



Social Media Use, Thinking Styles and Perceptions of Fake News

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Abstract

Is the advancement of communication technology causing more trouble than it is worth? Social Networking Sites (SNS) have connected people in unforeseen ways however they have also become breeding grounds for spreading false information, referred to as “Fake News” (FN). The concept of critical thinking (CT) seemingly offers a potential solution, yet the limited amount of studies examining SNS relationship with CT and an individual’s susceptibility to FN leaves many unknowns. Subsequently, using a general sample (N = 89) this study hoped to examine the effects that time spent on SNS has on someone’s disposition to think critically alongside the effects that both of these variables have on their susceptibility to FN. The Cognitive Thinking Disposition Scale (CTDS) was used to examine one’s disposition to think critically whilst participants accuracy at correctly guessing the nature of 20 articles (10 true/ 10 false) denoted their susceptibility to FN. This study found no relationship between either time spent on SNS and the disposition to think critically or these two variables and FN susceptibility. Implications for these findings are discussed with considerations going towards the possibility of control beliefs and that whilst CT ability might protect ourselves, CT disposition might protect others.

Keywords: social networking sites, time spent on social networking sites, critical thinking, disposition to think critically, fake news, susceptibility to fake news

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Social Media Use, Thinking Styles and Perceptions of Fake News

Rapid technological advancement during the 20th and 21st century has transformed our global society, with beneficial innovations including new modes of transport, medical improvements, and perhaps one of the most influential inventions: the internet. The internet allows for the instantaneous mass transfer of information around the world and has drastically increased the accessibility of information for the average individual. The internet has revolutionised the media; individuals are no longer reliant only on traditional forms of media (newspapers, radio, television) to access news and information, but instead have access to a huge range of sources on a constant basis. Societies switch to the internet has occurred rapidly with its addiction status being a prevalent focus for debate (Young, 1998; Block, 2008; Weinstein, & Lejoyeux, 2010), yet despite this controversy the excess of internet capable devices and use has only continued to increase as the years go by (Papacharissi, & Rubin, 2000; Dimmick, Chen, & Li, 2004; Lenhart, Purcell, Smith, & Zickuhr, 2010; Jia, Wang, Yang, & Yang, 2018; McCarthy, 2018).

Following this we must acknowledge that individuals are now exposed to many “traditional” forms of media alongside newer forms such as the internet, each trying to get their own messages across (Hobbs, & Jensen, 2009). The ability to comprehend these different forms of media is generally referred to as a “literacy”, something that can range from “Media literacy” “Information literacy” to “Digital literacy” (Bawden, 2008; Koltay, 2011; Livingstone, 2004). Schweiger (2000) have suggested that individuals usually view these “traditional” forms of media as only slightly more credible than the internet, although given the age of the study this outlook might have changed. Johnson and Kaye (2004) however, found that individuals seem to rate the media they use the most as more credible, which given societies switch to the internet

indicates that it might eventually be considered the primary source for credible news. Fletcher and Park (2017) propose that this migration could be due to a lack of trust in traditional media which are causing individuals to move towards the internet in hopes of validating the credibility of the news and finding alternative perspectives.

One of the main problems however is that due to its less regulated nature, the internet has very little barriers stopping people from creating their own story and proposing it as if it was fact/reality (Lee, & Oh, 2017; Zubiaga, Aker, Bontcheva, Liakata, & Procter, 2018; Zubiaga, Liakata, Procter, Hoi, & Tolmie, 2016), these untrue stories which are pushed as facts are referred to as fake news (FN) (Allcott, & Gentzkow, 2017; Vosoughi, Roy, & Aral, 2018). FN is spread using multiple means although a common one is the use of “bots” which are programs that act like real individuals and have been linked heavily to the spread of misinformation (Shao, Ciampaglia, Varol, Flammini, & Menczer, 2018). Shao et al., (2018) also found that bots are likely to be more active during the initial stages of information spread and that they are prone to targeting influential individuals perhaps to increase their validity through association. Another form of spreading FN is through real people and their utilization of online services, this is primarily found through “Social media” otherwise known as “Social Networking Sites” (SNS) (Jang et al, 2018).

These SNS are extremely popular within society as shown by Facebook’s 2.5 billion monthly active users (Clement, 2020) who all visit the site at minimum once a month. This popularity is not restricted to Facebook however as shown by the level of traffic that some such as Reddit experience which nearly reached 1.5 billion views for the month of July 2019 (Clement, 2019a) or YouTube with 2 billion monthly logged in viewers as of May 2019 (Clement, 2019b). SNS are used for a multitude of different purposes although a primary one, is

the sharing of information between individuals, particularly news stories (Gil de Zúñiga, Jung, & Valenzuela, 2012; Park, 2019). Following this is the rate at which these users use SNS for news, something which varies depending on the platform with Clement (2018) suggesting that 73% of Reddit, 71% of Twitter and 67% of Facebook users for example use the platform to view news stories.

Chang and Hsiao (2014) also found that the duration of time spent on SNS does have an effect on that individual's behaviour for example, individuals who spend a lot of time on SNS are more likely than others to share information. This might imply that if individuals who spend more time on SNS are more likely to share information then they may also have a higher chance of not only viewing FN but of subsequently spreading it. Although it must be noted that Chang and Hsiao (2014) used an eastern population and failed to question what SNS were being used, something which could reduce the validity of their results is if participants did not recognise a certain software, like YouTube, as a SNS. When considering these numbers and findings, the potential for FN to cause harm starts to become noticeable, a proposed solution is the use of algorithms to ban those they perceive as bots or regulate speech which is deemed as misinformation. Shao et al., (2018) however reiterate that this could result in serious concerns regarding censorship which would create a multitude of new problems therefore leaving the best possible solution ambiguous.

One potential theory which might help increase the understanding of FN is the notion of confirmation bias which denotes that individuals are predisposed towards information that confirms their own views/ beliefs (Klayman, 1995; Nickerson, 1998). Shu, Sliva, Wang, Tang, and Liu, (2017) propose that confirmation bias alongside naive realism (Ward, Ross, Reed, Turiel, & Brown, 1997), believing one's own recollection is accurate whilst those who disagree

are wrong/biased, are the two main mechanisms of FN. This study however also ignores another dangerous mechanism which could be largely contributing to FN on SNS, namely the illusory truth effect (Begg, Anas, & Farinacci, 1992) which denotes that people are more likely to believe what they are initially or repeatedly presented with. Fazio, Brashier, Payne and Marsh (2015) raise further concern as their study suggests that despite knowing information that contradicts a false statement, individuals are still predisposed towards believing the information initially presented despite its credibility so long as it is not outrageous. This reiterates the dangers of FN as despite prior knowledge to the contrary, FN is still likely to alter our perceptions. This not only creates issues for everyday life with false statements as innocent as “Humans have only five senses” but to as dangerous as “Vaccines cause Autism” and the subsequent societal issues which can arise.

A prime example of when FN and subsequently these mechanisms came into public view was during the 2016 American presidential elections where FN relating to both presidential candidates became extremely prevalent (Allcott, & Gentzkow, 2017; Jerit, & Barabas, 2012; Strömbäck, Djerf-Pierre, & Shehata, 2013). Pennycook, Cannon and Rand (2018) found that in regards to the 2016 American presidential election the illusory truth effect, repetition, did increase the perceived accuracy of FN to a small degree upon first exposure. Interestingly, this was then further increased upon second exposure suggesting a possible compounding effect across different exposures. It must be noted however that this study focused solely on FN in relation to the 2016 election and partisan stories rather than using a more general example of FN. Pennycook and Rand (2018) also found that contrary to initial beliefs, susceptibility to FN might be driven by a lack of analytical thinking rather than political bias's, which are in of itself supported by confirmation and perceptual bias's (Jerit, & Barabas, 2012; Knobloch-Westerwick,

Johnson, & Westerwick, 2015). They did however fail to consider any SNS other than Facebook whilst also exclusively focusing on the 2016 American presidential election and gathering participants solely from the Amazon Mechanical Turk program, potentially raising generalizability problems. Another concerning factor is that participants disposition towards this type of thinking was measured in their study using the Cognitive Reflection Test something which it is not designed for, therefore potentially confounding their results

Following on from the results found in Pennycook and Rand (2018) it seems that analytical thinking, might hold the answer to countering the dangers of FN. This is supported by Pennycook and Rand (2019) who found further evidence to suggest that analytical thinking works as a protective factor against FN articles although they failed to address any of the aforementioned issues found within similar studies (Pennycook et al, 2018; Pennycook & Rand, 2018).

The concept of analytical thinking is not isolated however as it is nearly synonymous with the more common concept of critical thinking (CT) which involves the use of impartial analysis and logical thinking in order to form judgements. (Facione,1990; Feuerstein, 1999; Halpern, 2013; Georgiadou et al, 2018; Walker, 2003). Higher CT has been shown as relatively beneficial, with students holding higher CT scores on average performing better in education than those with lower scores (D'Alessio, Avolio, & Charles, 2019). The potential benefits of CT are further explained by Ghanizadeh and Moafian (2011) who found CT positively correlated with higher emotional intelligence showcasing the advantages to supporting such a concept.

Interestingly however is the very limited number of studies investigating the links between SNS and CT with those that do suggesting relatively mixed findings. One example is Pattanapichet and Wichadee (2015) who found evidence to suggest that SNS can be used to

promote CT in an undergraduate population yet the limited amount of studies makes it hard to fully understand this relationship. It must be noted though that Pattanapichet and Wichadee's (2015) sole use of Facebook and academic population might question their generalization and validity, suggesting that perhaps future studies should utilise a general population to improve the overall inferences that could be made.

To mitigate the limited amount of studies Rahwan, Krasnoshtan, Shariff and Bonnefon's (2014) study was also considered, they found a negative relationship between SNS and engaging in analytical thinking independently alongside a failure to implement these analytical processes in future tasks. Bronstein, Pennycook, Bear, Rand and Cannon (2018) using a similar methodology to Pennycook and Rand (2018) also found that individuals with lower levels of analytical thinking were more susceptible to FN than other individuals. This offers further support that analytical thinking, and subsequently CT, is playing an important role in identifying FN which alongside the mixed findings relating to the relationship between CT and SNS emphasises the need for more research.

In conclusion, the increasing popularity of utilizing SNS for news consumption alongside the diversity of SNS and relative ease at which FN can be shared on these platforms is causing growing unrest about the influence FN might be having on society. This is compounded by the ever-increasing traffic that SNS are receiving and the amounts of time that individuals choose to spend on these platforms. It has subsequently been suggested that prolonged periods of use on SNS may be increasing susceptibility to FN as a result of biases such as the illusory truth effect, which in prior exposure increases the likelihood of deeming information as accurate. This is due to Individuals prone to spending more time on SNS might subsequently be more at risk to being exposed to these FN articles regularly than those who use SNS sparingly.

There is an increasing amount of evidence to support these fears yet due to a restricted amount of studies, majority of which focus solely on one or two SNS (Facebook or Twitter) rather than considering a broader range of SNS, the full situation cannot be observed (Lee, & Oh, 2017; Pennycook et al, 2018). A possible mediator to the issue of FN however seems to be in CT although the current state of literature examining this solution could work to be refined and expanded upon. Current studies suggest that those with higher levels of CT might be less susceptible to FN yet limited evidence is available showcasing a need for further investigations, ideally with a general population, which this study hopes to contribute to (Bronstein et al., 2018; Pennycook & Rand, 2018; Pennycook & Rand, 2019). CT however seems to also be influenced by SNS but due to limited studies and mixed evidence suggesting that the relationship is both positive and negative the association is left vague, something which this study hopes to give insight to (Pattanapichet & Wichadee, 2015; Rahwan et al., 2014). Based on the information presented above the main research question which this study is interested in addressing is, what are the effects that time spent on SNS has on one's disposition to think critically and FN susceptibility in a general population.

This is in order to examine whether prolonged SNS usage will degrade an individual's disposition to think critically about a situation and subsequently discern reality from FN. The hypotheses that were derived from this were that, A) Time spent on SNS will influence an individual's CT disposition, and that, B) Time spent on SNS and CT disposition will predict one's susceptibility to FN.

Methods

Participants and Design

This study used a quantitative and within-subjects approach, alongside an experimental design similar to Allcott, & Gentzkow's (2017) and Pennycook et al., (2018) studies with English speaking participants who used SNS and were aged 18 and over. Participants ($n = 129$) were gathered using both convenience and snowball sampling across a multitude of SNS such as Facebook, Instagram and Reddit through postings whilst also being spread by the participants themselves to their friends/family. Participants were male ($n = 61$) and females ($n = 68$) with ages ranging from 18-76 ($M = 29.23$, $SD = 11.07$) within a general population.

Based on their response to the final question a number of participants ($n = 19$) had to be excluded if they indicated use of search engines to assist themselves during the study, as also employed in Pennycook et al., (2018). Similarly, those who failed to specify hours or minutes in reporting their SNS usage were also excluded ($n = 21$). Subsequently this study had a total of 89 viable participants with ages ranging from 18 to 56 ($M=28$, $SD = 10$) which was sufficient according to Tabachnick, Fidell, and Ullman's (2007) recommendations for multiple regression analysis. See Table 1 for further details.

This study was compliant with the ethical guidelines set forth by the National College of Ireland as all participants were informed about their rights and distinctly asked if they agreed to take part in this study. Similarly, they were informed about their right to withdraw at any point alongside their anonymity as no identifying data was collected. The articles were selectively chosen in order to reduce as much potential risk to the participants as possible whilst also

including contact details to helplines and other services at the end for those who might wish to use their services.

Apparatus and Materials

The main apparatus utilised for this study was the online questionnaire presented on Google Forms which gathered the results. This questionnaire contained an information sheet which was followed by a series of demographic questions such as age, SNS used and time spent on which SNS they used alongside the presentation of 20 news articles and the CTDS.

The materials employed included the different forms of technology the participants used to access the questionnaire such as computers, laptops and mobile phones. Other materials included that this study used however primarily included the SNS sites which were used to share the study such as Facebook, Instagram and Reddit alongside Google forms on which the questionnaire was created and presented.

News articles. Following this are the twenty news articles that the participants were presented with in order to determine their susceptibility to FN, ten of which were true events whilst the other ten were false. These articles were gathered from a number of different news sites such as The Irish Independent, CNN, Breitbart and The Telegraph alongside satirical news site The Waterford Whispers and fact checking site Snopes.org. The articles were all manually altered to appear identical to one and other based on the design used by news site Breitbart. This was done to prevent participants from deciphering whether or not an article was true or false based on factors such as “likes” or presentation style. The order in which the articles was presented was randomly generated using the site Random.org. Below each article was also a short synopsis gathered from the site for articles 1, 9, 12, 15, 19 and 20 whilst one was created for the rest of the articles to provide slight context to the headline and images presented based on

Pennycook et al., (2018). Similarly, a few headlines were also altered from their original presentation with those which were altered being articles 3, 4, 5, 6, 7, 8, 10, 13, 17, 18 and 19 whilst the rest were left as found. See appendices D and E for further information about the news articles presented.

Participants were asked to indicate whether they believed the event presented in the article occurred by clicking the corresponding button below each article, either “True” or “False”. The participants accuracy at determining which articles were true and which were false was then summed up to form their overall accuracy score which was out of 20. This was based on the methodology of Pennycook et al, (2018) who used a similar approach with the presentation of articles to determine an individual’s susceptibility to FN. However, their study employed different articles and used a Likert scale rather than a “True” “False” paradigm to determine FN susceptibility.

Critical Thinking Disposition Scale (CTDS). Also, utilised was the CTDS (Sosu, 2013) which is an 11-item questionnaire and was used to identify the participants disposition towards CT. This scale was positively scored based on the participants responses to a series of questions (Ex. “Q1. I usually try to think about the bigger picture during a discussion?”) using a Likert scale which ranged from 0 (Strongly Disagree) to five (Strongly Agree). The internal consistency for the CTDS has been reported as high (Cronbach’s Alpha = .79) although this study reported a lower internal consistency (Cronbach’s Alpha = .67). See appendix A for more information on the CTDS.

Procedure

Participants were approached through SNS sites such as Facebook, Reddit and Twitter where a link for this questionnaire was presented. Upon clicking this link, the participant was re-

directed to the information sheet detailing the study's nature and the rights each participant held. See appendix B. In order to progress past this page, the participant was required to click "I agree" at the bottom of the page which was utilised to collect informed consent electronically and indicate their willingness to participate.

Participants were then presented with a page designed to collect demographic questions such as their sex and age alongside which SNS they use, and for how long on a weekly basis. The following section focused on delivering the 20 news articles to the participant. The presentation of these articles/blurbs continued until answers for all twenty had been acquired which then signified the end of this section.

The next section presented participants with the CTDS (Sosu, 2013) and its 11-items on one page to be answered before they could proceed. Upon completion of the CTDS, based on Pennycook et al (2018) there was one final question asked which investigated whether or not a participant had used a search engine such as google to research the articles and that could have potentially confounded the results,.

The final page of the questionnaire contained a message of gratitude for the participant in taking part alongside the contact details for both the researcher and their supervisor in case they required further explanation. Participants were also informed that should they wish to be made aware of the article's natures, they would have to email the researcher to request it and would be informed through email once data collection had ceased. They were encouraged to spread the link to the questionnaire to friends and family they believed would like to take part. Contact details for helpline services such as Niteline, Samaritans and Befrienders Worldwide were also included on this page should anyone feel the need to avail of their services. See appendix C. This page and the questionnaire as a whole were concluded once the participant had clicked the

“Submit” button at the bottom of the page, a fact which was reiterated to them upon their arrival on the page.

The data was then downloaded from Google forms and stored electronically on a USB stick with a password to be retained for a period of 5 years as dictated by the data retention policy of National College of Ireland 2019.

Results

Descriptives

This study compiled a total of 129 responses for data analysis from male and female participants, of this number however only 89 participants responses were viable with forty (44.9%) being male and forty-nine (55.1%) being female. These responses contained information regarding the participants sex, which SNS they used and for how long, their accuracy at discerning whether an article was true/false alongside their scores on the CTDS. See Figure 1 for further details about which SNS were used by the participants.

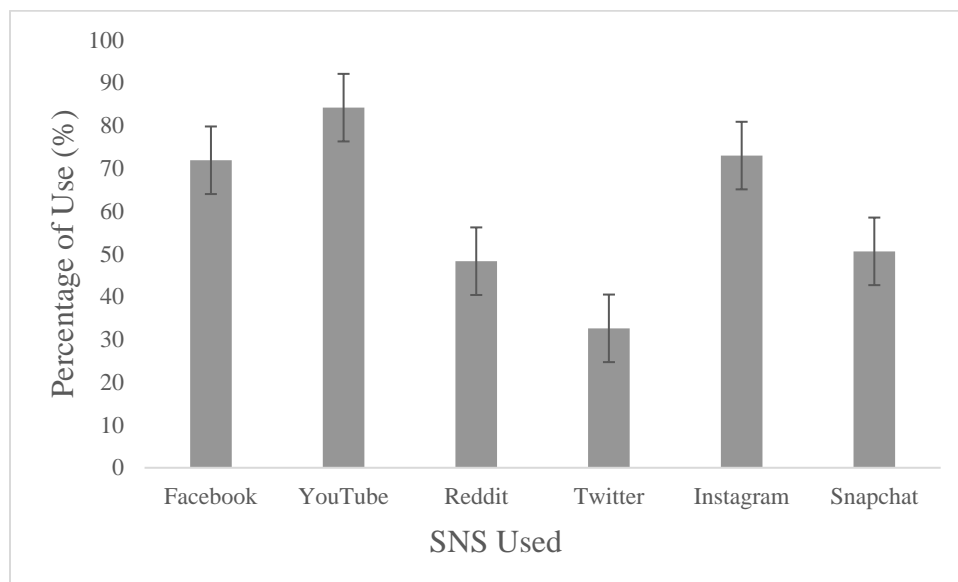


Figure 1.

Table 1

Descriptive data for predictor and criterion variables

	Mean	Median	Standard Deviation	Range (Min & Max)	Skew ness	Kurtosis
Age	28	24	10	18 to 56	.89 / .26	-.54 / .51
News accuracy	12.66	13.00	2.36	7 to 18	-.24 / .26	-.17 / .51

Time on SNS(Min)	1234.47	1020.00	867.32	60 to 4440	1.35 / .26	2.18 / .51
CTDS	44.66	45.00	4.51	34 to 55	.18 / .26	-.07 / .51

Spearman's Rho

The relationship between time spent on SNS and CTDS scores was investigated using a Spearman Rho correlation analysis. Preliminary analyses were performed to ensure no violation of the assumptions of linearity and homoscedasticity however Time spent on SNS did violate the assumption of Normality. There was no correlation between the two variables as it was not statistically significant ($r_s = .06$ [95% CI = $-.13 - .26$], $n = 89$, $p = .56$). Results indicate that time spent on SNS is not associated with an individual's disposition towards critical thinking.

Multiple Regression

Multiple regression analysis was performed to determine how well accuracy at determining true/fake news articles could be explained by two variables including time spent on SNS and CTDS scores.

Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity and homoscedasticity however only Time spent on SNS violated the assumption of normality. The correlations between the predictor variables and the criterion variable included in the study were examined (See Table 2 for full details). Neither of the two predictor variables were significantly correlated with the criterion variable, these effects ranged from $r = -.01$ (CTDS) to $r = -.07$ (Time on SNS). The correlations between the predictor variables were also assessed with an r value of $.03$. Tests for multicollinearity also indicated that

there was no violation of the assumption of multicollinearity and that the data was suitable for examination through multiple linear regression analysis.

Since no a priori hypotheses had been made to determine the order of entry of the predictor variables, a direct method was utilized for the analysis. The two predictor variables explained .01% of variance in relation to news accuracy ($F(2, 86) = .238, P > .789$). See Table 3 for further details. The results indicate that neither time spent on SNS or one's disposition to think critically have any significant effect on an individual's ability to accurately discern true/false news articles.

Table 2

Correlations between variables included in the model

Variables	1	2
1.News accuracy	1	
2.Time on SNS (Min)	-.074	1
3.CTDS	-.008	.030

Table 3

Multiple regression model predicting news accuracy scores

	R^2	β	B	SE	CI
					95% (B)
Model	.01				
Time on		-.07	.000	.00	-.001
SNS (Min)					/ .000

CTDS	-.01	-.003	.06	-.12
			/ .11	

Note. R^2 = R-squared; β = standardized beta value; B = unstandardized beta value; SE = Standard errors of B; CI 95% confidence interval for B; N = 89

Discussion

This study utilising 89 participants investigated two areas which have recently rose to prominence within the general public, the impact SNS are having on individuals and the concept of FN. Primarily whether spending longer times on these SNS are causing a reduction in an individual's disposition towards thinking critically alongside whether or not prolonged periods of time on SNS are increasing our susceptibility to FN whilst also investigating the impact of one's CT disposition. Curiously, it was found that the duration of time spent on SNS had no effect on an individual's disposition towards CT and conflicting with this study's initial assumption prior to the hypotheses that there would be a negative relationship.

Similarly, the results also indicate that an individual's time spent on SNS has no relationship with their susceptibility to FN however, more concerning was that this lack of a relationship was also true for one's disposition to think critically. CT disposition not having an effect on one's susceptibility to FN raises a considerable amount of questions as not only is it disregarding the logical assumption, it is also apparently contrary to the limited amount of studies which have investigated such a relationship. The legitimate articles which were utilised in this study were all gathered from reputable sources and factually accurate as opposed to the false articles which detailed fabricated events. Considering that the articles were gathered in such a way as to be as general as possible it can be inferred that based on these results, the disposition to think critically has no effect on an individual's susceptibility to general FN.

Hypothesis 1

The results gathered for this study contribute to the debate regarding the effects of SNS on individuals whilst also addressing a gap within the literature as based on these results it appears that an individual's time on SNS does not affect their disposition towards CT ($r_2 = .06$, P

= .56). This result is slightly contradictory to studies such as Pattanapichet and Wichadee's (2015) who suggest SNS as a possible tool for increasing CT skills yet the present result suggests that time on these SNS has no effect on an individual's disposition to think critically. This might imply that whilst SNS can be used to bolster the skills of CT, using these platforms doesn't make an individual any more likely to actually use these skills. This is partially in line with Rahwan et al's., (2014) study which indicated that SNS are not ideally suited for encouraging the actual use of these skills rather that individuals are more likely to simply copy others analytical output than the process. Additional support comes from Facione (2000) who found that CT skills and the disposition to think critically are actually separate constructs which need to be individually supported rather than being considered as one solitary construct.

Another possible explanation comes from the theory of planned behaviour (Ajzen, 1991; Ajzen, 2002; Conner & Armitage, 1998), particularly control beliefs meaning the ease/difficulty of performing a behaviour alongside the extent that performance is decided by the individual, which are having an effect on the individual's disposition to think critically. This is reinforced by Pintrich, Smith, Garcia, and McKeachie (1993) who reported a relationship between control beliefs and one's disposition to think critically. Further evidence is suggested by Stupnisky, Renaud, Daniels, Haynes, and Perry's (2008) study which found evidence suggesting that CT disposition has a reciprocal relationship with perceived academic control. Building on this is that control beliefs have also been shown to have a relationship with the amount of time adolescents spend on SNS (Baker & White, 2010). The aforementioned evidence seems to suggest that control beliefs might possibly be mediating both time on SNS and CT dispositions, something which this study failed to account for.

Hypothesis 2

Following the results of the first hypothesis are the findings pertaining to the second hypothesis and its contributions towards the growing literature associated with FN by revealing that neither the duration of SNS usage ($r = -.07$) or one's disposition to think critically ($r = -.01$) influences someone's susceptibility to FN ($p > .789$). The duration of time spent on SNS not having any significant effect on one's susceptibility towards FN suggests that people who are on these platforms for a substantial amount of time are no less affected by them than those who only briefly utilise them. This seems to contradict Pennycook et al., (2018) however who found that the illusory truth effect was having a significant effect on FN susceptibility and the logical assumption that those who spend more time on SNS would be increasingly vulnerable towards being exposed to FN. Perhaps this is due to the different activities people use SNS for, whilst Clement (2018) suggest that for example 73% of Reddit users and 67% of Facebook users use SNS for news, it's unknown how much time they actually spend looking at the news.

Whiting and Williams (2013), using an exploratory approach, observed that whilst individuals do use SNS for information gathering, they are also primarily used for other means such as entertainment, messaging friends and relaxation. Thus, these results might infer that whilst individuals are possibly at a higher risk of being exposed to FN with longer usage times, due to the many other ways of using these platforms it appears that the relationship is negligible as individuals are not spending the entire duration being exposed to news.

The results suggesting that an individual's disposition to think critically also having no relationship with their susceptibility to FN raises mixed concerns in relation to prior research (Pennycook & Rand, 2018; Pennycook & Rand, 2019). Pennycook and Rand (2019) for example found that analytical thinking can work as a protective factor against FN however when

considering the results of this study it appears that whilst analytical thinking and subsequently CT might protect against FN, one's disposition to actually use this ability might not matter. Facione (2000) would also help explain Pennycook and Rand's (2019) findings due to their results showcasing that the two constructs of CT ability and the disposition to think critically are independent of one another. This could perhaps mean that just having these CT abilities unconsciously protects individuals when they are exposed to FN, therefore further emphasising the need to promote the teaching of CT skills across all ages and occupations.

Something which must be noted however is the possibility of conformity bias in that individuals are more susceptible to FN that they believe is supported/believed by others as suggested by Lee and Oh (2017) who found higher amounts of "retweets" indicative of future support. These findings are also in line with Rahwan et al., (2014) who reported that individuals seem to copy others analytical deductions rather than implement these processes themselves further showcasing the impact others have on someone's susceptibility to FN. Colliander (2019) reinforces this idea with their findings suggesting that others are more likely to support FN which has been itself supported by others through "comments" left on the post, although conversely they are also less likely to believe FN if "comments" that are critical of it have been posted. This evidence seems to again emphasise the importance of CT but also proposes another way to look at this study's results as whilst one's disposition to think critically has no relationship with their susceptibility to FN, perhaps those increasingly disposed to CT are more likely to protect others from FN instead. This possibility highlights that those disposed to think critically and the subsequent sharing of this thought process with others might be acting as a protective factor for a numerous amount of individuals who view that FN article.

Limitations

It must be acknowledged that this study contained a multitude of limitations and strengths which should be emphasized. Paramount, was the present sample size which this study's analysis relied upon being only 89 viable participants which whilst acceptable according to Tabachnik et al., (2007) for regression analysis, it was still a relatively low sample size which might have affected the results. The variation between the sexes however was a notable strength of the study as the split was nearly perfectly distributed (Males = 44.9%; Females = 55.1%). This sample whilst gathered from a general population, rather than a specific one such as the Amazon Mechanical Turk users (Pennycook et al., 2018; Pennycook & Rand, 2018), was not nationally representative due to the convenience and snowballing methods of collecting data from online participants. This meant that any nationality would be able to take part which whilst a considerable strength did result in the study not being able to be generalised to one nation in particular, for example Ireland, as there were potentially participants from around the world.

Another key limitation was the self-report nature of the present study, something which left open the possibility for response biases from the participants, potentially confounding the results. However, this nature also allowed for the mass transfer of this study across different SNS platforms whilst making it easier for participants to engage with the study whenever they were able to as there was no experimenter directly required.

The basis for this study's methodology came from Pennycook and Rand (2018) who also utilised the presentation of both real and fake news articles in order to examine the accuracy of an individual in discerning which were which. This study however also includes a couple of big methodological differences from their study which must also be considered. One example is their utilization of a Likert scale ranging from 1 (not at all accurate) to 4 (very accurate) in order to

determine accuracy whilst this study restricted it to simply true/ false. This constraint ultimately restricted the amount of data which could be gathered relating to participants beliefs about the presented articles and was a key limitation this study faced, however it should be noted that the definitive style this study used was done in hopes of keeping the study simplistic for participants and avoiding the possibility of confusion.

Another methodological difference between the two was the scale used in relation to CT with Pennycook and Rand (2018) using the Cognitive Reflection Test to determine CT ability and disposition whilst this study used the CTDS (Sosu, 2013) to examine one's disposition to think critically. Whilst the Cognitive Reflection Test examine one's CT ability it was not designed to test one's disposition to actually use these skills, hence in order to address this apparent gap the current study used the CTDS. This was a big strength of the study as it addresses a key gap in the literature which is further supported by Facione (2000) declaring CT and the disposition to think critically as independent of one another. Similar to Pennycook and Rand (2018) this study also accounted for and excluded individuals who might have sought online assistance by including a question at the end asking participants to report if they had utilised a search engine (for example, Google) to look up any stories. Whilst this was self-reported it did allow this study to screen for participants who had potentially ingenuine results which was a very beneficial strength to the overall methodology of the study. The final key limitation that must be taken note of was the fact that in order keep the data as anonymous as possible, individuals did not need to log in/ sign up to anything in order to take part which whilst beneficial at first glance, left open the possibility for individuals to take part in the study multiple times if they wished.

Conclusion

The concept of FN is something which has been seemingly around for centuries if not all of human history in the form of propaganda and rumors, however society now faces a new battle with it as SNS provides a new platform for this confrontation to occur. As previously mentioned a prime example of when this occurred was during the 2016 presidential election, setting a concerning precedent that as society advances is it potentially opening itself up to more manipulation on a much more regular basis. The present study's results seem to alleviate some of these fears as there was no relationship found between the time spent on SNS and one's disposition to think critically or between both of these and susceptibility to FN.

Interestingly when taking these results into consideration alongside other research it seems that perhaps one's disposition to think critically is instead something which could protect others rather than oneself from CT. This emphasises the need to encourage the teaching of both concepts of CT as together they seem to be able to promote the protection of not only ourselves but also of others from FN. Promoting these concepts is something which needs to be incorporated into the curriculums of all levels of education as the evidence implies their effectiveness at combating FN but likewise they have also been shown to have additional benefits in a multitude of other areas. These concepts are also a much more beneficial alternative to censorship which might seem like the best course at first glance given the impact of bots but historically this has caused its own host of disastrous problems.

Based on these findings it is hoped that future research would aim to properly examine the effects that control beliefs might be having in mediating an individual's SNS usage and their disposition to think critically alongside the potential effects that specific SNS other than

Facebook might be having on individuals. Similarly, future research should also aim to explore the potential effects that one's disposition to think critically might be having in protecting others alongside further investigating the potential benefits of using SNS to promote CT abilities.

Overall, this study's findings imply that whilst no immediate relationship was found, there are potentially other associated nuances and outlooks to be considered if society hopes to fully understand the concept of FN and the impacts of SNS.

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Appendices

Appendix A

Critical Thinking Dispositions Scale CTDS

Items

The following preliminary suggestions can be used in deriving composite scores. The scores of the 11 items can be summed to provide an overall dispositional score for an individual with a range of 11–55. Scores between 11 and 34 will indicate low disposition; 35–44 moderate disposition; and 45–55 high disposition. A useful strategy should also include examination of subscale scores. The total score for the Critical Openness scale will range from 7 to 35 with the following cut-offs (7–21 low; 22–28 moderate; 29–35 high). Reflective Scepticism will have a range of 4–20 with cut-off ranges being 4–12 low; 13–16 moderate; and 17–20 high.

Critical Openness

N	I usually try to think about the bigger picture during a discussion.
C	I often use new ideas to shape (modify) the way I do things.
D	I use more than one source to find out information for myself.
A	I am often on the lookout for new ideas.
O	I sometimes find a good argument that challenges some of my firmly held beliefs.
J	It's important to understand other people's viewpoint on an issue.
E	It is important to justify the choices I make.

Reflective Scepticism

T	I often re-evaluate my experiences so that I can learn from them.
S	I usually check the credibility of the source of information before making judgements.
K	I usually think about the wider implications of a decision before taking action.
U	I often think about my actions to see whether I could improve them.

Note. All items utilized a 5-point Likert-type response scale (1 = strongly disagree, 5 = strongly agree).

Appendix B

Information Sheet

Social Media Use, Thinking Styles and Perceptions of Fake News

Hello, I would like to take the time to invite you to participate in my research study. Before you make your final decision, it's important that you understand why this research is being performed and what it means for you. Please go through the following information carefully and take as much time as you need.

WHO I AM AND WHAT THIS STUDY IS ABOUT

My name is Caolán Murphy and I am a final year undergraduate Psychology student in National College of Ireland. As part of my final degree, I am required to complete my own research study. For my study I was inspired by the recent interest in the concept of "Fake news" in the past couple of years from a vast array of individuals and organizations. My study aims to investigate whether or not social media use, and thinking styles might be related to how people make judgements related to news stories

WHAT WILL TAKING PART INVOLVE?

If you decide to take part in this research, you will be asked to complete this online questionnaire. The questionnaire contains items that collect some basic information about you, and your use of social media. You will then be presented with a series of 20 news articles on a range of different topics and asked to indicate whether you think the story is true (genuine news article) or false (fake news article). You will then be asked 11 questions which relate to your thinking style which will mark the end of the study and direct participants to a final page containing helplines and a few closing remarks. The questionnaire should take about 10 – 15 minutes to complete.

WHO CAN TAKE PART?

You can take part in this study if you are 18 years of age or older, speak English and utilize social media in some shape or form.

DO YOU HAVE TO TAKE PART?

Participation within this study is entirely voluntary. If you decide not to take part, there will be no consequences for you. You can withdraw from the study at any time during the questionnaire, by simply closing the browser window to exit the questionnaire. Please note that due to the anonymous nature of the data being collected, it will not be possible to withdraw your data from the study once you have completed the questionnaire.

WHAT ARE THE POSSIBLE RISKS AND BENEFITS OF TAKING PART?

There are no direct benefits to taking part in this research. There is a very small risk however that questions and news articles presented may cause distress for some participants. Should this arise, there will be a list of help-lines, directories and avenues to further explore for help on the final page of the questionnaire.

WILL TAKING PART BE CONFIDENTIAL?

The questionnaire is anonymous, so it will not be possible to identify any participant based on their responses.

The data collected will be treated in the strictest confidence. Please note that due to the anonymous nature of the data being collected, participants will be unable to request their own data being excluded once they have completed the study as the experimenter will be unable to identify which data belongs to said participant.

HOW WILL INFORMATION YOU PROVIDE BE RECORDED, STORED AND PROTECTED?

All data acquired from this study will be stored securely on a password protected USB drive which only the researcher has access to. No one except the researcher and their supervisor will have access to the data. Data will be retained for 5 years in accordance with the National College of Ireland's data retention policy.

WHAT WILL HAPPEN TO THE RESULTS OF THE STUDY?

The results of this study will be analysed and written up into my dissertation, which will be submitted to National College of Ireland. This report, and its results, are also intended to be presented at the student's conference 2020 hosted by the Psychological Society of Ireland and potentially submitted to a peer reviewed journal for publication.

WHO SHOULD YOU CONTACT FOR FURTHER INFORMATION?

For further information or questions related to this study, please contact:

Researcher: Caolán Murphy, National College of Ireland, x17478922@student.ncirl.ie

Supervisor: Dr. Caoimhe Hannigan, Email: caoimhe.hannigan@ncirl.ie

THANK YOU

Appendix C

Debriefing sheet

You have reached the end of the questionnaire. **Please click the ‘submit’ button below to submit your responses and complete your participation in the study.**

Once again, I would like to say thank you very much for agreeing and taking the time out of your day to take part in this study, it was greatly appreciated. I hope that you will consider sharing the link to this questionnaire with others who may be interested in taking part.

If you wish to be made aware of which of the presented articles were true/false please get in contact with myself through the email provided below. I will be able to send you this information by email once data collection for the study is complete.

If you have any questions or concerns about the nature of this study, you can contact myself or my supervisor using the details below. If any aspect of this questionnaire has caused you distress, you may also contact the support services listed below.

Caolán Murphy:

x17478922@student.ncirl.ie

Supervisor: Dr Caoimhe Hannigan:

caimhe.hannigan@ncirl.ie

Nightline student support:

Open every night of term, 9pm – 2:30am

Call: 1800 793 793

Samaritans:

Open 24 hours, 365 days a year to everyone who wishes to talk or seek help

Call: 116 123

Samaritans are also located in England, Wales, Scotland and Northern Ireland, information about these branches can be accessed through their site: <https://www.samaritans.org/branches/>

Befrienders Worldwide:

They are a helpline which evolved from Samaritans and now work on a larger international scale to help people who need or want it. See their website below for more details applicable to you.

Website: <https://www.befrienders.org/directory>

Appendix D

Article 1. (True)

Sunday 29 September 2019

 News Europe

Police use tear gas in Paris to disperse anti-government demonstrators



Article 2. (True)

Did a Man Twice Land a Plane on a New York Street on a Bar Bet?

This "hold my beer" story may seem like a work of fiction, but the aerial exploits of Thomas Fitzpatrick are well-documented.

DAN EVOY

PUBLISHED 24 APRIL 2018



Article 3. (False)



Article 4. (False)



Article 5. (False)

Did St. Patrick Wipe Out an African 'Pygmy' Tribe, the First Inhabitants of Ireland?

A long-standing theory of ancient Irish history describes the genocide of the Twa pygmies, purportedly the original source of the "leprechaun" myth.

DAN MACGILL
PUBLISHED 29 JULY 2018



Article 6. (False)

Was a Man Hospitalized After His Apple AirPods Exploded in His Ear?

Do you hear that? It sounds like something that might not be true.

DAN EVON
PUBLISHED 23 DECEMBER 2018



Article 7. (False)



Article 8. (False)



Article 9. (True)

EATING MEAT IS 'ECOCIDE' AND SHOULD BE MADE ILLEGAL, SAYS TOP LAWYER

f 1,476 EMAIL SHARE TWEET



Article 10. (True)

Has the Macaw Species from 'Rio' Movies Been Declared Extinct in the Wild?

Saving the species from extinction has been a central focus of the movies' storyline.

ALEX KASPRAK
PUBLISHED 27 AUGUST 2019



Article 11. (True)

Anti-racism event hosted by Edinburgh University bans white people from asking questions

Article 12. (True)

Florida man arrested after whipping out samurai sword in trash dispute

By Josh K. Elliott Senior National Online Journalist, ViralTrends Global News



Article 13. (False)

Did Sweden Rename 'Christmas' to 'Winter Celebration' in Order to Avoid Offending Muslims?

The so-called "war on Christmas" seemingly hasn't ended; it just changes location from time to time.

DAN EVON

PUBLISHED 13 DECEMBER 2018



Article 14. (True)

Is Actor Tom Hanks Related to Fred Rogers?

You may be surprised to find out just how many sixth cousins the average person has.

DAN EVON

PUBLISHED 23 NOVEMBER 2018 | UPDATED 25 NOVEMBER 2018



Article 15. (True)

A new 'report card' on America's diet: It's not an 'F' but...

By Sandee LaMotte, CNN

Updated 16:48 GMT (00:48 HKT) September 24, 2019



Article 16. (False)

Majority Of British Public To Be Treated For PTSD Post Brexit

Thursday 5, 2019 - BREAKING NEWS, POLITICS, WORLD REPORT



View Comments



Article 17. (False)



Article 18. (False)



Article 19. (True)

Did Trump Sign a Law Making Animal Cruelty a Federal Crime?

Trump signed the Preventing Animal Cruelty and Torture Act in November 2019, banning several specific kinds of animal cruelty and torture.

DAN MACGILL
PUBLISHED 26 NOVEMBER 2019



Article 20. (True)

Oregon woman charged with serving meth-laced bean dip

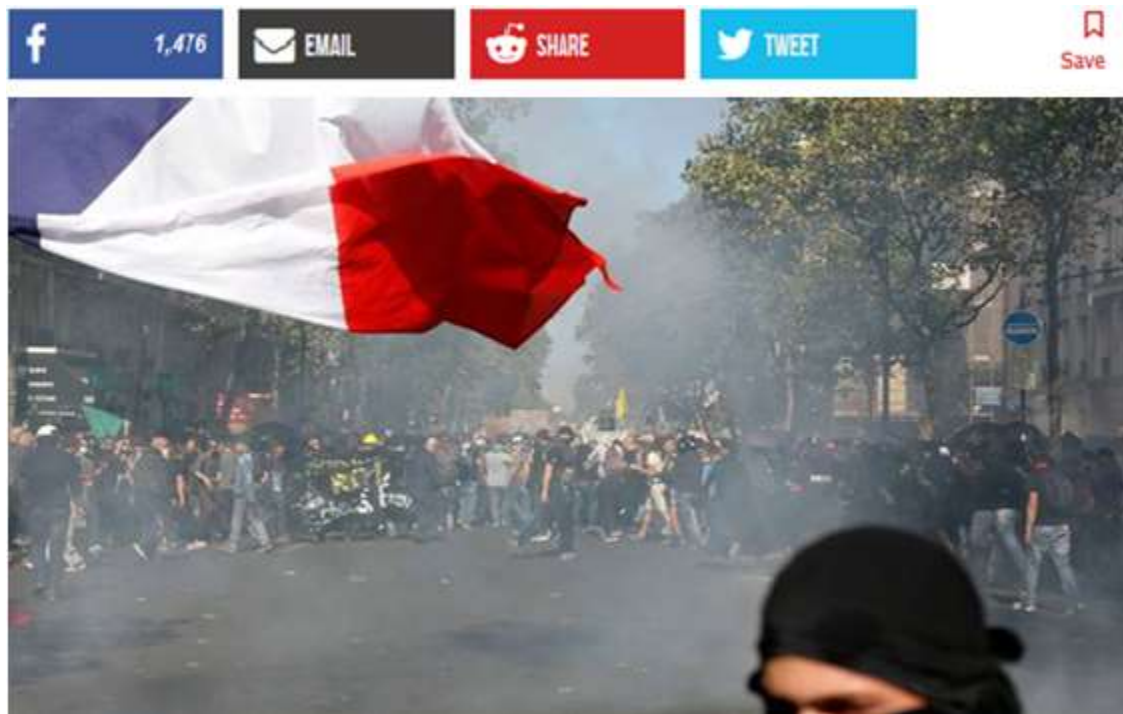
By Jay Croft and Shawn Nottingham, CNN
Updated 21:47 GMT (06:47 HKT) September 28, 2019



Appendix E.

Article 1.

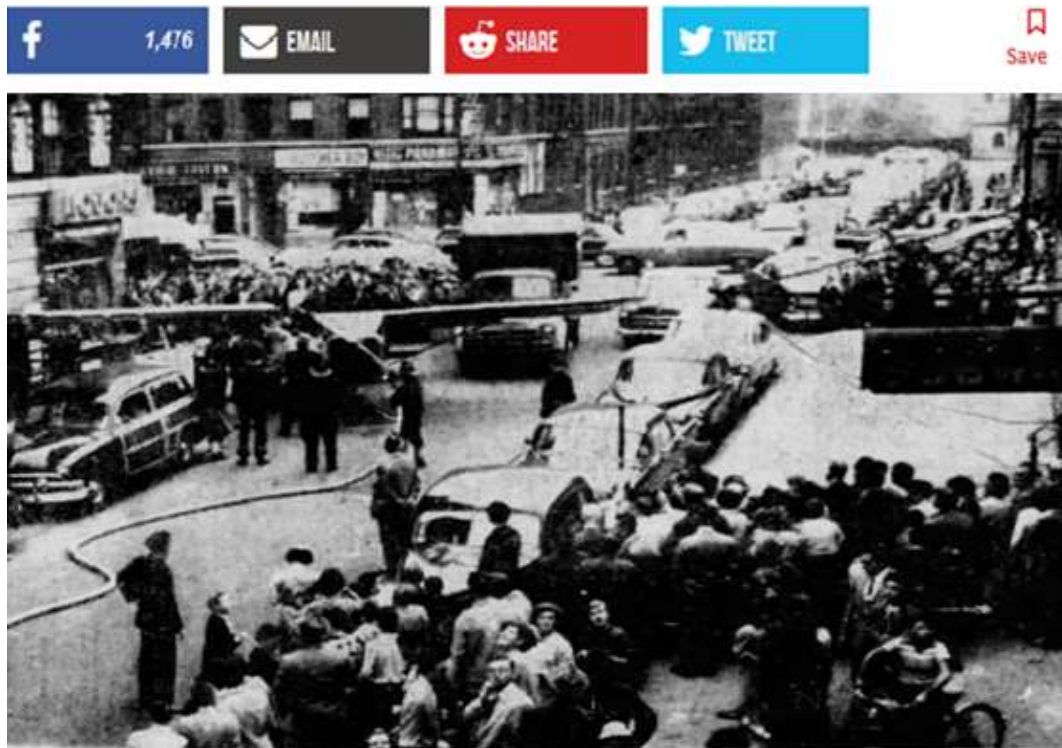
Police use tear gas in Paris to disperse anti-government demonstrators



Paris police have used tear gas to disperse anti-government demonstrators trying to revive the yellow vest movement in France.

Article 2.

Did a man twice land a plane on a New York street on a bar bet?



An old newspaper has apparently resurfaced which seems to suggest that an individual known as Thomas Fitzpatrick flew and landed a plane twice on a New York street while inebriated during the 1950's

Article 3.

Democrat candidate, Tara McClossoff introduces bill to ban Senior Citizens from voting



Bill to prevent senior citizens from voting is, according to democrat candidate Tara McClossoff, desperately needed citing that they are 'out of touch' with modern issues.

Article 4.

Scientists claim that putting a Penny in a microwave will cause the coin to shrink if it has been exposed to illegal drugs



Scientists, according to recent studies, have discovered that the size of a coin will shrink if placed in a microwave once it has come into either direct/indirect contact with common illegal drugs, marijuana and crystal meth due to a unique chemical reaction.

Article 5.

Education minister declares that St. Patrick wiped out an African ‘Pygmy’ tribe, the first inhabitants of Ireland



Education minister Joe Mchugh has revealed his belief of St. Patrick's genocide of the African 'Pygmy' population who initially inhabited Ireland, alongside future plans to incorporate this event into both the Junior and Leaving cert curriculum.

Article 6.

Man hospitalized after his Apple Airpods exploded in his ears



Man (26) was listening to music during his morning commute before it was replaced with static and his Airpods suddenly exploded within his ears, suffering third-degree burns and permanent hearing loss in the process.

Article 7.

Methodist church launches campaign against online dating and adultery



Methodist church in Effing, SC launches new campaign against online dating and adultery after many prominent locals have been found cheating on their spouses through apps such as 'Tinder' and 'Hinge'.

Article 8.

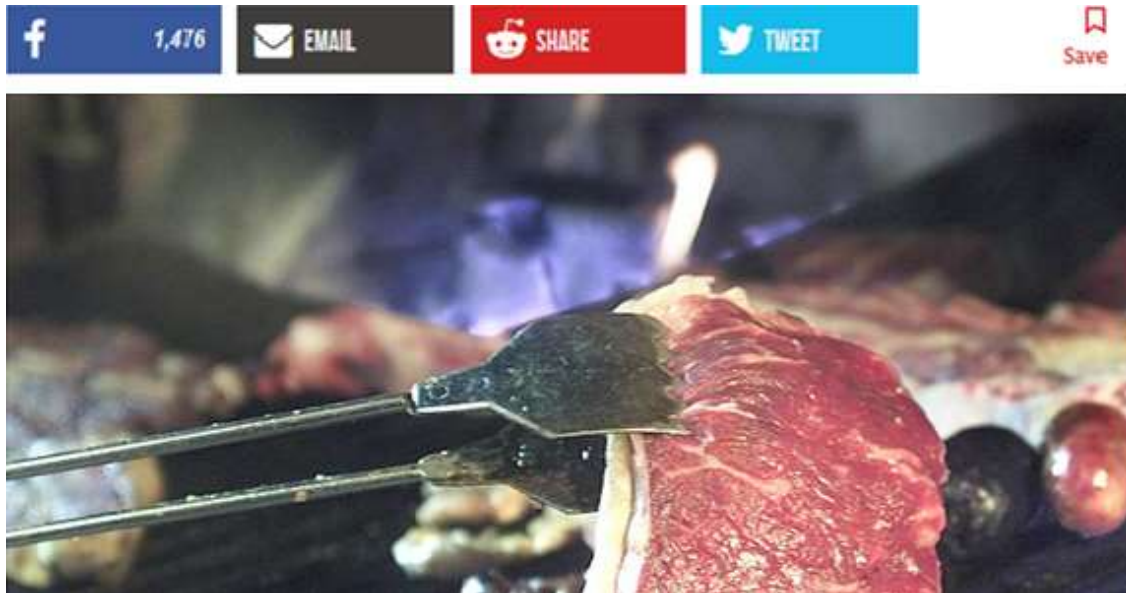
‘The Simpsons’ TV Show has predicted yet another disaster, is it a modern-day Nostradamus?



‘The Simpsons’ have had their fair share of conspiracy’s over the years, none more recurring however than their ominously accurate portrayal of future events which has led to fans questioning the abilities of series creator Matt Groening.

Article 9.

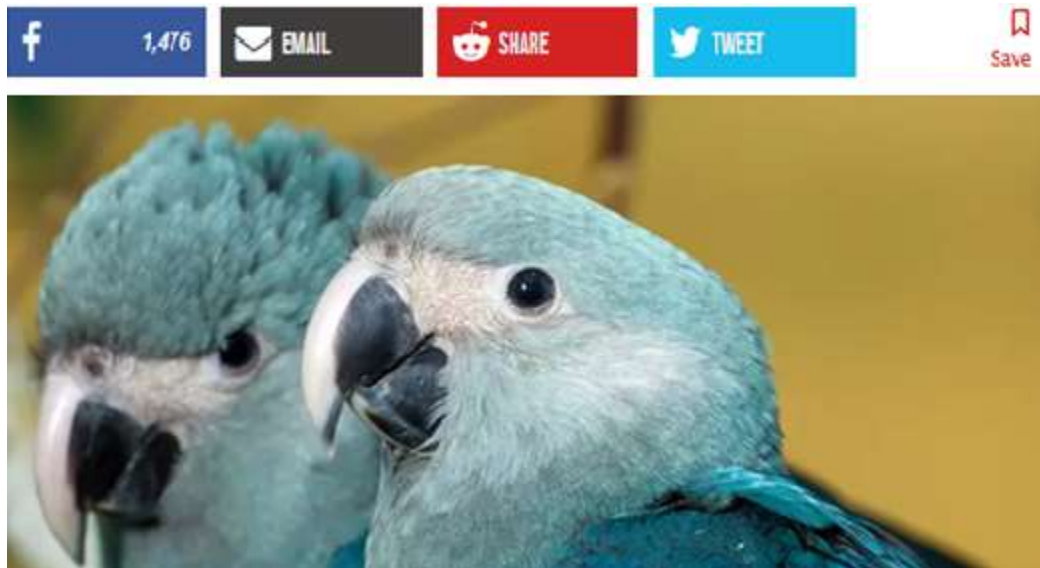
Eating meat is ‘Ecocide’ and should be made illegal, says top lawyer



A British barrister has predicted that eating meat will one day be viewed as a form of ‘ecocide’ and made illegal because of the ‘damage’ it does to the environment.

Article 10.

Macaw species from ‘Rio’ movies have been declared extinct in the wild by scientists



Saving the species from extinction has been a central focus of the movies' storylines however due to recent studies and lack of sightings, scientists have declared that this specific species is now extinct in the wild.

Article 11.

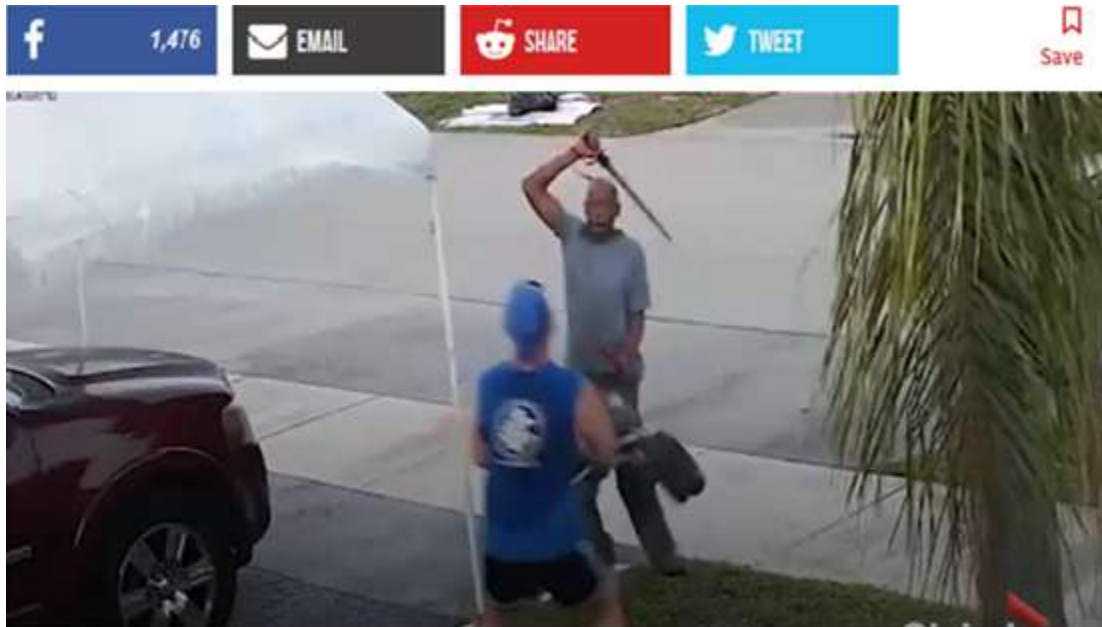
Anti-racism event hosted by Edinburgh University bans white people from asking questions



The university of Edinburgh has been criticized for hosting an 'anti-racism' event in which white people were due to be banned from asking questions and entering a specific room.

Article 12.

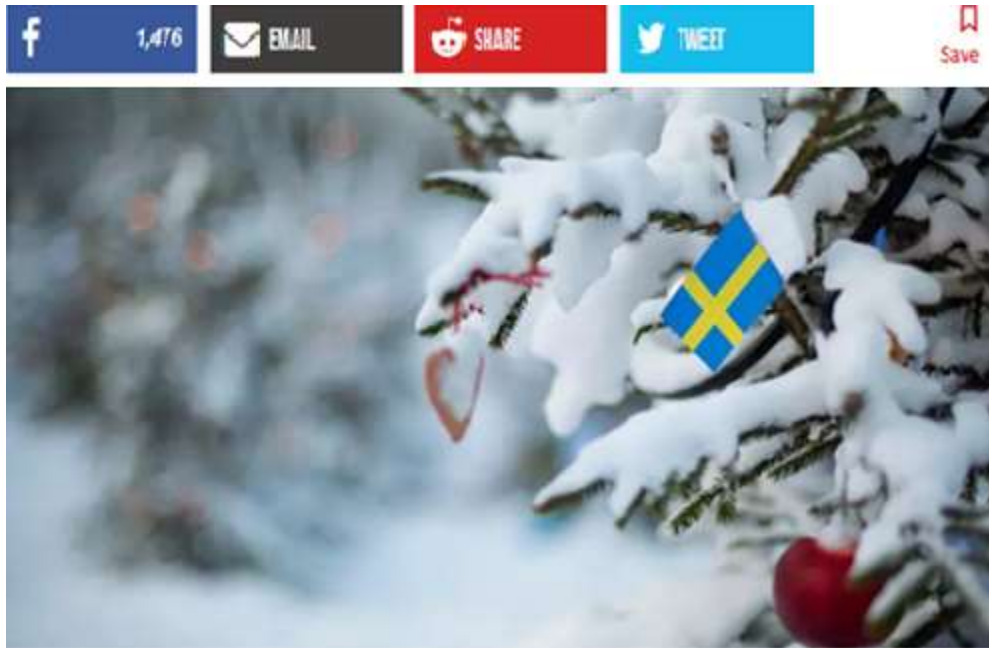
Florida man arrested after whipping out samurai sword in trash dispute



Police have charged a 54-year-old man with attempted murder in connection with a dispute involving a katana sword and a wheelbarrow.

Article 13.

Sweden renames ‘Christmas’ to ‘Winter Celebrations’ in bid to increase inclusivity



Due to recent protests from within the increasingly diverse country, a bill has been passed to replace the term ‘Christmas’ in a bid to make the celebrations appeal to everyone.

Article 14.

Is Actor Tom Hanks related to Fred Rogers?



The uncanny likeness between the two has been recently noticed due to Tom Hanks latest starring role as 'Mister Rogers' otherwise known as Fred Rogers in the upcoming bio-picture 'A beautiful day In the Neighborhood' and led to the reveal that they are in fact sixth cousins.

Article 15.

A new ‘report card’ on America’s diet: It’s not an ‘F’ but...



Are you a glass half-full sort of person? Well, then, get ready for some good news. You and your fellow Americans are doing a better job of eliminating crummy carbs and sugar from your diet.

Article 16.

Majority of British public to be treated for PTSD post Brexit



The British government have recently revealed their plans to offer optional therapy sessions for majority of the public in hopes to reduce any negative impacts the long-anticipated Brexit might induce.

Article 17.

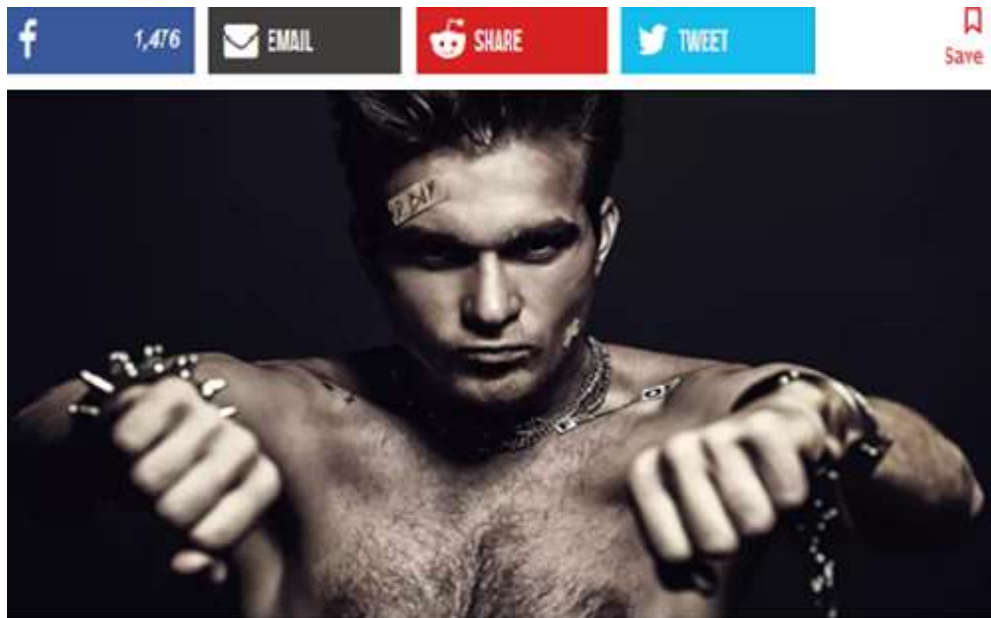
New research suggests that cream of tartar mixed with orange juice is more effective at causing people to quit smoking due to detoxifying the body than prescriptions



A new research study from Oxford have found that the unique combination of cream of tartar and orange juice works twice as fast at reducing nicotine consumption compared to most prescriptions.

Article 18.

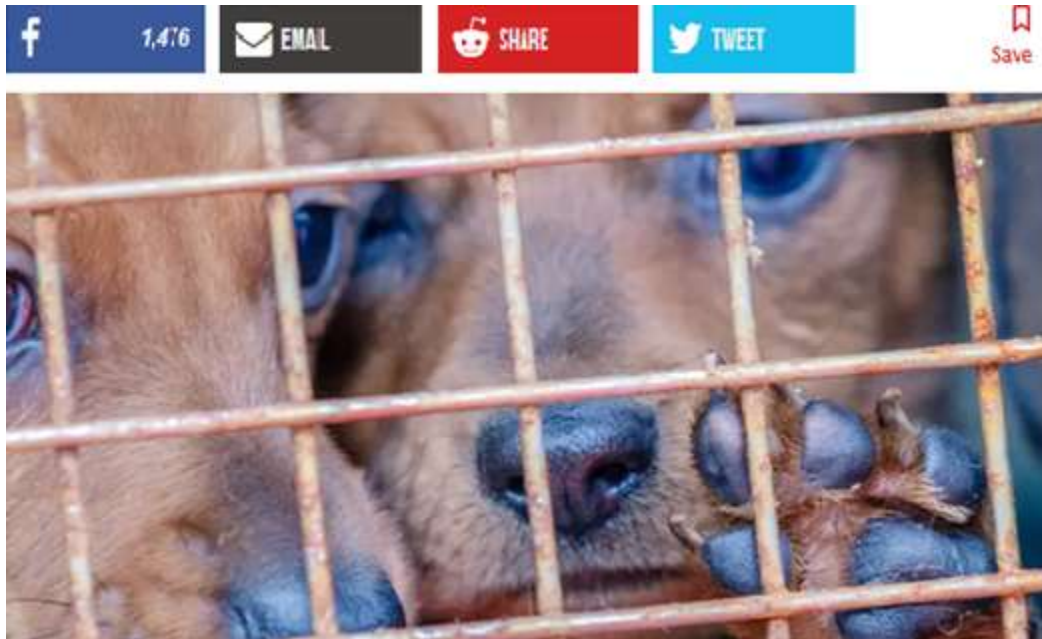
Retirement home raided by Gardaí for running Elderly fight club



In recent investigations to make sure those most vulnerable are being cared for correctly, Gardaí discovered a retirement home in south Dublin was holding an elderly 'fight club', betting on winners and streaming it illegally online.

Article 19.

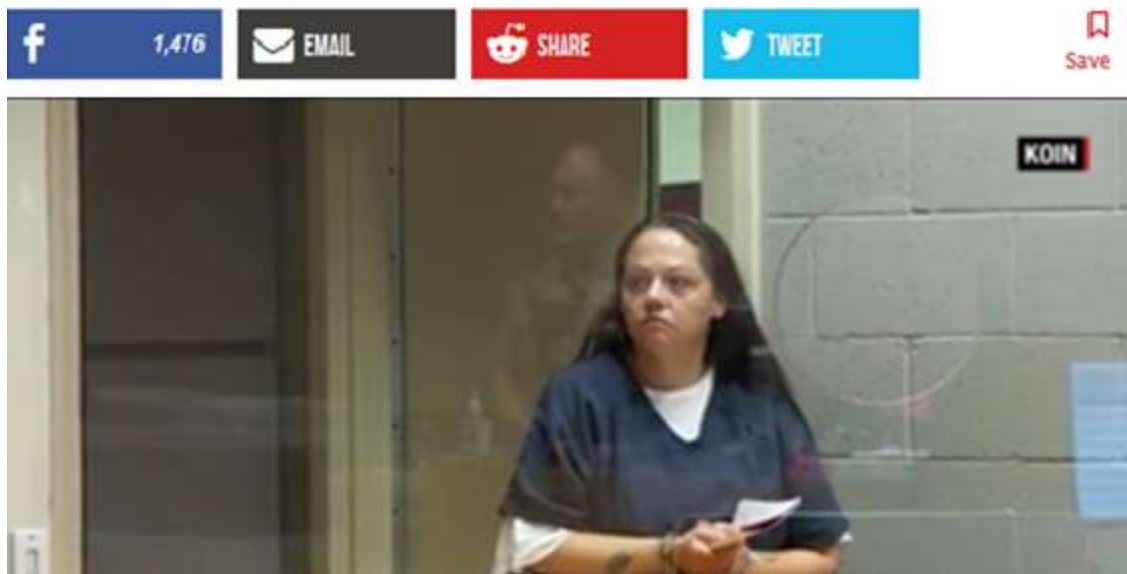
Trump signs a law making animal cruelty a federal crime



Trump signed the Preventing Animal Cruelty and Torture Act in November 2019, banning several specific kinds of animal cruelty and torture.

Article 20

Oregon woman charged with serving meth-laced bean dip



An Oregon woman is under arrest after police say she shared bean dip with an extra ingredient: Methamphetamine.