud in the week after the 2020 U.S. election. Besides cognitive reflection (a personal characteristic that is important in our review), the authors also analyzed the political ideology of the participants, the approval of the outgoing president, trust in mainstream media, education, susceptibility to conspiracy narratives and news consumption (Calvillo et al., 2020). Participants were selected from Mechanical Turk, in the end there were N=376 people (198 females, 175 males, 3 did not respond), with age 19 to 75 (median=40) years old, with 221 having a college degree and 155 having not (Ibid.).

In order to determine belief in fake news, participants rated the truthfulness of 15 election-related headlines (5 true, 10 false) on a 6-point Likert scale (1-definitely false, 6-definitely true); cognitive reflection was measured on the 6-item cognitive reflection measure; conspiracy ideation was measured with a 15-item conspiracist belief scale (Brotherton, 2013); trust in the mainstream media coverage of the election was measured with a created 5-item questionnaire (e.g. main question: "Mainstream media coverage of the election…" + "has been fair"/ "has been accurate"/ "has been unbiased"/ "has told the whole story"/ "can be trusted", with answer varying from 1-strongly disagree to 5-strongly agree) (Calvillo et al., 2020). Then participants answered questions regarding about demographics, their political ideology (1-very liberal to 7-extremely conservative), who they voted for in the election and the approval of the former president (1-strongly disapprove, 4-strongly approve) and stated their news consumption habits with regard to quality (from a 45 news sources provided, each having a bias rating an the website Allsides.com) and quantity (for each source selected, how many hours of election news they consumed in a week) (Ibid.).

Descriptive statistics and bivariate correlations are presented in Annex 6, Table 1. Belief in false election news was positively correlated with political ideology, approval of the outgoing president and conspiracy beliefs, and

negatively correlated with cognitive reflection and media trust (all $p<0.001$), while having a college degree was not significantly related (Calvillo et al., 2020). Many of the predictors were also intercorrelated among themselves (Ibid.).

The multiple linear regression analysis yielded the results presented in Annex 6 Table 2. Conspiracy beliefs, political ideology and approval of Trump were positively associated with belief in fake news and cognitive reflection was negatively associated with the belief in fake news, the model accounting for a significant proportion of variation for the belief in false news ($F(6,369)=98.31$, $p<0.001$, $R^2=0.62$, adjusted $R^2=0.61$) (Calvillo et al., 2020). On the other hand, media trust was not significantly related to the belief in election fake news, even if it had a significant bivariate correlation with it (Ibid.). The relation between news consumption and the belief in fake news was calculated in another regression, but because this does not relate to our review (non-personal individual characteristic) we do not present it here.

Limitations identified by the authors of this study were related to the fact that the sample was not representative (as Mechanical Turk sample tend to be more politically liberal than the representative samples); people holding strong conspiracy beliefs tend to be underrepresented in this study; small number of false headlines about election fraud (Calvillo et al., 2020).

A 2020 Polish diagnostic survey by Brzóska and Rosińska explored the impact of analytical thinking on the ability to detect fake news. A sample of 303 people was selected from Facebook using the snowball method (Brzóska and Rosińska, 2020). Belief in fake news was measured with the responders rating on a 6-point Likert scale (1-definitely not accurate, 6-definitely accurate) 14 real news from popular Polish sources and 14 fake news identified as being so by Polish fact-checkers (Ibid.). Three indicators were then calculated: 1 – the perceived accuracy of fake news (average of responses to all fake news), with a higher indicator pointing to a higher degree of belief in fake news; 2 – perceived accuracy of real news (average responses to all true news) and 3 – detection of fake news (measured by subtracting 2 from 1) (Ibid.).

Analytical thinking was measured using both a cognitive reflection test and a verbal cognitive reflection test (Brzóska and Rosińska, 2020). The final results were coded so that the first 25% of respondents who score the best were assigned to the group with high analytic thinking and the 25% of respondents who scored the worst were assigned to the group with low analytic thinking (Ibid.). Finally, demographic questions regarding gender, age, education and using Facebook as a source of news were distributed (Ibid.).

A simple diagnostic survey was then conducted, trying to present the connection between analytical thinking and the detection of fake news (indicator number 3). General results, as well as the results by gender, age, educational level

and using Facebook as a source of news are presented in Annex 10. It was observed that in general, Polish people who think more analytical are better at detecting fake news (Brzóska and Rosińska, 2020). Regarding gender, both males and females with high analytical thinking had similar accuracy when detecting fake news, but there was a marked difference between males and females in the low analytic thinking group regarding the detection of fake news; regarding age, people aged 25-34 scored highest at detecting fake news, irrespective of their high or low cognitive abilities, while for people aged 50+ there was no markable difference between low and high analytic thinkers (Ibid.). In the case of education, two problems appeared: first, there was no high analytical thinker in the Vocational cohort; second, in the Technical cohort, high analytical thinkers scored lower at fake news detection than low analytic thinkers, which is not in line with the accepted theories (Ibid.). These problems notwithstanding, it was observed that the higher the education, the higher the success in detecting fake news (Ibid.). Regarding the use of Facebook as the source of news, it is worth mentioning that the study had no person in the high analytical cohort who did not use Facebook; second, that the highest difference between high and low analytical thinking people in detection of fake news happened for people who used Facebook as their main source of information, which is counterintuitive and needs to be investigated further (Ibid.).

3. Fake News and Emotions

The way emotions influence the belief in fake news was studied in a 2020 article by Martel, Pennycook and Rand. It comprised of two studies, in the first one (N=409) it was studied the way in which experiencing emotions modified the propensity to believe in fake news; in the second study (N=3884), the authors measured and manipulated reliance on emotion versus reason in four experimental studies (Martel, Pennycook and Rand, 2020).

Emotion plays an important role in the individual cognition and decision-making processes. It was found that anger elicits greater reliance on heuristic cues in a persuasion paradigm, while sadness elicits an opposite, decreased reliance on heuristic cues (Bodenhausen et al., 1994). Moreover, being in a negative mood increases skepticism, while being in a positive mood increases gullibility and decreases the ability to detect deception (Forgas and East, 2008). Regarding the way specific emotions are involved in the appraisal of fake news, it has been suggested that anger promotes politically aligned belief in misinformation while anxiety increases belief in politically discordant fake news (Weeks, 2015). Sad individuals could engage more in analytic thinking, therefore be more skeptical of fake news, with the opposite being true

for happy individuals (Forgas 2019). Faith in intuition ("gut feelings") are associated with belief in conspiracy theories and falsehoods in science and politics (Garret and Weeks, 2017).

The first study, which was exploratory, investigated the relationship between the state of emotionality and accuracy judgements of real and fake news (Martel, Pennycook and Rand, 2020). There were N=409 participants (M=35.18 years old, 227 women) selected via Amazon Mechanical Turk, who completed the 20-item Positive and Negative Affect Schedule scale (PANAS; Watson et al., 1988), which assessed on a 5 points Likert scale (1-Very slightly or Not at all, 5-Extremely) the extent one feels a certain emotion at that moment; belief in fake news was gauged by using 20 actual headlines that appeared on social media, 10 being factually accurate (real news) and 10 being entirely untrue (fake news), with each participant ascribing scores on a 4 points Likert scale (1-Not at all accurate, 4-Very accurate) to the question: "To the best of your knowledge, how accurate is the claim in the above headline?" (Ibid.).

The authors then performed linear mixed-effects analysis of the relationship between perceived accuracy, specific emotions (PANAS score) and the type of headline (true or false), with results presented in Annex 5 Table 1 (Martel, Pennycook and Rand, 2020). Results indicated that for almost all emotions present, increased emotionality also predicted decreased discernment between real and fake news, with only "interested", "alert", "determined" and "attentive" (which could easily be associated more with analytic thinking than with emotionality) not registering those effects (Ibid.). Moreover, *both* positive and negative emotions are associated with an increased belief in fake headlines, but the relationship is not clear in the case of true headlines (see Annex 5 Figure 2) (Ibid.). Effect sizes were also substantial, belief in fake news being nearly twice as high for participants with the highest aggregated positive and negative emotion scores compared to participants with the lowest aggregate positive and negative emotion scores, so it can be concluded that even if people experiencing a high emotion state are still able to discern between fake and true news, there is a notable increase in belief in fake news as one's emotional state increases (Ibid.).

There are two limitations identified by the authors pertaining to study 1. First, those results could be driven by floor effects, because most participants reported experiencing a relatively low level of emotion (Martel, Pennycook and Rand, 2020). Second, that participants with higher emotionality scores were most probably less attentive, and that could negatively influence the process of discrimination between real and fake news (Ibid.).

Study 2 was a continuation of the research conducted in the first study, the authors manipulating the extent to which individuals relied on emotion OR reason when judging the accuracy of news headlines (Martel, Pennycook and

Rand, 2020). It consisted of four experiments in which reliance on reason versus emotion was experimentally manipulated using an induction prompt taken for the work of Levine et al. (2018). For each experiment (with the exception of experiment 1, which had no control condition), participants were randomly assigned to one of the three conditions: *a reason induction* (i.e., "Many people believe that reason leads to good decision-making. When we use reason, rather than feelings, we make rationally satisfying decisions. Please assess the news headlines by relying on reason, rather than emotion"), *an emotion induction* (i.e., "Many people believe that emotion leads to good decision-making. When we use feelings, rather than logic, we make emotionally satisfying decisions. Please assess the news headlines relying on emotion, rather than reason") or *a control induction* (Martel, Pennycook and Rand, 2020). All these are summarized in Annex 5, Table 3. After the induction prompt, participants had to read a series of headline news, some which were true and others which were fake, and rate them on a 6-point Likert scale (1-Definitely false; 6-Definitely true), and after that participants (experiments 2, 3 and 4) had to answer several questions regarding how much reason or emotion used when assessing the accuracy of the news headline (1-None at all, 5-A great deal) (Ibid.). Finally, data was aggregated across all four experiments, in order to improve the statistical power and to determine if the effects of using emotion or using reason were consistent across a range of slightly different assessments (Ibid.).

The authors performed first a linear mixed-effects analysis with either self-reported use of emotion or self-reported use of reason and determined that the use of emotion is associated positively with belief in fake news (but not in real news), while the use of reason is associated positively with belief in real news (but not in fake news) (Martel, Pennycook and Rand, 2020). The results are summarized in Annex 5, Figure 3. Secondly, the authors performed a linear mixed-effects analysis of the relationship between news accuracy, induced experimental condition (emotion, reason or control) and type of news headline, in order to determine if there is a condition effect on the perceived accuracy of fake and real news across all four experiments (Ibid.). Results are presented in Annex 5, Table 4 and Figure 4. Again, participants in the emotion condition tended to believe more in the fake headline news presented (assign higher accuracy ratings), while participants in the control and reason conditions tended to believe less in the fake headline news presented (assign lower accuracy ratings) (Ibid.).

As limitations to this study the authors pointed to the fact that the induction manipulation used in those four experiments was heavy-handed, probably prompting experimenter demand effects; most individuals considered fake news headlines as being more likely to be false, even when relying on emotion; the

study did not find evidence that inducing reason improves the belief in fake news relative to the control; the study did not include/calculate the emotions produced by reading the news presented, as it is well known that fake news elicits strong emotions for its consumers; the study did not consider the precise mechanisms by which certain emotions might influence the ratings ascribed to news headlines; it was not determined the role of baseline emotional state (as a stable individual trait) in judging the accuracy of presented news; the sample used was a convenience sample; finally, the experiments only used a small number of contemporary fake and real news headlines (Martel, Pennycook and Rand, 2020).

IV. CONCLUSIONS

1. Summary of obtained results

We synthesized the last eight years of research into the association between fake news and individual personal characteristics. This review found that the most important traits affecting the belief in fake news are personality, intelligence, cognitive modes of thinking and emotions.

All five personality traits (extraverted, critical/quarrelsome, open to new/complex, sympathetic/warm, disorganized/careless) have at least a medium effect size for correctly identifying disinformation. However, across multiple studies, higher Extraversion was associated with lower ability to discern fake news. On the other hand, agreeableness, conscientiousness, and open-mindedness were associated with higher ability to discern fake news.

Higher intelligence is another trait that safeguards against the belief in fake news, but the mechanism of action is intricate: individuals with higher crystallized intelligence are better at correctly classifying true news, while individuals possessing higher fluid intelligence are more protected against believing fake news. When cognitive ability moderates personality traits, individuals with high cognitive ability and a high degree of emotional stability (low neuroticism) are associated with a lower belief in fake news. On the other hand, individuals with low cognitive ability and higher consciousness, as well as individuals with low cognitive ability and higher agreeableness, are associated with lower belief in fake news.

Regarding the belief in fake news and cognitive modes of thinking, reflexive open mindedness (the tendency to trust one's intuition and come to a conclusion quickly) can predispose an individual to believe more in fake news. Reflective open-mindedness, or analytical thinking, protects an individual against the belief in fake news. Moreover, actively open-minded thinking (the use of evidence such

as opinions of others or information that disconfirms one's beliefs) when an individual is forming or updating its own beliefs plays a positive role in protecting against the belief in fake news. Its opposite, represented by delusional individuals, dogmatic individuals and religious fundamentalists, represent individuals who are more inclined to believe fake news, and these relationships can be partially explained by the individuals' cognitive mode of thinking, i.e., by exhibiting reduced engagement in actively open-minded thinking and in analytic thinking.

Finally, it was determined that increased emotionality predisposes to belief in news. This is true for a wide range of human emotions (the notable exceptions being those emotions that are intimately related to cerebral thinking like interested, alert, determined and attentive). Moreover, both positive and negative emotions are associated with an increased belief in fake headlines when their intensity is higher.

2. Limitations

Prior work regarding the relationships between the belief in fake news and personal individual characteristics has yet to obtain broad consensus among scientists. There were studies – especially those regarding personality – which obtained non-congruent results: in some of the studies some personality traits played a role in the belief in fake news, while in other studies those same traits registered no statistical significance and vice versa.

What is probably even more important, one can not draw a definite conclusion encompassing the whole human nature, as the majority of the studies were done at the country level, and the influence of cultural differences in tackling fake news have not been factored in. Moreover, many authors pointed towards the lack of representativity for their chosen sample, even at this level of country research.

Another shortcoming present in many of the studies analyzed was that no long-term conclusions could be extracted from the research. The experiments were done "here and now" and offered just a glimpse into the momentary state (emotional and cognitive) of the participants.

3. Future implications

The fake news is here to stay, with all its negative consequences affecting people, institutions and states. There are already moves initiated by state-actors to curtail the spread of this phenomenon, but this action can limit the freedom of speech, and, moreover, raises another complicated question: who gets to decide what constitutes fake news?

A different avenue – albeit much harder and probably more resource consuming – would be to combat the spread of fake news through the implementation of educational programs aimed at teaching people how to better identify fake news and what skills they could develop in order to properly process this type of truncated information. In this respect, of use would probably be teaching people to rely less on emotions and employ reflective thinking more often, while avoiding the pitfalls of overconfidence and/or dogmatism. This could be a direction for future research, what skills would an individual learn that would work best to protect against false beliefs, which in turn could produce detrimental actions.

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