1   Do Deepfake Videos Undermine our Epistemic Trust? A thematic analysis of tweets that

2   discuss deepfakes in the Russian invasion of Ukraine

3   Deepfakes, war, trust, and knowledge

4

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20 # Abstract

21   Deepfakes are a form of multi-modal media generated using deep-learning technology. Many

22 academics have expressed fears that deepfakes present a severe threat to the veracity of news and

23 political communication, and an epistemic crisis for video evidence. These commentaries have often

24 been hypothetical, with few real-world cases of deepfake's political and epistemological harm. The

25 Russo-Ukrainian war presents the first real-life example of deepfakes being used in warfare, with a

26 number of incidents involving deepfakes of Russian and Ukrainian government officials being used

27 for misinformation and entertainment. This study uses a thematic analysis on tweets relating to

28 deepfakes and the Russo-Ukrainian war to explore how people react to deepfake content online, and

29 to uncover evidence of previously theorised harms of deepfakes on trust. We extracted 4869 relevant

30 tweets using the Twitter API over the first seven months of 2022. We found that much of the

31 misinformation in our dataset came from labelling real media as deepfakes. Novel findings about

32 deepfake scepticism emerged, including a connection between deepfakes and conspiratorial beliefs

33 that world leaders were dead and/or replaced by deepfakes. This research has numerous implications

34 for future research, societal media platforms, news media and governments. The lack of deepfake

35 literacy in our dataset led to significant misunderstandings of what constitutes a deepfake, showing

36 the need to encourage literacy in these new forms of media. However, our evidence demonstrates that

37 efforts to raise awareness around deepfakes may undermine trust in legitimate videos.

38 Consequentially, news media and governmental agencies need to weigh the benefits of educational

39 deepfakes and pre-bunking against the risks of undermining truth. Similarly, news companies and

40 media should be careful in how they label suspected deepfakes in case they cause suspicion for real

41 media.

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INTRODUCTION

Synthetic media are a type of audio-visual media which has been partly or fully generated/modified by technology [1]. Deepfakes are a new form of synthetic media which interpolates artificially generated media into an existing video, often with intent to imitate or mimic an individual. Researchers and commentators have argued that deepfakes have the potential to undermine truth, to spread misinformation and to undermine our trust in information, media and democracy [2]. The increasing prevalence of fake videos could undermine what we know to be true [3]. Specifically, academic researchers believe that deepfakes could create a situation where fake videos are believed to be real and conversely, where real videos are denounced as fake. Fears of deepfakes being used to spread disinformation have been realised during the Russo-Ukrainian war. We have seen fake videos of both Russian President Vladimir Putin and Ukrainian President Volodymyr Zelensky, as well as many satirical and entertainment uses of deepfakes around the crisis. Our paper seeks to provide empirical evidence for the hypothesised and forecasted harms of deepfakes to truth and knowledge. The aim of this paper is to understand the nature of deepfake discourse on social media in the context of the Russo-Ukrainian war.

In this paper, we analyse Twitter discourses around deepfakes in relation to the Russo-Ukrainian war by carrying out a thematic analysis on relevant tweets during the first months of the 2022 invasion. Our study is the first empirical analysis carried out on the use of deepfakes in wartime misinformation and propaganda. As deepfake technology becomes increasingly accessible, it is important to understand how such threats emerge over social media. Understanding the current threats of deepfakes will have implications in how social media companies and academic researchers deal with harmful deepfakes online. Understanding how the threats of deepfakes emerge online is a significant step in learning how to mitigate their harms. The current paper also has numerous implications for academic research on deepfakes. Our research explores the epistemic harms of deepfakes in practice, as opposed to the theoretical discussions of the concept in academia [4]. We also provide a non-exhaustive timeline of the use of deepfakes and other synthetic media in the Russo-Ukrainian war. The provided timeline is important as both a record of the uses and the impact

71   of deepfakes during the Russian invasion of Ukraine and as a means to gauge the type and quality of

72   synthetic media content created during the conflict.

Background: Deepfakes and Misinformation

74   Deepfakes are an emerging form of synthetic media with potentially harmful implications for

75   truth and democracy [5]. While there is not a consistent definition of the technology, deepfakes are

76   generally understood as audio-visual media which have been manipulated using artificial intelligence

77   technologies [6]. Deepfakes most often consist of videos where a fake "face" constructed by artificial

78   intelligence has been merged with an authentic video. The result of this is a realistic, mimetic

79   recording of someone doing and saying things which they never did or said [7]. Deepfakes were

80   brought to media attention in early 2018 when a reddit community (r/deepfakes), used artificial

81   intelligence to swap celebrities faces into pornographic videos [8]. The potential harms of deepfakes

82   include the erosion of trust in institutions, democracy and journalism [9]. Some journalists have even

83   hypothesised that deepfake misinformation could lead to a world leader declaring nuclear war over

84   deepfake videos [10].

85   Concerns about deepfakes have centred primarily on their capacity to deceive.

86   Misinformation and disinformation refer to false information utilised to mislead people. The

87   difference between the two concepts is that disinformation is done purposely, while misinformation is

88   not [11]. Deepfakes have the capacity to be used for both misinformation and disinformation by

89   depicting events that never happened [12]. While deepfakes are usually created with deceitful aims,

90   they are often shared online by people who believe them to be unedited videos. For example, in a

91   study carried out by Ahmed [13] in the USA and Singapore, it was found that over 30% of their

92   sample had inadvertently shared a deepfake. Quantitative research around deepfakes has broadly

93   focused on individuals' ability to detect deepfakes [14] , and factors which lead to accidental sharing

94   of deepfakes [15]. In contrast, qualitative research has focused on the supposedly positive elements of

95   deepfakes on social media, focusing on entertainment videos on YouTube [16,17]. There has also

96   been some quantitative research into the effects of deepfakes on trust. Vaccari and Chadwick [18]

97   found that deceptive deepfake videos were significantly more likely to elicit uncertainty compared

98   with the same video containing an educational disclaimer. However, they did not compare this to a

99   control group who hadn't been exposed to a deepfake, which poses a broader theoretical question as

100   to whether or not educational deepfakes may be harmful to truth in themselves and if the very

101   existence of deepfake technology may pose a threat to truth.

102   The broader theoretical concern as to how the very existence of deepfakes may cultivate

103   misinformation is exemplified by the liar's dividend. As described by Chesney and Citron [2], the

104   liar's dividend refers to a situation in which people may avoid accountability for real audio and video

105   evidence as a result of public scepticism. As the public becomes more and more aware of novel video

106   manipulation technologies, real video evidence will be increasingly denounced as fake. For example,

107   in a hypothetical situation, where a politician is faced with compromising video evidence, they could

108   deny a factual incriminating video of themselves as a deepfake. The prevalence of the liar's dividend

109   also increases proportionately with the public's awareness of deepfakes [2]. Encouraging scepticism

110   towards visual media may unintentionally have the adverse effect of making it more likely that people

111   will flatly deny real video evidence with which that they are presented [19]. While pre-emptive

112   misinformation interventions, known as pre-bunking, can be used to combat other forms of

113   misinformation, pre-bunking deepfakes may only increase their epistemic harms [20]. Quantitative

114   research into the efficacy of deepfake misinformation interventions has found that while interventions

115   improved people's ability to identify deepfakes it also reduced participants' ability to correctly

116   identify real media by 9% [21]. While the capacity of deepfakes to undermine people's ability to

117   distinguish truth has thus been shown in experimental contexts, there is a lack of research

118   qualitatively exploring how this epistemic distrust may manifest online.

119

120   The liar's dividend demonstrates deepfakes' potential to encourage deniability of real video

121   evidence and harm the work of journalists, governments, and the legal system [22]. The doubt that

122   deepfakes cast on the truthfulness of video evidence has been described as the biggest epistemic threat

123   of the 21st century [23]. Interestingly, despite these drastic projections made by commentators when

124   deepfakes first emerged, there have not been many high-profile or large-scale uses of deepfakes for

125   misinformation purposes. This has led some academics to consider the epistemic harms of deepfake

126   overblown and to suggest that deepfakes may conversely have a positive effect on trust due to an

127   increased scepticism towards dubious online sources and a move to more verifiable content [24]. In

128   practice, most existing uses of the technology revolve around harassment and bullying, particularly

129   image-based abuse of women [8]. Any uses of deepfakes in the political sphere have largely been

130   benign, such as a Belgian political message spoken by a deepfake of Donald Trump, which was used

131   to highlight climate change [25]. The use of deepfakes on social media during the Russian invasion of

132   Ukraine indicates that this may be changing.

Deepfakes, disputed deepfakes and other synthetic media during the Russian invasion of Ukraine.

135   The Russo-Ukrainian war began in 2014 with the Russian invasion and annexation of Crimea

136   [26]. In the years after this, Ukraine saw increased acts of aggression initially by Russian-proxy forces

137   and Russian backed separatist militias in the Donbas region of Ukraine [27]. Later responses to

138   Ukraine's attempts at a counterattack were foiled by covert troops and weapons from the Russian

139   armed forces [28]. In the later months of 2021, Russian forces were amassed at the two countries'

140   borders under the pretence of a training exercise. At this time, Russian governmental figures made

141   incorrect and disingenuous claims of widespread Russophobia and Nazism in Ukraine [29]. This was

142   further fuelled by a controversial address made by the Russian president Vladimir Putin which

143   incorporated similar "conspiracy theories and lies" to attempt to undermine the history and existence

144   of Ukraine as a Sovereign state in its own right [30]. On the 24th of February 2022, the armed forces

145   of Russia launched a full-scale military invasion of the country of Ukraine [31]. These actions, along

146   with the brutality of the Russian invaders, drew widespread condemnation from many governments

147   and organisations both within Europe and worldwide [32].

148   Public outrage and interactions with the Russo-Ukrainian war have been mediated by social

149   media platforms and technology. Cell-phone journalistic practices mean that first-hand accounts of the

150   atrocities of the conflict are readily available online [33]. Internet activism has meant that individual

151   users of the internet have been able to co-ordinate DDOS attacks on Russian websites [34]. While

152   modern technologies have facilitated the spreading of first-hand accounts of the brutality of the war,

153   they have also been used to spread misinformation and propaganda [35]. The Russo-Ukrainian war

154   has seen for the first time, the use of deepfake technology in wartime propaganda and misinformation.

155   Figure 1 provides an overview of deepfakes (as well as similar synthetic media that have been

156   misidentified as deepfakes) used in the Russo-Ukrainian war during the first four months of the

157   invasion. In this section we will discuss the key events relating to deepfakes, contested deepfakes and

158   other synthetic media in the war in more detail.

159

160   Figure 1. Timeline of the use of deepfakes/synthetic media in the war. Images via Twitter, YouTube, Facebook, Reddit and

161   Deutsche Welle.

Synthetic video footage of a Ukrainian fighter jet

Misinformation in the early days of the war was not characterised by deepfakes. Instead, most misinformation consisted of the misuse of videos from the earlier conflicts in Ukraine. Notably, the second day of the war saw the spread of video game footage as evidence of the urban myth fighter pilot "The Ghost of Kyiv". This video footage was taken from the video game Digital Combat Simulator. It was spread around social media during the first few days of the invasion purporting to show a Ukrainian fighter jet [36]. The Ukraine Department of Defence even tweeted the viral footage. This serves as the first known example of synthetic media concerning the Russian invasion of Ukraine.

Deepfake of Putin announcing peace with Ukraine

In early March a deepfake of Russian president Vladimir Putin emerged, showing the Russian president announcing peace with Ukraine. The deepfake was first published online in the first week of March on the reddit r/sfwdeepfakes and r/ukraine communities [37]. It was posted with an acknowledgment that it was fake and the user who submitted this video claimed to have found it on the social media site Telegram and added their own subtitles. The deepfake was then published on Twitter on the 18th of March. This is the version that was reported on by news agencies. The version posted on Twitter did not contain subtitles, suggesting it may have come from Telegram. This deepfake was unique out of the major examples of the technology in the conflict as it has been suggested that the audio was also generated using AI [38].

Deepfake of Zelensky surrendering to Russia

In the months leading up to the invasion, the Ukrainian government warned of the potential for Russia to employ a deepfake of Zelensky surrendering to the Russian Government [39]. On the 14th of March 2022, a Ukrainian news website was hacked to display a deepfaked message of Zelensky surrendering. Concurrently, the News Ticker of Ukraine24's television channel was changed to read a similar message. Despite media coverage of this event accusing the government of Russia of orchestrating the hack, they have not claimed responsibility to date, nor has any significant evidence been found indicating their involvement. This event is significant as it is one of the first cases of a

189 deepfaked politician being intentionally used to spread disinformation. The quality of the deepfake

190 was poor and quickly debunked by Zelensky himself. However, this incident highlights the potential

191 harms of deepfakes. The usual indicator of truthfulness and trustworthiness of online information, the

192 source of the video, was undermined by the hack. If the video had been more realistic and more

193 widely believed, it may have had a more harmful impact.

Educational deepfakes from the Ukrainian government and news media outlets.

196 On the 21st of April, the government of Ukraine released an educational deepfake video in

197 partnership with Reface, a Ukrainian AI company. Titled "Putin telling truth, huh? Well, we tried to

198 imagine what he'd say if he did", the footage showed a deepfake Putin walking around the Ukrainian

199 city of Mariupol and describing the war crimes carried out by the Russian forces [40]. A similar non-

200 deepfaked video was posted the month before consisting of a CGI video of Paris being bombed,

201 asking how European citizens would feel if their cities were being attacked. These two examples are

202 relevant as they show the educational and political communication uses of synthetic media and

203 deepfake technology.

204 The Reface app also allowed users to swap their faces into Zelensky's speeches, or onto

205 images of Ukraine soldiers [41]. The app encouraged users to faceswap themselves and Putin into a

206 scene from the Quentin Tarantino movie "Inglorious Basterds" in which a Nazi is violently beaten to

207 death by an American soldier. Versions of these videos including Zelensky as the American soldier

208 also went viral online [42]. This is one example of the numerous online videos recasting the two

209 presidents into Hollywood movies and other satirical or humorous videos. Most of these videos

210 involved using AI to insert the Russian and Ukrainian presidents into comedic movie scenes or

211 dancing/lip-synching to music. Oftentimes, political figures in the war would be recast as famous

212 movie villains or heroes. These videos were clearly satirical. While intended to influence, they were

213 obvious parodies and probably not intended to deceive.

European mayors receive possible deepfake video call from the mayor of Kyiv.

216   On the 24th of June, three European mayors came forward as victims of a deepfake video call.

217   The mayors of Berlin, Madrid and Vienna had believed they were talking to the mayor of Kyiv, Vitali

218   Klitschko [43]. After a certain point, odd and seemingly nonsensical questions alerted the politicians

219   that this was not the real Vitali Klitschko. This potential deepfake is both unverified and contested,

220   with some suggesting that the hack does not contain deepfaked footage and the video consisted of

221   reused video clips [44]. Two Russian comedians, Lexus and Vovan have claimed responsibility for

222   the video, but haven't stated how the video was manipulated [45]. This case is quite similar to an

223   incident in 2020, in which many mayors decried the use of a supposedly deepfaked video call with

224   Leonid Volkov. It was in fact a prank call also orchestrated by Lexus and Vovan. The supposed

225   deepfake was no more sophisticated than make-up and cleverly chosen, obfuscating camera angles

226   [46]. The pair of comedians, who are notoriously pro-Putin, have attracted attention with similar

227   actions during the Russo-Ukrainian war, imitating Zelensky during an audience with noted author

228   J.K.Rowling [47].

229   While it is possible to deepfake a face in a video-call with software such as DeepfaceLive

230   [48], the software to accomplish this is in its infancy and while capabilities have advanced

231   significantly in the last two years, it still often requires significantly more work to get to a lower level

232   of quality than traditional deepfakes. It is more likely that the video call used either manually (non-

233   deepfaked) stitched together clips from a previous interview or lip-syncing technology (which is

234   considered by some as a type of deepfake). Evidence for this is the fake mayor's insistence on using

235   Russian despite their fluency in German and how the video frames seem to come from an earlier

236   interview from the mayor. Nonetheless this is an example of the capabilities of fake videos in warfare

237   and the current vigilance towards potential deepfakes. It also highlights how news media and

238   governmental agencies can label traditionally manipulated videos as deepfakes, contributing to a fear

239   of the capabilities and prevalence of the technology.

The current study

241   The Russo-Ukrainian war has highlighted the impact of novel misinformation technologies on

242   online media spaces. We have seen the realisation of many fears around deepfake technologies, in

243 which deepfaked presidents have been used to affect public opinion regarding an active war.

244 However, it is unclear how this new form of wartime misinformation was perceived online at the

245 time, and what harms were caused. It is integral to assess this, so governments, social media

246 organisations, and other stakeholders are able to understand the harms deepfakes may cause to social

247 media discourse in present and future conflicts. We used qualitative analysis to explore Twitter users'

248 comments on the topic of deepfakes during the Russo-Ukrainian war. This data provides a unique

249 opportunity to assess the potential harms of deepfakes in a real-world situation, as well as assessing

250 evidence for some of the fears around deepfakes, such as the liar's dividend and the harms to

251 epistemic truth.

252

253   Our research questions are as follows:

254   1. How have people responded on Twitter to deepfake content during the Russian

255   invasion of Ukraine?

256   2. Does Twitter discourse around deepfakes provide real-world qualitative evidence

257   of the epistemic harms of deepfake technology which have been previously

258   theorised and experimentally studied?

259

260 # METHODS

261 ## Data Collection

262   The decision to study Twitter was because the majority of the most prominent cases of

263 deepfakes (and similar synthetic media) identified in our timeline involved the social media platform.

264 We used the Twitter developer API to capture tweets relating to deepfake content from the 1st of

265 January 2022 to the 1st of August. The API was accessed using a python program based on one from

266 the Twitter GitHub page [49]. The search term used was "(deepfake Zelensky OR deepfake Ukraine

267 OR deepfake Putin) – is:retweet". We excluded retweets in our search as they would have been

268 duplicates of an original tweet. We extracted the textual content, the date, and the tweet ID of each

269   tweet into a CSV file. Our final dataset included tweets in English, German, and French. This was

270   done to consider a broader range of western European perspectives rather than a purely English-

271   language dataset, particularly considering the salient German language discourse around the Klitschko

272   video call. Furthermore, these were languages that two members of the research team had experience

273   with, which avoided the pitfalls of relying on purely machine-based translation. Russian and

274   Ukrainian language discourse were excluded out of respect to those involved in the war, to reduce the

275   chance of researcher harm resulting from exposure to sensitive personal and combat footage being

276   included in the dataset, and because we are primarily concerned with the discourse around the war and

277   not the experiences of the war itself. This decision was also informed by challenges with searching the

278   Twitter API for multiple search terms in different languages, the increased likelihood of

279   mistranslation due to the team's lack of fluency in either Ukrainian or Russian, and issues with sample

280   bias due to the comparative unpopularity of Twitter in Eastern Europe. Similarly, we avoid making

281   claims as to whether tweets were posted by Ukrainian or Russian Twitter users, considering the

282   existence of Russian troll farms which assume false identities and automatically generated accounts to

283   spread misinformation [50]. Any claims made in online research regarding the participants or victims

284   of this war faces issues around the prevalence of these appropriated identities. Research on the actual

285   experiences of Ukrainian nationals with deepfake disinformation during the invasion requires careful

286   ethical consideration and knowledge of identity which cannot be securely gained by this type of broad

287   qualitative research of an online dataset.

288   As with all qualitative research, is also important to consider the biases and positionality of

289   the research team. It is impossible to make claims to the demographics of the dataset, except that both

290   it and the research team broadly consisted of privileged voices from western Europe and north

291   America. Our research questions do not focus on the specific experiences of people involved in the

292   war with deepfakes, as the specific demographics and anonymity of Twitter reduce any claims to the

293   national identities of any of the participants. While we have justified our decisions to work on this

294   demographic, it does highlight possible alternative avenues for the analysis of deepfake content on

295   social media. Any qualitative research on the experiences of the Ukrainian people with deepfake

296 disinformation (such as the Zelensky deepfakes) would require a different mode of analysis, and a

297 different method of data collection which would avoid the risk of studying false identities online.

298   In total, 4869 tweets were extracted between the 1st of January 2022 and the date of data

299 extraction, the 28th of August 2022. The extracted dataset was saturated with articles from news

300 media outlets. 1984 tweets were excluded as they consisted of links to news articles with news

301 headlines and quotes and no other relevant reactions and commentary. Similarly, a further 212 only

302 consisted of links to images and videos with no significant textual content. 590 of the posts were

303 excluded for being duplicates, usually consisting of spammed posts. While we aimed to reduce the

304 number of fake posts in our datasets, we limited ourselves to excluding tweets which were obviously

305 spam as further measures of bot-detection would run risks of excluding real data. 691 tweets were

306 excluded because they were in languages not included in our inclusion criteria such as Spanish.

307 Overall, 1392 tweets were included for analysis. 84% of these were English, 12% were German and

308 4% were French. This is generally unsurprising considering the use of English language search terms.

309 The high prevalence of German tweets in the dataset is most likely a result of the fake Vitali

310 Klitschko video call which affected two German-speaking cities. During the analysis it was found that

311 161 of these didn't contain enough lexical density to be used in our analysis because they for example

312 only consisted of self-promotion or spreading news without commentary. In total, our data collection

313 provided 1231 tweets to be analysed. Due to ethical considerations, any links to Twitter pages or

314 attachments were replaced with summaries after the analysis.

Prevalence of deepfake discourse during the start of the war

316   Deepfake related content steadily grew during the week leading up to the war and the first

317 few weeks of the war (fig.2). This wave of deepfake discourse peaked on the second of February, with

318 441 tweets being extracted on this day. This largely is the result of spam content and news coverage

319 of the US and Ukraine's warnings of deepfake content. The largest number of tweets occurred

320 between the 16th to the 18th of March, correlating broadly with the release of the fake Zelensky

321 surrender video and news coverage of the supposed Putin deepfake. A smaller peak occurred during

322   the 4th to 26th of April coinciding with the supposed deepfake video call between Klitschko and the

323   European mayors.

324

325   Figure 2. Prevalence of tweets over time in the dataset

Ethics

327   Ethical issues with researching Twitter have been well-established in prior literature. Our

328   ethical processes were designed to mitigate the harms associated with online research, particularly the

329   inability to gain informed consent. Specifically, we followed relevant academic ethical guidelines

330   [51–53] as well as the relevant Twitter developer and privacy policies. We used anonymisation and

331   non-traceability as a means of mitigating this risk. Despite existing as a public online platform that is

332   open to inquiry by researchers, Twitter users still deserve care and anonymity when being studied

333   online, especially in ethnographical research where informed consent cannot be easily gathered.

334   Similarly, many Twitter users are not aware that their content is not only open to use by researchers

335   and businesses, but actively encouraged to be used in this context, and often used in a way which is

336   traceable back to their account [53]. Because of this, it is important to make sure users are not

337   publicly identifiable from research papers.

338   To ensure users' anonymity and non-traceability, any examples of tweets in this paper have

339   been replaced with fully fictionalised tweets which represent broadly the original data. Ethical

340   approval to carry out this research was granted by the Social Research Ethics Committee of

341   University College Cork.

Data analysis

343   We used and inductive, reflexive thematic analysis [54] to understand and illustrate patterns

344   in our data.. We judged thematic analysis as the most appropriate way to address the data set, since

345   the approach is flexible, allowing for many different levels of interpretation. Moreover, there is no

346   existing well-defined theory of how people understand and respond to deepfakes that could guide a

347   more deductive or theory-driven approach. The thematic analysis broadly followed the six steps

348   outlined by Braun and Clarke [55]. Initially, while applying the inclusion and exclusion criteria, we

349   familiarised ourselves with the data, drafting up a series of rough codes in a text document. We then

350   used NVIVO software to descriptively open code the data. Once open coding was complete, we

351   carried out a number of iterative rounds where we sought to meaningfully define observed patterns in

352   the codes. Specifically, we first arranged the codes into small groupings and sub-themes within

353   NVIVO, and then worked on developing larger overarching themes. The majority of this work was

354   done by the primary researcher (White-Irish, Male), with regular consultation with the broader

355   research team throughout the process to iterate on codes and themes. We chose to have one primary

356   researcher do this work as the research often required making judgements to the truth or falsity of

357   deepfake claims and the primary researcher was most aware of both the news media within the dataset

358   (for exclusion of news headlines) and the specific cases of deepfakes used in the war. This was an

359   inductive and iterative process. For example, while initially we approached formulating the codes as a

360   typology of responses to deepfake misinformation, but we found that the range of novel themes and

361   usages of deepfake content outside of misinformation necessitated a broader and more comprehensive

362   set of themes.

363   After generating and refining a set of three themes, we carried out further analysis, borrowing

364   methodologies from discourse analysis [56], which allowed us to critically appraise the social

365   constructions behind the textual data [57]. We considered how the tweets reflected and drew meaning

366   from the real-world incidences of deepfakes and we incorporated discursive methodologies such as

367   the use of framing and interpretative repertoires. Analysing power relations, positioning, and

368   comparing the discourse in individuals' tweets such as in critical thematic analysis [58] was

369   impossible due to the anonymity of our dataset, the character limit of tweets and the lack of

370   conversational context. While this research did not involve a content analysis [59], we include the

371   number of references to give the reader an idea of the prevalence of themes in our interpretation of the

372   dataset.

373

374   During the writing up process, to ensure the validity of the final quotations, the analysis was

375   written up with the actual quotes before those quotes were then replaced with paraphrased versions.

376   We chose to anonymise the quotes during at the end of the write-up process to ensure that the

377 fictionalisation not affect the analysis. The full research team refined these quotes to ensure they

378 adequately represented the original quotations which included utilising similar typos, using synonyms

379 and rewording the order of sentences. This was done to accurately reflect the original tweets and how

380 they draw from the "new language" of online discourse [60]. The methodology was reported in this

381 paper according to the Consolidated criteria for reporting qualitative research (COREQ) checklist

382 [61], though this had to be adapted due to the unique participant and methodologies of online

383 qualitative studies in contrast to research carried out using in-person interviews.

384

385 # RESULTS

386 Our analysis produced three main themes of online content related to deepfakes and the

387 Ukraine crisis; 1) deepfakes and misinformation, 2) deepfake fuelled scepticism, and 3) non-

388 misinformation related deepfake discourses. The first and third of these are relevant to our first

389 research question: understanding how people reacted to deepfakes online. The second of these,

390 addresses our second question showing epistemic distrust as a result of deepfakes. Each of these will

391 be discussed in the following section using fictionalised versions of the quotations from the dataset.

392 ## Deepfakes and misinformation (interactions with news articles,

393 ## deepfakes in warfare, solicitation of deepfakes)

394 A significant portion of our dataset consisted of commentary and general reactions to

395 deepfake-related news articles (n = 246). There was a disproportionate amount tweets which consisted

396 entirely of news articles in the dataset (which were excluded) in comparison to the deepfake discourse

397 that was included for analysis. Users often emotionally reacted to the news about deepfakes with

398 negativity (n = 29), worry (n = 27), shock (n = 6) and confusion (n = 6), mostly targeted towards news

399 about the deepfake Zelensky surrender. This highlights how reactions to news articles seemed to

400 overshadow independent discourse relating to deepfakes. Many tweets in the dataset reacted to the

401 news of the deepfake as something that had been expected (n = 36), highlighting the many attempts of

402 pre-bunking carried out by the Ukraine government." *Well this confirms the warning that Russia*

403   *would use a deepfake of Zelensky surrendering*". The reaction to deepfakes in the war was generally

404   negative. "*Deepfake tech has arrived, and it's absolute madness*" Many tweets sought to explain

405   deepfakes and deepfake news for other users, spreading information about their prevalence and

406   defining the technology. Some spoke to the anecdotal experiences they had had with deepfakes during

407   the war (n = 3). A significant portion revolved around the technical appraisal of the technology, often

408   reflecting on their poor quality (n = 109). Specifically, many users criticised the quality of the

409   Zelensky deepfake, which users felt didn't live up to warnings of deepfakes or their own expectations

410   of the technology. *"You've seen the deepfake of Zelensky, now we've seen a deepfake Putin declare*

411   *surrender. This is clearly better quality than the Zelensky cheapfake but it's still poorly made.*

412   *Unfortunately, the technology will get better with every advance of the technology".* Some Twitter

413   users reacted positively to deepfakes used during the war, particularly those used for entertainment

414   value (n = 5), especially demeaning videos such as those putting Vladimir Putin's face onto Gollum

415   from the Lord of the Rings movies. Other people positively reacted to the deepfakes used for

416   misinformation (n = 15), especially towards those made of Vladamir Putin. In some cases, they

417   framed them as revenge for the Zelensky deepfake*. "In an outstanding retaliatory move by pro-*

418   *Ukraine VFX artists, a deepfake of the Russian president has been released as a response to the*

419   *deepfake of the Ukrainian president. Gives insight into the future and how edited videos can be used*

420   *as a response to deepfakes."*

421   One element of deepfakes that tweets seemed to engage in strongly was the potential of

422   deepfakes in warfare. Deepfakes were seen as a new form of weapon (n = 28) or a new kind of

423   propaganda (n = 10). *"You'd think deepfakes are harmless, if you've only seen silly videos of*

424   *deepfaked Keanu Reeves. Unfortunately deepfakes can be a new and vicious type of propaganda.*

425   *We've seen it now with deepfakes of the Russian and Ukrainian leaders"* In January and early

426   February, people feared deepfakes would be used as a false flag to start the war (n = 22). "*Russia have*

427   *plans to use a deepfake video to justify an invasion of Ukraine. Before making a statement I need*

428   *some time to process this*". As a response to this, many tweets also focused on detecting and preparing

429   for deepfakes (n =17) and criticising government bodies for perceived inaction (n = 20). In particular,

430   German language tweets tended to express doubts about their own politicians' abilities to detect

431   deepfakes. The Klitschko hoax phone call was perceived as a worrying or embarrassing indicator of

432   government cyber-security. *"Some political actors are very behind the times. The stupidity of using*

433   *technology which is not compliant with modern internet safety protocols. There's no excuse when*

434   *there are means of authenticating video calls".* The doubts over cyber-security led to many users

435   encouraging stricter media controls (n = 14). These often framed the rise of deepfakes and

436   misinformation as a justification of the decision made by the Ukrainian government to take over

437   private news agencies. "*Ukraine is completely justified in taking over news companies, it is very*

438   *important to stop Russia's misinfo. Putin used a deepfake of Zelensky surrendering and has used their*

439   *propaganda news to rig a US election*." Some also demanded significant improvements in

440   governments cyber-security or the banning of deepfake technologies altogether.

441   A disturbing trend in the dataset involved Twitter users, often jokingly, requesting that people

442   create deepfakes of world leaders in incriminating or humorous defamatory videos. These often

443   included placing world leaders into videos as dictators, movies such as Downfall (Der Untergang) or

444   Charlie Chaplin's the Dictator. *"Anyone made a deepfake yet of Putin as Hitler in that Bunker scene*

445   *from downfall?"* However, a significant portion of the requests for deepfakes involved the president

446   of Russia (n =190). People specifically requested deepfaked pornography, which was seen to

447   humiliate or demean Putin, occasionally involving bestiality (n = 3) and BDSM. *"Would it be*

448   *possible for some dedicated VFX guy to make a video of Putin, heh "developing a connection with a*

449   *barnyard animal"?"* A significant portion also desired to place him into pornography with other men

450   (n = 30). While some justified this as a consequence of Putin's own anti-LGBT policies, many created

451   an uncomfortable association between sexuality and shame. *"We need to stop this invasion. What if*

452   *we show Russian politicians a high quality deepfake of Putin in an orgy with a ton of men. We ask*

453   *them to stop the war or we will plaster the video all over the internet. No offense to gay people, but*

454   *this could stop a war".* These requests were often accompanied by requests to disseminate and

455   distribute the defamatory video (n = 92), such as hacking Russian news stations or televisions (n =

456   28).

457   Some users however did request more positive deepfakes of world leaders which would tell

458 the truth (n = 23), for example to have Vladimir Putin admit to the war crimes carried out by Russian

459 soldiers. *"It's time for hacker groups to join forces with VFX tech. Russia isn't telling it's people*

460 *what's really happening, so we'll make a deepfake Putin tell them the truth. No lies, just showing*

461 *them that civilians are dying and it is a real war".* While distinctly more noble this was still often

462 accompanied by asking if anyone could hack Russian media to present the deepfake. *"It's time to play*

463 *dirty as well, we should do a deepfake of the President of Russia. We can hack it into Russian news*

464 *sites and show the real truth of what's happened during this war".* This shows a worrying tolerance

465 towards the production and distribution of deepfake disinformation when it fits one's own political

466 beliefs.

Deepfake fuelled scepticism.

468   Many tweets in the dataset expressed a healthy scepticism towards deepfakes. People often

469 warned about the dangers of the technology (n =61) and mentioned how they were preparing for

470 deepfakes (n =3), and how to identify the technology (n = 7). *"Prepare for Russian deepfake*

471 *disinformation. They are going to use deepfakes to spread propaganda and make excuses for their*

472 *war crimes".* Many users engaged in fact checking the media they were consuming and identifying

473 signs that videos were (n = 11) or were not (n = 25) deepfakes. Good media practice was encouraged,

474 tweets promoted healthy scepticism of online information (n = 39), these tweets occasionally

475 highlighted the important work done by government and news agencies in detecting and rebutting

476 fakes. *"Sources say, the Russians are planning a deepfake of Zelensky soon where the president will*

477 *falsely surrender. Be prepared".*

478   Unfortunately, the majority of this type of Deepfake discourse during the war consisted of

479 unhealthy scepticism fuelled by deepfakes. Fears of deepfakes often undermined users trust in the

480 footage they were receiving from the conflict (n = 85) to the point where they lost trust in any footage

481 coming from the conflict. *"We can't always trust our eyes anymore. Not that this video is fake, but all*

482 *possibilities need to be considered".* Many Twitter users expressed the opinion that no information

483 from the conflict could be inherently trusted, with the implication that sinister agencies were

484 presenting false narratives. *"None of the videos coming out of this war can be trusted. In the next few*

485 *years, the media will be using sophisticated deepfake software. If you think we have a problem now,*

486 *wait until we start seeing completely faked videos, as opposed to their current lies".* This quote also

487 highlights the scepticism of journalism and new media (n = 30) as an interpretive repertoire in the

488 dataset. *"This is a western media deepfake. These journalists are under the globalists thumb. We*

489 *know what will happen next. Praise the lord".* At its most extreme the anti-media sentiment seemed to

490 be used to justify conspiratorial thinking and a distrust in reliable sources of news. This highlights

491 how deepfake discourse can be used in arguments which undermine the veracity and trustworthiness

492 of news media.

493 Most emblematic of the epistemic impact of deepfakes were the deepfake accusations,

494 particularly in situations where real media was accused of being deepfake. Tweets in the dataset

495 tended to label real media as fake more (n = 60) often than they correctly fact-checked deepfakes (n =

496 11). Often this media was of real footage or of footage taken out of context. These accusations were

497 often directed towards an incident where a video of Vladimir Putin appeared to show the Russian

498 President's hand pass through a microphone. While this was later shown to be a video artifact, a

499 significant number of tweets accused it of being a deepfake. *"Look at his hand passing through the*

500 *mic. This is a possible deepfake and a poorly made one at that. The Russian president wasn't in*

501 *attendance".* These claims were often used to justify the theory that Putin was hiding or that he was

502 suffering from serious health issues. *"Vlad's clearly at deaths door. He has had an abdomen surgery*

503 *and those addresses have been deepfaked".* Often users would call CGI footage deepfake (n = 12) or

504 confuse the terminology of CGI and Deepfakes (n = 3) when accusing other users of spreading fake

505 news. The word deepfake, took on the role of an adjective in these cases often referring to concepts or

506 people instead of media (n = 15). *"He's got the world consuming his Deep Fake News spreading his*

507 *Deepfake ideas and his Deepfake beliefs".* When used as a buzzword and applied to people and

508 groups, the word deepfake was generally used insultingly. *"This is all nonsense from the Deepfake*

509 *liberals, they've made Zelensky into an idol".* The proclivity of users to call people and governments

510   deepfake and the tendencies to use the word deepfake as a buzzword are a worrying indicator of the

511   lack of awareness of what deepfakes are.

512   In the most extreme cases of scepticism in the dataset, tweets contained conspiracy theories

513   claiming real world events and individuals were deepfakes. The falsely accused video of Vladimir

514   Putin was one of many examples of deepfake conspiracies theories which focused on deepfaked world

515   leaders (n = 155) or deepfakes being used to represent world leader who were in hiding (n = 30).

516   More broadly, users suggested the war was not as it seems, referring to the entire conflict as a

517   deepfake (n = 21). *"We are being deceived by Ukraine, they are probably laughing with Putin over*

518   *our dollars. The war is a deepfake".* These conspiracies often justified this accusation by relating it to

519   larger criticisms of governments or passing the entire war off as anti-Russia propaganda. *"We need to*

520   *figure out what is really true. Most importantly, the truth that Ukraine isn't real, we are being fed lies*

521   *against Putin. All our incompetent leaders in the west, under certain payrolls, are hiding this from us.*

522   *Look at the Wikipedia page for deepfakes".* This quote shows how conspiratorial thinking was often

523   related back to broader interpretative repertoires of conspiracies, often referencing interpretative

524   repertoires of conspiracy theories such as deep states and antisemitic conspiracies (n =10). *"THE*

525   *SEMITIC DEEPSTATE HAS HAD FREE RUN TO SPREAD THEIR PROPAGANDA AGAINST*

526   *PUTIN AND THEY MUST BE HELD ACCOUNTABLE".*

527   Not all conspiracies were endorsed so wholeheartedly, some users explained the conspiracies

528   as more a humorous thought experiment and reflecting on the implausibility of it. *"The nutty*

529   *conspiracy theorist in me thinks maybe it isn't real. Either he's worn the same outfit every day since*

530   *the first video or he's been deepfaked".* Some people created sarcastic conspiracies as a way of

531   criticising other users' opinions and claims (n = 12). *"Putin was obviously created by a lab in China*

532   *and will be broadcast to us all using 5G and our vaccines".* While a lot of these conspiracies were

533   presented earnestly, the outlandishness of these theories often made it hard to judge. Some of the

534   more preposterous conspiracies came from users and in response to media that was seriously posting

535   the conspiracies. The theory that Vladimir Putin had a health issue and was temporarily replaced with

536   a deepfake was picked up as a rumour and ran by a few tabloid newspapers. Some tweets in the

537   dataset then presented this tabloid reporting on online rumours as evidence for the conspiracy. *"This*

538   *news report suggests that Putin has been using deepfakes for his public appearances, which have*

539   *been pre-recorded to hide his deteriorating health".*

540   A less extreme aspect of conspiracy theories in the dataset also involved attributing the

541   creation of the well-known deepfakes to government bodies, for example claiming the two deepfake

542   presidents were made by the opposite governments (n = 33). The two presidential deepfakes were

543   often framed as responses to each other in state sponsored cyber-warfare *"Very cool. After Putin's*

544   *laughable deepfake of Zelensky, the Ukrainians have got their payback with this epic deepfake of*

545   *Putin. Very funny!".* Some conspiratorial accusations in this vein involved claiming that Ukraine and

546   Russia were making the deepfakes of their own presidents so they could claim victimhood (n = 13)

547   *"Does anyone else think that the Russians created the Putin deepfake so it matches the Zelensky*

548   *deepfake?".*

Non-misinformation related deepfake discourses

550   A significant characteristic of non-misinformation related deepfake discourses was humour, both

551   through jokes (n = 84) and through reactions to humorous deepfakes (n = 45). Jokes were used to

552   criticise politicians and to mock conspiratorial deepfake beliefs. Some users made requests for non-

553   serious deepfakes based off current news stories. *"If we made a deepfake of Putin making fun of Jada,*

554   *Will Smith would slap him so hard it could end the war. MI6 should get onto this".* Similarly,

555   humorous deepfakes of the figureheads of the Ukraine war were often used to criticise politicians by

556   placing them into unflattering movie scenes. Users reacted positively to these deepfakes, especially

557   the deepfake of Vladimir Putin being swapped into a violent death scene of the movie Inglorious

558   Bastards. *"There is a great deepfake of Putin getting his head caved in with a bat on YouTube".* A

559   small number of people found these deepfakes bizarre and in poor taste. Humorous deepfake content

560   when related to the war was framed as embarrassing. *"Someone please get me off this wild ride,*

561   *there's a deepfake of Putin getting beaten to death in Inglorious bastards while Biden watches".* In

562   contrast to the requests for demeaning and pornographic content, these requests were not seen as a

563   weapon in the Ukraine war nor did users request them to be used in hacks. Instead, they were viewed

564 as strange indicators of the current state of internet discourse. *"Social media really has the world's*

565 *worst opinions on Ukraine. There's videos of people dying soundtracked by folky songs about ww3,*

566 *people stanning Zelensky like Beyonce, Deepfake Putin doing TikTok dances"*. Social media

567 companies were also criticised for leaving up violent Putin deepfakes online with some Twitter users

568 believing that they would've been taken down if they weren't of Putin. *"It's a well-made-deepfake.*

569 *Biden watching Zelensky beating Putin to death with a baseball bat. From Inglorious Basterds. If it*

570 *was a video of Biden or Zelensky getting their heads bashed in people would be reporting it to*

571 *YouTube for removal"*.

572   References to educational deepfakes also existed in this dataset, consisting of users spreading an

573 educational deepfake with a summary (n = 27). Many of these were positive, especially toward a

574 deepfake of Vladimir Putin soliciting donations for Ukraine. However, reactions to the CGI videos

575 posted by the Ukraine government often expressed distrust towards other media produced by Ukraine

576 (n = 15). "*Look how well made this Ukrainian deepfake is. You'd start to lose faith in how real their*

577 *supposed evidence of Russian involvement in the MH17 plane crash*". Despite the positive messages

578 of these deepfakes it was felt that by showing people they had the capacities to create fake footage,

579 the Ukraine government undermined their own credibility.

580

DISCUSSION

582   Since computer-generated deepfakes emerged in 2017, researchers have speculated that

583 deepfakes would be used in warfare for propaganda and misinformation [62]. Here we report the first

584 study of deepfakes used in an active war. In line with researchers' predictions about the harms of

585 deepfakes in war time, there were a great many deepfakes shared online during the period studied.

586 The most notable were the false surrender videos of the Russian and Ukrainian presidents. Though of

587 very poor quality, had these deepfakes been believed, they may have had wide-reaching consequences

588 for the war. In particular, the deepfake of the Ukrainian president undermines the idea that relying on

589 reputable sources will prevent the harms of deepfakes [63], as the video was spread through the hack

590 of a reputable Ukrainian news website. Though there were examples of harmful deepfakes in the war,

591   the majority of deepfakes were not serious attempts to stop or start a war; predictions have severely

592   underestimated the satirical and humorous use of deepfakes. Another important event during the war,

593   the "deepfake" Klitschko video call, indicates the tendency of news articles and governments to label

594   unknown video manipulations as deepfake. In light of the epistemic harms of deepfake discourse, the

595   importance of technical literacy in news reporting around deepfakes is important.

596   This research had two aims: to study people's responses online to deepfake content during the

597   Russo-Ukrainian war and to explore if there was practical evidence of the effect of deepfakes on

598   epistemic trust. Our thematic analysis highlighted three main areas of deepfake discourse online;

599   deepfakes and misinformation, deepfake fuelled scepticism and non-misinformation related deepfake

600   discourses. We found evidence for the epistemic harms of deepfakes in cases where people doubted

601   the veracity of real videos and in cases of deepfake conspiracy theories. In the following section we

602   will discuss what these results teach us about how deepfakes are perceived online, and the

603   implications for journalistic practice and future academic research.

Reactions to deepfakes in the Russo-Ukrainian war

605   We found that perceptions of deepfakes and deepfake news in the dataset were generally

606   negative. Tweets generally focused on the harms of the technology, expressing fear and shock at the

607   potential harms of the technology similar to the fears expressed in news articles and academic

608   research on deepfakes [64,65]. Positive discourse around the technology often celebrated the use or

609   potential use of deepfakes in cases where the target was seen as justified. Users often asked for

610   deepfakes to be made of world leaders and to be disseminated through hacks. This evokes past

611   research into deepfake communities on Reddit, where redditors often requested deepfakes for specific

612   purposes [66]. This is indicative of the crowd-sourced nature of deepfakes and how the social

613   demands for certain deepfakes influences what is created and spread [66]. Another element of

614   deepfakes which became apparent through our analysis was the absolute prevalence of deepfake

615   discourse relating to pornography. Past research has estimated that 95% of deepfakes online are

616   pornographic in nature [67]. Despite the Ukraine war showing the potentials of the technology in war

617   and misinformation, there is clearly a widespread tendency to use deepfake technology to create non-

618   consensual pornography, even when relating to the leaders of military conflicts. This harm does not

619   depend on the capacity of deepfakes to deceive it instead was seen as a way to publicly attack a

620   politician's image. Our research showed people's desire to shame and humiliate world leaders, but

621   this technology is and will be used, to bully and harass people in their everyday lives [68]. The

622   impacts of harmful defamatory deepfakes and deepfake pornography remain an important and

623   understudied harm of the technology. The prevalence of this harm highlights the need for researchers

624   and policy makers to tackle defamatory deepfakes through research and legislation.

625   A significant element of deepfake discourse highlighted in our analysis was the humorous and

626   educational discourses around deepfakes. While these have generally been viewed as positive

627   potentials of deepfakes [62], our dataset showed more complex views on the non-misinformation

628   deepfakes. Because they used images of politicians and often related to current events, the humorous

629   deepfakes in the war still served as a way for users to make political commentary through satire and

630   parody. Humorous deepfakes were generally celebrated by users, but many found the videos

631   uncomfortable, especially in instances where the deepfakes were graphic or violent. This highlights

632   the need for more nuanced research into creative uses of deepfakes.

Deepfakes and distrust

634   This study provides tentative indications as to how the epistemic damage of deepfakes exist in

635   an online environment and the complex interactions it encourages between truth and falsity existing

636   on social media. The liar's dividend is the result of an information environment where real

637   information can be easily discredited as fake [19]. Our research provides insight into the creation of

638   an information environment which may potentially lead to the liar's dividend. Real video and images

639   were decried as deepfake, people often mistook CGI for deepfakes and used deepfakes as a catch-all

640   insult for information they did not like. This shows the practical implications of the previously-studied

641   relationship between awareness of deepfake technology and how it undermines one's belief in real

642   media [21]. There were also two incidences in our dataset where tweets misidentified real war footage

643   as deepfakes but because of our methodological restrictions on sensitive combat footage we cannot

644   make any claims as to the prevalence of this. While the generally assumed threat of deepfakes is their

645 believability, the labelling of real media as deepfakes shows the capability of deepfake discourse to

646 undermine truth [22]. Though this paper cannot account for pre-existing conspiratorial beliefs or the

647 impact of malicious "bad actors" using deepfakes to encourage scepticism for their own advantage,

648 our results still highlight that deepfakes are being discussed in epistemically harmful ways. We found

649 deepfakes were used for accusations and to cultivate unhealthy scepticism of real media, though

650 future quantitative research is required to highlight both the prevalence of deepfake accusations and

651 its potential effects on trust.

652   The use of deepfake and CGI educational media by the Ukrainian government was often

653 viewed quite negatively in the dataset. Many users felt that by showing their ability to create

654 deepfakes, the government had undermined the credibility of other authentic video evidence. This has

655 broad implications for educational deepfakes and their potential harms. The current study suggests

656 that educational deepfakes may damage the credibility of the reputable agencies which produce them.

657 By making educational deepfakes, one is only showing the public that their company or agency can

658 produce highly convincing fake videos. Previous quantitative research has shown that educational

659 disclaimers can to some extent mitigate the harms of pure deepfake misinformation [18], but our

660 research indicates that educational deepfakes may still undermine truth in comparison to unedited

661 videos. The effects of educational deepfakes on deepfake related scepticism and the liar's dividend

662 require further study, but we suggest that governments and organisations that rely on the public's trust

663 should avoid using deepfakes as part of their messaging.

664   A novel finding of the analysis was the observed interactions between deepfakes and

665 conspiracy theories. The use of image editing and video editing techniques in conspiracies is not new.

666 The moon-landing conspiracy was fuelled by the current state of Hollywood cinema and visual effects

667 at the time, specifically those used in Stanley Kubrick's 2001: A Space Odyssey [69,70]. Deepfakes

668 and the liar's dividend may provide another tool of deniability to conspiracy theorists. Conspiracy

669 theories harness suspicion of video evidence, which deepfakes have the potential to fuel [71].

670 Advancement in modern video-editing technologies is likely to inform a host of theories revolving

671 around deepfake replacements of world leaders or world leaders using deepfakes to improve their

672 speeches or to hide their own illnesses. For example, on the 27th of July 2022, a 40 second video of

673   US president Joe Biden in which he did not blink led to many Twitter users to decry the video as a

674   deepfake and endorse similar conspiracies to those that emerged during our analysis [72]. This paper

675   is the first to find evidence of online conspiracy theories which incorporate deepfakes. Conspiratorial

676   deepfake beliefs are a potential problem of deepfakes going forward and one that necessitates further

677   research.

678   Limitations

679   An important limitation of this study is that Twitter may not be representative of other social

680   media platforms. The format of tweets, limited to 280 characters and the prevalence of news sites and

681   bots means the data gathered from the service tends to be less textually dense than information from

682   Reddit or Facebook. Most tweets consisted of short sentences, and longer posts tended to be simple

683   summaries of news articles. The lack of lexical density significantly limited the ability to derive some

684   of the intended meanings, at times it was impossible to gauge if users were being serious or not with

685   their posts. This is an issue that researchers have encountered when studying language, particularly

686   the study of sarcastic language, on Twitter [73]. This was especially true regarding conspiratorial

687   posts where often the ridiculousness of the claim was not indicative of its seriousness. Future research

688   could explore more textually rich online spaces such as online forums and blog posts.

689   Because the extracted data was from a Western media service, the search terms were in English, and

690   the tweets were in Western European languages, the dataset has the potential for political bias.

691   Telegram and Russian social media were significantly involved in the spreading of anti-Zelensky

692   media and deepfakes which may not be fully represented in our dataset [74]. As such it is impossible

693   for us to make conclusions as to whether the deepfakes and discourse of the crisis were more anti-

694   Russia (as generally observed in our data set) or anti-Ukrainian. Another bias is that the dataset did

695   not include any tweets that had been deleted before data collection so it may not be representative of

696   the misinformation spreading at the time.

697   A minor limitation of the research is the inability to determine if any of the content was

698   produced by politically motivated "bad actors". Considering the unverified and anonymous nature of

699   many Twitter users, much of the discourse undermining truth could potentially have been motivated

700   in this manner. However, politically motivated or not, this discourse is still indicative of the real-

701   world social media discourses around deepfake.

702   One further limitation of this research is the use of the word deepfake in the search terms.

703   This excludes from our dataset incidences where people discussed deepfakes without knowing that

704   they were watching edited footage. Though it would have proved unfeasible to carry out a search for

705   media that people didn't recognise as being deepfaked, it is still important to note that people who

706   accepted or believed the deepfake media to be real are missing from our dataset, especially in the

707   discussion of people's ability to be misled by deepfakes.

IMPLICATIONS

708

709   This research has implications into how news media and governments interact with the

710   general discourse around deepfakes. In our dataset, the number of news articles and tweets spreading

711   stories about deepfakes significantly eclipsed actual user discourse. Given that the liar's dividend is

712   likely to grow with education and efforts to curb deepfakes [2], the dominance of news media in our

713   dataset may give credence to claims that deepfake coverage has outpaced the use of actual deepfakes

714   in misinformation [65]. We need to consider if the news focus on deepfakes is disproportionate to the

715   threat we are currently facing and whether this response is creating more distrust and contributing to

716   an epistemic crisis. Warnings about deepfakes need to be measured against their probability, and due

717   diligence may be necessary before claiming videos which are traditionally faked are actually

718   deepfakes. In many cases, preconceptions and fears about deepfakes informed the anti-media

719   sentiment throughout the dataset. The implication of this is that news media needs to weigh the

720   benefits of pre-bunking and information inoculations against the risks of the liar's dividend and the

721   undermining of real information. News coverage should also be careful in the labelling of suspected

722   deepfakes, for example news coverage of the dubious supposed deepfake video call with Mayor

723   Klitschko, which possibly only used traditional video fakery, encouraged users to doubt other

724   interactions between politicians and accuse them of being deepfakes. In an information environment

725   where people are endorsing deepfake conspiracy theories and decrying real media as deepfake, it

726   becomes vitally important that news discourse around deepfake encourages literacy in identifying

727   deepfakes and other forms of fakery. News coverage of deepfakes needs to focus on educating people

728   on what deepfakes are, what their potential is, and both what their current capabilities are and how

729   they will evolve in the coming years.

730   This research has implications as to how deepfakes can be used in warfare. The harms

731   deepfakes have on people's trust and their concept of truth significantly undermine faith in

732   governments. In our dataset, some users responded negatively to the educational deepfakes, and CGI

733   made by the Ukraine government. While well intentioned, the use of educational synthetic media

734   encouraged Twitter users to frame the real combat footage in Ukraine as deepfakes. The timeline

735   we've established for the Ukraine war shows that deepfakes are by the time of writing having real

736   world impacts on the war. The Zelensky deepfake serves as a worrying indicator of the potential

737   harms of the technology. The general playbook against misinformation and deepfakes often

738   encourages people to check the source of any claims or videos. However, the deepfake of Zelensky

739   was distributed in tandem with a hack of both the TV station and news site of a reputable media

740   source. Deepfake literacy and a healthy scepticism of outlandish claims should be encouraged as a

741   way to avoid the harms of deepfakes used in hacked media. This is consistent with research on the

742   protective nature of deepfake literacy and awareness against the harms of deepfake misinformation

743   [75].

744   In the dataset, almost no tweets involved individuals' belief in real deepfakes, instead most of

745   the misinformation came from labelling real media as deepfake. The word deepfake tended to devolve

746   into meaning "extra fake" when used as an adjective against individuals, CGI and other non-deepfake

747   media. Deepfakes, already suffering from the lack of consistent definitions, seem to have become a

748   buzzword and an insult. A lot of the deepfake scepticism in our dataset seemed to only have a

749   tentative understanding of what deepfakes were. Non-media objects such as individual people or even

750   the entire war were accused of being deepfakes. The lack of general knowledge of what deepfake

751   means and the tendency to use it towards other fakes has implications for academic researchers. In

752   research that measures proclivity to share deepfakes, the measurements of deepfake sharing are biased

753   by individuals' perceptions of what deepfakes are. It is possible that if someone has only been

754   presented with a rough definition of deepfake that they may be using the term to describe CGI or

755 traditional fakery. To avoid this, academic research on deepfake sharing behaviours should encourage

756 people describe any deepfakes they have fallen for qualitatively to ensure that they are indeed

757 deepfakes.

758

CONCLUSIONS

760 The use of deepfake technologies in the Russo-Ukrainian war is a significant moment in the

761 history of deepfake technologies. For the first time we've seen deepfake propaganda and

762 misinformation that has attempted to influence a war. Despite the use of deepfakes in fake surrender

763 videos, the chief focus of deepfake discourse is still the personal defamatory harms of deepfakes.

764 Individuals tended to overlook or even encourage the harms of defamatory deepfakes when they were

765 directed towards political rivals. The current research provides the first practical qualitative evidence

766 of the of the epistemic harms of deepfakes on social media. In the dataset, real videos were accused of

767 being deepfakes and deepfakes fuelled conspiratorial beliefs and unhealthy scepticism. The use of

768 deepfakes in education and entertainment must also be reconsidered in light of the epistemic harms of

769 deepfake technology.

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