

The unifying anger in social media: On the symbiosis of "humans and algorithms" and its effect on fear, anger and hatred

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The unifying anger in social media^{*}

On the symbiosis of „humans and algorithms“ and its effect on fear, anger and hatred

Michael Adelmund, Jan-Erik Hahn, & Sebastian Grochowicki

1 Introduction

With the increasing digitalisation of social interactions, the technical framework conditions of virtual environments and their formative influence on political decision-making and radicalisation processes are repeatedly becoming the focus of social research. In recent years, the focus has been primarily on identifying extremist influencers, lone perpetrators and small groups, or the manipulative influence of trolls, bots, fake news and disinformation on political opinion-forming processes.¹ The fundamental role played in this context by the interaction between „humans and algorithms“ – e. g. effects such as the „echo chamber“² or „filter bubble“³ – seemed to have been somewhat overlooked. One reason for this was and certainly still is that the state of research is controversial and that data science approaches and the lack of transparency in algorithmic regulation pose particular hurdles that need to be overcome.

On the one hand, the digitisation of social interactions in the context of political radicalisation and „online hate“ presents a wide range of major challenges. On the other hand, it also opens up new opportunities to quantitatively examine the theoretical (and mostly classically qualitative) breeding ground for radicalisation processes (from the formation of prejudice to the emergence, consolidation and outbreak of hate) on the basis of new and comprehensive data, thereby enabling interdisciplinary re-

search-relevant findings to be reviewed, adapted and deepened where necessary.⁴

This theoretical elaboration aims to serve this purpose by providing a topic-focused, summarising theoretical overview from which the relevant factors for the emergence and consolidation of hatred within virtual environments can be derived from the common points of contact between the relevant interdisciplinary fields of research. In this way, the aim is to present a comprehensive overview of the various stages of research on the topic of „humans and algorithms“, which makes it possible to highlight important key points and needs while at the same time conveying basic principles of media literacy and responsibility in virtual environments. This is not only particularly relevant for social media users, but also provides important information for the decision-making processes of stakeholders (especially in politics, legislation and platforms).

In order to achieve this research goal, the theoretical basis of the framework problem – the interaction between „humans and algorithms“ – will first be presented in an introductory section. This section will highlight the core problem and provide an exploratory overview of global developments that serve as potential indicators of the theoretically anticipated effects. On this basis, systematically relevant research findings will be compiled and condensed into relevant factors in their overall context based on the gradually concretising problem.

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1 See Adelmund, M. (2021). Radicalisation in the age of digitalisation. Data science approaches to effectively combating extremist threats from social media, in H. Hansen, & A. Pfahl-Traughber (Eds.). Yearbook for Extremism and Terrorism Research 2019/2020 (I), pp. 127 - 169, Federal University of Applied Administrative Sciences. Brühl/Rhineland 2021. <https://www.hsbund.de>, p. 127.

2 See Sunstein, C. R. (2001). Republic.com. Princeton University Press.

3 See Pariser, E. (2011). The Filter Bubble: What the Internet Is Hiding from You. Penguin Press.

4 See Adelmund, M. (2025). Modern right-wing extremism as a challenge for democratic security architecture. New approaches to combating extremism in social media with computational criminological science. Verlag für Polizeiwissenschaft.

2 „Humans and algorithms“

Sunstein⁵ and Pariser⁶, two of the best-known thought leaders in this field, focused their considerations on the selection of content – whether through automatic curation („filter bubble“⁷: algorithms only make selected content available through personalisation) or individual selection by users („echo chamber“⁸: reinforcement of opinions by like-minded people). Both effects remain controversial in research and have not yet been conclusively falsified or verified.⁹ The main reasons for this are the lack of transparency in platform-specific algorithmic distribution processes and the lack of access to data (offering both sufficient quantity and quality).

In „Republic.com“ („Echokammer“), the effects of the internet on deliberative democracy¹⁰ were examined and a general decline in democratic ideals was predicted; the selective use of filter technologies reinforces people’s prejudices, which tends to lead to the polarisation of groups, isolate citizens from one another and, in this respect, reinforce prejudices and hatred. In „The Filter Bubble. What The Internet Is Hiding From You“¹¹ focuses on filter technologies that unconsciously influence users from outside, their framework conditions and the resulting influences on a distorted perception of what is to be regarded as „important, true and real“. From various perspectives, it is emphasised that the „filter bubble“ acts like a „centrifugal force“ that drives people apart.

Similar to the „echo chamber,“ the „filter bubble“ presents a comparable scenario, but sees its root cause as lying more in the algorithmic curation of content than in individual selection processes by users. At this point, it becomes clear that digital transformation has fundamentally and massively changed the way people communicate and interact socially with each other – at the micro, meso and macro levels: Journalistic gatekeeping functions of traditional mass media (with largely unidirectional information transfer based on a sender-receiver model) have been made feedback-capable by social me-

dia in the form of technological affordances (such as comment columns, generally visible interaction options and algorithmically controlled visibility). Recipients’ participation, through commenting on or „sharing“ posts, is no longer just „allowed“ but also specifically activated.¹² However, this functionality is associated with a changed communication logic, because users are not only to be understood as addressed recipients but also as potential co-producers of meaning. Interactions can and are recorded in algorithmic systems as relevance indicators, whose visibility is determined by the strength of the emotional charge of the content. The potential diversity of information as the basis for political opinion-forming is thus limited in social media (and largely unnoticed by recipients) by weightings. The supposed advantage of a fundamentally broader spectrum of information in social media must therefore be weighed against its limited perceptibility due to the orientation of control processes. Of paramount importance in this regard is the goal pursued on the platforms of „increasing dwell times and generating advertising revenue,“ which can lead to „inadequate prioritisation of information [...]“ and jeopardise „plurality and its perception, i.e. the diversity of opinion and information in democratic public spheres.“¹³ This highlights the danger that particularly emotional posts, which attract a great deal of interest on this very basis – and thus have a considerable reach – will push factual or consensus-oriented posts into the background.¹⁴

What connects the different theories in this segment, at least in one respect, is that the digitalisation of social interactions – regardless of the starting point of the interaction between „human and algorithm“ – is associated with a structural distortion of perception, which is based on the (fundamentally necessary) filtering of (an almost unlimited variety of) content in social media. On the other hand, this gives rise to the danger of similar concentrations of information that appeal to emotions and promote political radicalisation:

5 See Sunstein, C. R. (2001). Republic.com. Princeton University Press.

6 See Pariser, E. (2011). The Filter Bubble: What the Internet Is Hiding from You. Penguin Press.

7 See ibid.

8 See Sunstein, C. R. (2001). Republic.com. Princeton University Press

9 See German Bundestag (2022). Scientific Services. „Echo chambers“ and „filter bubbles“ in digital media. Report. WD 10 - 3000 - 007/22. Berlin. 2022. p. 15.

10 See Bessette (1980). Deliberative Democracy: The Majority Principle in Republican Government.

11 See Pariser, E. (2011). The Filter Bubble: What the Internet Is Hiding from You. Penguin Press.

12 See Andree, M. (2024). The Hunger Games: How digital monopolies are destroying journalism and threatening democracy. Friedrich Ebert Foundation.

13 See National Academy of Sciences Leopoldina, acatech – German Academy of Science and Engineering, & Union of German Academies of Sciences and Humanities. (2021). Digitalisation and Democracy, p. 4 ff.

14 „Social media users are therefore more likely to be confronted with emotional content due to the interaction of human interactions and algorithmic distribution processes.“ See Adelmund, M. (2021). Radicalisation in the age of digitalisation. Data science approaches to effectively combating extremist threats from social media. In A. Pfahl-Traughber (Ed.), Yearbook for Extremism and Terrorism Research 2019/2020 (I) (pp. 127 - 169). Federal University of Applied Administrative Sciences, p. 131.

As the quantity of such stimuli grows, there is a risk that those affected will develop reservations based on a multitude of individual contributions, which are increasingly channelled into enemy stereotypes. As a result, foreigners may be perceived as „criminals“, alternative people as „autonomists“, but also police officers as „racists“ or conservatives as „Nazis“.¹⁵

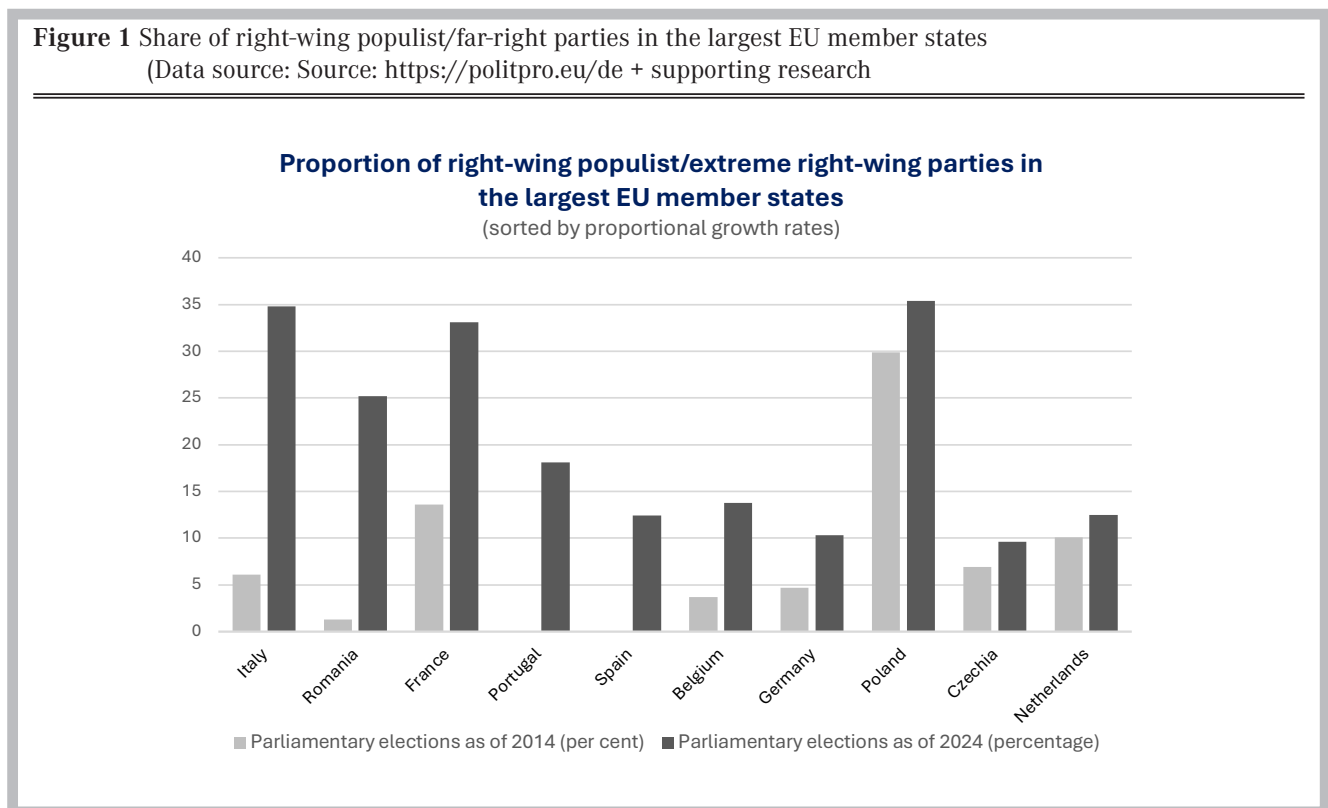
The danger of distortion of representations of reality then arises from the respective population’s emotional involvement in the scenario presented.¹⁶ This reinforces prejudices, creates or solidifies hatred, drives the polarisation of society and permanently undermines democratic processes. Virtual environments become saturated with false and extreme norms, thus functioning like a factory of distorting mirrors.¹⁷

The scenarios that theoretically result from this and have already been predicted by Sunstein and Pariser can now be considered to have come true in many respects: Possible indicators of this include, for example, the mostly survey-based and internationally diverse research contributions on the perception of the atmosphere within virtual environments.¹⁸ These show that users of social media are increasingly exposed to extreme political opinions and hate speech and perceive the atmosphere there as increasingly emotional and aggressive.

15 See Adelmund, M. (2021). Radicalisation in the age of digitalisation. Data science approaches to effectively combating extremist threats from social media. In A. Pfahl-Traughber (Ed.), Yearbook for Extremism and Terrorism Research 2019/2020 (I) (pp. 127 - 169). Federal University of Applied Sciences for Public Administration, p. 131.
 16 See ibid.
 17 See Robertson, C. E., del Rosario, K., & Van Bavel, J. J. (2024). Inside the Funhouse Mirror Factory: How Social Media Distorts Perceptions of Norms. Current Opinion in Psychology, 60, 101918.

18 See, among others: Henne, C., & Hoffrichter, P. (2016). Facebook users see more extremism, want to unfriend people and, in some cases, reduce their own use! Munich Digital Institute. <https://www.munich-digital.com/de/facebook-politik-stimmung> Hoven, E., University of Leipzig, & Research Group g/d/p. (2022). Hate on the internet. Results of a study. https://www.gdp-group.com/fileadmin/user_upload/news/ms/hate_speech_22.pdf. Auxier, B. (2020). 64 % of Americans say social media have a mostly negative effect on the way things are going in the U.S. today. Pew Research Centre. <https://www.pewresearch.org/short-reads/2020/10/15/64-of-americans-say-social-media-have-a-mostly-negative-effect-on-the-way-things-are-going-in-the-u-s-today>. ADL. (2024). Online Hate and Harassment: The American Experience 2024. ADL Centre for Technology and Society. <https://www.adl.org/sites/default/files/documents/2024-06/online-hate-and-harassment-the-american-experience-v2024.pdf>, p. 4.

Figure 1 Share of right-wing populist/far-right parties in the largest EU member states
 (Data source: Source: <https://politpro.eu/de> + supporting research)



Outside virtual environments, too, increasing radicalisation is reflected in the significant strengthening of political fringe groups in parliaments: between 2004 and 2024, for example, the proportion of far-right or right-wing populist parties in the European Parliament more than doubled from 8.4 to 20 per cent.¹⁹ A similar political development was also observed in the national parliaments of the EU member states: within the 10 largest EU states, which together represent over 70 per cent of the EU population, the proportion of far-right parties rose significantly (see Figure 1).

Comparable developments can also be traced from different research perspectives with regard to a factual, measurable weakening of democratic processes globally: using a wide variety of democracy indices, various studies in this regard show, among other things, a loss of credibility and reliability in international cooperation, there has been a reduction in the ability and willingness to keep anti-democratic actors at bay through con-

sistent exclusion or skilful integration of blocking political influence, and in a growing number of countries, it is „opponents of democratic and market economy reforms who sit at the levers of power“.²⁰ One cause of this is diagnosed, among oth, as „more conflict and less consensus building“.²¹ Furthermore, studies from this branch of research indicate that a third wave of autocratisation, which has been evident since around the mid-1980s, was accompanied in the early 1990s - i. e. with the onset of commercial use of the internet - by a massive erosion of democratic processes (see Figure 2; dotted line).²² Compared to past phases of autocratisation, it has been found that this development is not due to military or invasive intervention, but rather stems from an unprecedented erosion of democratic substance.²³

19 See Schellenberg, B., & Schellenberg, A. (2024). The Radical Right in European Comparison. Federal Agency for Civic Education. <https://www.bpb.de/themen/parteien/rechtspopulismus/240093/die-radikale-rechte-im-europaeischen-vergleich/>

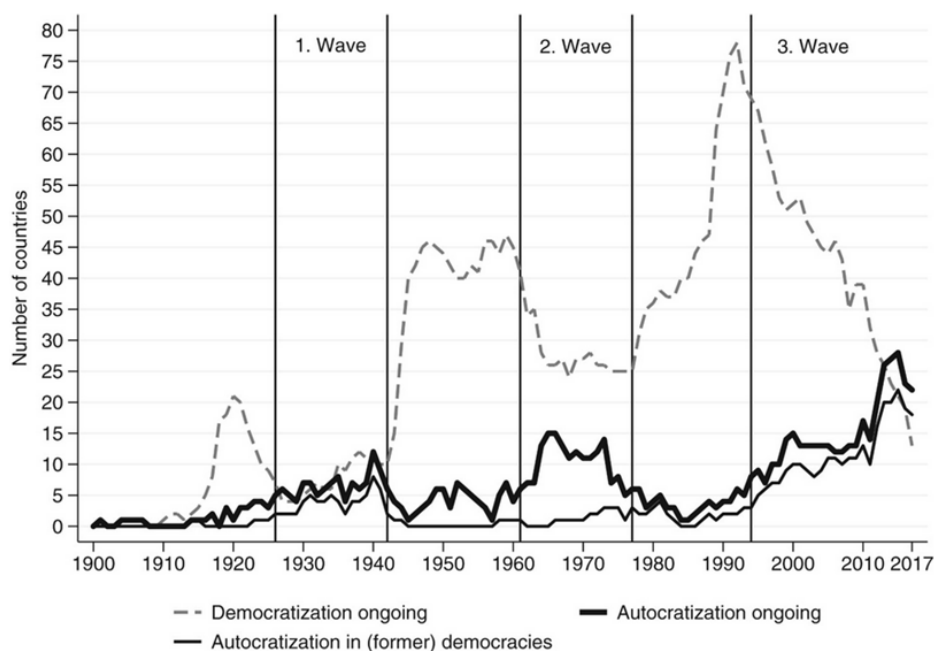
20 See BTI. (2024). Transformation Index 2024. Summary of global results. Bertelsmann Foundation. https://bti-project.org/fileadmin/api/content/de/downloads/BTI_2024_Ergebnisueberblick.pdf, p. 1.

21 See *ibid.*

22 See Lührmann, A., & Lindberg, S. I. (2019). A Third Wave of Autocratisation Is Here: What Is New About It? *Democratisation*, 26(7), pp. 1095 - 1113. <https://doi.org/10.1080/13510347.2019.1582029>, p. 1103 f.

23 See *ibid.*

Figure 2 Global erosion of democratic substance (Image source: Lührmann, A., & Lindberg, S.)

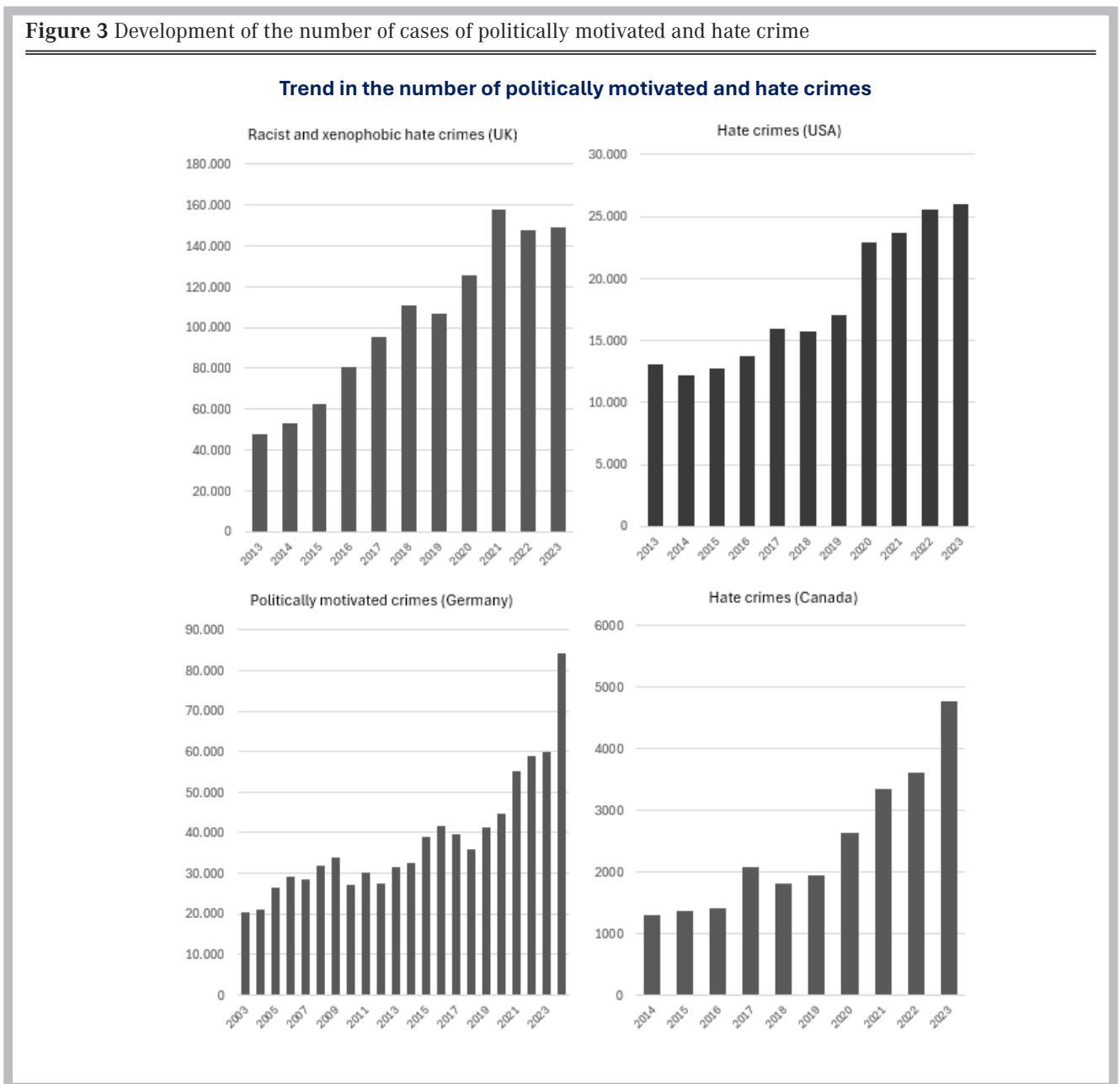


Ultimately, and in concrete terms, the scenarios envisaged of an affect-oriented distribution of emotional appeals – assuming that this fuels fears, reinforces prejudices and spreads enemy stereotypes – may also be reflected in the development of relevant case numbers for „politi-

cally motivated crime“ (PMK) or „hate crime“. ²⁴ Basically, this refers to manifestations of deviant behaviour directed against people because they are perceived as belonging to a generally definable group of people against whom this hatred is directed and which is expressed in the respecti-

²⁴ Fundamentally, politically motivated crime (PMK) or so-called hate crime refers to manifestations of deviant behaviour directed against people because they are perceived as belonging to a generally definable group of people against whom this hatred is directed and which is expressed in the respective act.

Figure 3 Development of the number of cases of politically motivated and hate crime



ve act.²⁵ In this segment (insofar as it can be reproduced at this point),²⁶ a very significant increase has been recorded in many countries over the last ten years, for example. Various attacks by radicalised lone perpetrators have highlighted the special role played by social media, both in terms of radicalisation processes and as a means of committing crimes: perpetrators were active in relevant forums, published online manifestos or posted live videos of their crimes.²⁷ In this regard, security authorities report new all-time highs every year. The case numbers for PMK in Germany,²⁸ hate crime in the USA²⁹ and Canada,³⁰ and „racist and xenophobic hate crime“ in the UK³¹ are cited here merely as examples (see Figure 3).

25 People can become victims of hate crime because of their skin colour, religion, nationality, gender, sexual orientation or even because of their profession (e. g. as police officers, emergency services personnel, administrative or government employees).

26 The legal framework for this varies, which is particularly noticeable in Germany. As a result of its responsibility for National Socialism, numerous organisations have been banned in Germany, which also has particular relevance under criminal law: This has an impact, for example, on the fulfilment of the elements of the offence of incitement to hatred (Section 130 of the German Criminal Code) and is also reflected in the number of cases of politically motivated crime (overall). Each nation has different definitional bases for the manifestations of this phenomenon, which makes statistical comparability almost impossible. In addition, the respective legal bases for this are subject to ongoing processes of change and adaptation, the number of cases is represented in different forms (crimes, offences, victims, perpetrators) and developments can only be traced retrospectively for limited periods of time using publicly available sources. Furthermore, it should be noted that in this area of crime – as with all crimes – factors such as the willingness to report offences and the problem of unreported cases have a greater or lesser impact on this type of crime.

27 See, among others: Hartleb, F. (2022). The phenomenon of virtualised right-wing terrorism. *SLAK Journal – Journal for Police Science and Police Practice*, 4, pp. 17 - 27. https://doi.org/10.7396/2022_4_B_p_17. “The global trend is towards livestream attacks” (cf. *ibid.*, p. 18). Quent, M. (2017). Were the racist and right-wing extremist references sufficiently weighted and appreciated? In *Racist Hate – The OEZ Attack in Munich*. Institute for Democracy and Civil Society. https://www.idz-jena.de/fileadmin/user_upload/PDFS_WsD2/OEZ-Attentat.pdf. „On 9 October 2019, right-wing extremist Stephan B. attempted to break into a synagogue in Halle an der Saale heavily armed. After failing to get through the door, he killed two people and injured two more as he fled [...]“ (cf. Online editorial team of the Federal Agency for Civic Education, 2020). „He [the perpetrator] had become radicalised primarily in internet forums and had also obtained construction plans for his partly self-built weapons on the internet. [...] During the filmed and internet-streamed crime, the perpetrator denied, among other things, the Holocaust“ (cf. State Ministry of the Interior - Free State of Saxony, 2020).

28 See Federal Ministry of the Interior & Federal Criminal Police Office. (2024). Nationwide case numbers 2024 Politically motivated crime. https://www.bka.de/SharedDocs/Downloads/DE/UnsereAufgaben/Deliktsbereiche/PMK/2024PMKFallzahlen.pdf?__blob=publicationFile&v=2.

29 See OSCE. (2025). United States of America. OSCE ODIHR Hate Crime Report. <https://hatecrime.osce.org/united-states-america>.

30 See Canada. (2025, July 22). Police-reported hate crime, by type of motivation, selected regions and Canada (selected police services). <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3510006601&cubeTimeFrame.startYear=2014&cubeTimeFrame.endYear=2023&referencePeriods=20140101%2C20230101>.

31 See <https://www.gov.uk/government/statistics>.

Even if a direct causal link between the interaction of „humans and algorithms“ and ultimately the development of case numbers of „PMK/hate crime“, the erosion of democratic substance or the electoral success of extreme parties can hardly be proven due to the complexity of the overall framework and the individuality of specific acts or decisions, the trend in such indicators points to a worrying development in society as a whole.

Certainly, more specific and individual factors are also relevant here, such as pandemics, crises or wars, but in the age of digitalisation, the perception of such circumstances is also shaped by algorithms and emotions, with social consequences. Findings of this kind underscore the urgency of taking a closer look at the technical framework conditions of social media with regard to the emergence or consolidation of hatred and its democracy-undermining effects. The following considerations will therefore focus on the danger of promoting similar information consolidation through the interaction of „humans and algorithms“. Specific individual selection factors – both by users and by algorithms – will not be the subject of consideration in this theoretical overview.

Against this background, the following section will first compile the results of relevant research on online radicalisation and reflect on the findings that can be derived from this with regard to the state of research on effects such as the „filter bubble“ or „echo chamber“. In the third section (cf. 3. Social psychological aspects of online radicalisation), we will identify psychological factors that are as concrete as possible in relation to the emergence and/or consolidation of „online hate“, on the basis of which conclusions can be drawn as to whether and to what extent algorithmic information distribution or the interaction of „humans and algorithms“ in social media undermines democratic opinion-forming processes and promotes hate.

In order to adequately indicate the interdisciplinary and multifaceted state of research on the two topics and to highlight them in the context of this theoretical elaboration, it was first necessary to develop as broad a spectrum of access to relevant contributions as possible. In addition to the relevant database systems of social research and university libraries, conventional and generally accessible search engines were also used for this purpose.

2.1 Online radicalisation and „fear propaganda“

Research into the potential consequences of phenomena such as the „filter bubble“ or „echo chamber“ is also wide-ranging with regard to the phenomenon of online radicalisation. Based on the research and comprehensive considerations, a central element has been identified in this paper which, even if it did not necessarily emerge in the specific context of the assessment, runs like a thread through the results of relevant studies: the propagandistic effect of appeals that play on feelings of threat. The following summary focuses on this and presents a few international studies and a large number of exemplary studies from Germany. The reasons for this can be found in the historically developed and quantitatively and qualitatively advanced research on radicalisation in Germany. In 2013, the Online Hate Prevention Institute (OHPI)³² addressed the growing issue of online hate, which was directed particularly against Muslims. To this end, 50 relevant Facebook profiles were analysed in which Islam was denigrated. The categorisation of the content of the respective hate speech revealed the particular significance of content that appeals to emotions and, in particular, addresses feelings of threat. In descending order of frequency, Muslims were primarily stereotyped in these hate messages as a security threat (category A), a cultural threat (category B) or an economic threat (category C).³³ From the perspective of narrative research, the particular significance of such content can also be substantiated in view of the propaganda successes of extremist endeavours. In the field of right-wing extremism, for example, the most effective narrative in Germany has proven to be the claim that immigration is destroying the „foundations of the nation,“ is responsible for Germany’s decline in international comparison, and has led to an increasing threat to internal security.³⁴ „The effectiveness of such ideas and arguments is therefore primarily due to the fact that they are also popularly represented in publications that do not belong to the extreme right.“³⁵ Even though this phenomenon is not new and has been present throughout

history in countries, religions and cultures in the context of enemy propaganda, social media has fundamentally changed the conditions for this. This is evident not only in terms of deliberately disseminated disinformation, which also conveys defamatory stereotypes of threat scenarios and goes viral. Even without the intention to defame, relevant posts, for example those containing misinformation or sensationalist language, can have a similar effect.

The significance of relevant narratives was also highlighted in the „Sixth Report on Right-wing Extremism and Xenophobia in the State of Bremen“,³⁶ commissioned by the Senate of the Free Hanseatic City of Bremen. For this purpose, right-wing extremist efforts and their online activities from 2013 to 2018 were examined both qualitatively and quantitatively. The report not only emphasised the fundamental importance of new media such as the internet and social media, because right-wing extremists were increasingly able to network informally, influence other people and spread their inhuman ideologies to new audiences and society at large.³⁷ „Above all, exaggerated threat scenarios on topics such as Islamist terrorism or crimes committed by foreigners to the detriment of German victims [had] a particularly high appeal and associated public impact.“³⁸ Right-wing extremists also succeeded in reaching people who would have been closed to the classic manifestations of right-wing extremism by means of seemingly „harmless“ statements that purported to address the perceived or real concerns of the population.³⁹

Terrorist attacks in particular serve as a prime example of this, as demonstrated by „Online Hate and Zeitgeist of Fear: A Five-Country Longitudinal Analysis of Hate Exposure and Fear of Terrorism After the Paris Terrorist Attacks in 2015“⁴⁰ showed that such events were associated with an increase in a heightened sense of fear that extended beyond the physical location of the attacks and led to increased expressions of hate on the internet. According

32 See Oboler, A. (2013). Islamophobia on the Internet: The growth of online hate targeting Muslims. <https://doi.org/10.13140/2.1.3523.1526>.

33 See *ibid.*

34 See Virchow, F. (2024). Right-wing extremist narratives in social media – characteristics, influence on young people and how to deal with them. *BzKJ Aktuell*, 2024(2). <https://www.bzjk.de/resource/blob/240364/b4c3068e23fba890d814b80fa76d3306/20242-narrative-der-extremen-rechten-data.pdf>, p. 6 ff.

35 See *ibid.*: Bade, K. J. (2013). Criticism and violence. The Sarrazin debate, ‚criticism of Islam‘ and terror in an immigrant society. Wochenschau Verlag. Virchow, F. (2019). Language and racism. In T. Dürr & R. Becker (Eds.), *Leerstelle Rassismus? Analysen und Handlungsmöglichkeiten nach dem NSU* (pp. 47 - 58). Wochenschau Verlag.

36 See Senate of the Free Hanseatic City of Bremen. (2019). Sixth report on right-wing extremism and xenophobia in the state of Bremen (2013-2018). Senate Press Office. <https://www.senatspressestelle.bremen.de/pressemitteilungen/sechster-bericht-ueber-rechtsextremismus-und-fremdenfeindlichkeit-im-land-bremen-2013-2018-319033>.

37 See *ibid.*

38 See *ibid.*

39 See *ibid.*

40 See Kaakinen, M., Oksanen, A., Gadarian, S. K., Solheim, Ø. B., Herreros, F., Winsvold, M. S., Enjolras, B., & Steen Johnsen, K. (2021). Online Hate and Zeitgeist of Fear: A Five Country Longitudinal Analysis of Hate Exposure and Fear of Terrorism After the Paris Terrorist Attacks in 2015. *Political Psychology*, 42(6). <https://doi.org/10.1111/pops.12732>.

to the study, the „zeitgeist of fear“ correlated with a higher personal fear of terrorism both immediately after the attacks and one year later. Hate speech on the internet thus contributed to a lingering sense of fear after the terrorist attacks by distorting perceptions of the social climate.⁴¹

In the article „Radicalisation in the Age of Digitalisation“,⁴² exploratory data science investigations of social media posts aimed, among other things, to identify quantitatively relevant factors influenced by automated information control processes from the perspective of extremism research. The structural composition of the content offered was placed at the centre of the analysis, and it was found that the virtual perceptibility of threat scenarios plays a central role in online radicalisation. The problem that became apparent here was as follows: curated⁴³ representations of alleged foreign criminality, Islamist terrorism or left-wing extremist violence in thousands of posts can both address the fears and concerns of large sections of society and, at the same time, gradually amplify them and channel them towards alleged culprits.⁴⁴ The quantity of information consolidation has thus become a decisive criterion for establishing the potential dangers arising from this, even if the curation of content does not pursue an extremist agenda. Based on complete surveys of the federal and state profiles of the right-wing parties „Alternative for Germany“ (AfD, n=37,997 Facebook posts) and „Die Heimat“ (formerly NPD, n=32,561 Facebook posts) assigned to the right-wing spectrum, it was possible to trace, among other things, using text and interaction analysis methods, that the „anger“ of the recipients of both categories was primarily directed at groups of people such as „REFUGEES“, „ASYLUM SEEKERS“ and „ASYLUM APPLICANTS“ (NPD) and „REFUGEES“, the „GREENS“ and „ASYLUM APPLICANTS“ (AfD). In addition, propaganda effects could also be demonstrated that unleashed right-wing extremist aspirations on the basis of online media reporting: with the help of emotionally charged media reporting from generally recognised media houses, right-wing extremists achieved particularly

high reach; in particular, reporting that addressed alleged foreign criminality was exploited for this purpose.⁴⁵

Accordingly, propaganda effects based primarily on content that depicts or suggests threat scenarios and appeals to emotions are of central importance. In this context, there are indications of a possible interaction between the virtual (curated) depiction of threats and the resulting (possibly quantitatively enriched and subjectively exaggerated) feelings of fear, which are used to fuel prejudices and thus spread enemy stereotypes. The research question thus focuses on the effects of the emotional perceptibility of content on processes of automated information distribution, especially when this appeals to feelings of fear and triggers anger. In order to further specify this objective, it is first necessary to critically evaluate the state of research on relevant effects, such as the „echo chamber“ or „filter bubble,“ and to examine them from this perspective.

2.2 State of research on filter bubbles and echo chambers

The results of relevant research contributions on the effects of the „filter bubble“ and „echo chamber“ appear – at least in their respective assessments – to be initially divided and can be broadly divided into two categories: falsifying assessments, which focus primarily on the analysis of sources used, and verifying assessments, which focus in particular on the effects of these phenomena (e. g. in terms of usage behaviour) and the processes of radicalisation. In view of the broad spectrum of available studies, a few falsifying and verifying studies are summarised below by way of example and evaluated in an interim conclusion. Research contributions are also discussed which, despite opaque methodological approaches or insufficiently validated results, have had a noticeable impact on the (especially popular) scientific discourse in this context.

First of all, it should be noted that many of the introductory – and thus also trend-setting – studies in this segment, which substantiated a supposed falsification of corresponding effects, were based on survey data that could be obtained in the context of website visits until 2008. At this point, the transferability of relevant evaluations is already questionable, because the functionality of network algorithms is based on different evaluation criteria and

41 See *ibid.*

42 See Adelmund, M. (2021). Radicalisation in the age of digitalisation. Data science approaches to effectively combating extremist threats from social media. In A. Pfahl-Traughber (Ed.), *Yearbook for Extremism and Terrorism Research 2019/2020 (I)* (pp. 127 - 169). Federal University of Applied Administrative Sciences.

43 This refers to both the automatic and targeted selection and compilation of posts and content.

44 See *ibid.*, p. 128.

45 See *ibid.*, p. 158 ff.

entities than is the case with search algorithms. Examples of this include the studies „A Turn Toward Avoidance? Selective Exposure to Online Political Information“⁴⁶ or „Partisan Enclaves or Shared Media Experiences? A Network Approach to Understanding Citizens“.⁴⁷ Based on source analyses, the authors concluded that concerns about increasingly selective political information consumption were exaggerated.

Findings of this kind were established in particular on the basis of the heterogeneity of the sources evaluated, both those selected and those suggested. According to these findings, users do show a tendency to seek confirmation, but they do not systematically avoid contradictory content.⁴⁸ Studies of this kind pointed to diversity in the source structure and thus called into question algorithm-induced fragmentation.

However, little or no attention was paid to the fact that, on the one hand, this cannot rule out the consolidation of similar content and, on the other hand, it is difficult to validly classify a broad spectrum of sources, especially given the fast-paced nature of social media profiles. In particular, online media reporting – which is at least easier to categorise in this respect – has been and continues to be attributed a decisive argumentative role in falsification in more recent studies, such as „The myth of partisan selective exposure: A portrait of the online political news audience“,⁴⁹ in which observable online audience behaviour was analysed using experimental or self-reported data. It was found that the audience for political news often navigates from Facebook to external news sites, concentrating primarily on a few popular and well-known news sites. These, in turn, are received by ideologically diverse target groups.⁵⁰ The „Cross-Phenomenon Scientific Analysis Centre for Anti-Semitism and Xenophobia“ (PAAF) of the State Office for the Protection of the Constitution in Hesse also investigated the extent to which echo chambers and filter bubbles can be observed based

on the information provided by right-wing extremist actors.⁵¹ Based on online media coverage, it was also found that only 24 per cent of the press products used by the right-wing extremist scene to obtain information could be classified as alternative news portals (e. g. from the right-wing populist or new right spectrum). In contrast, one third came from major newspapers (quality journalism), one quarter from regional and local newspapers, and 14 per cent from national tabloids.⁵²

Similarly, the joint project „Election Campaigning in (A) Social Networks“ (WSN) was able to take an „empirical-critical look at concerns about democratic debate in the digital age.“ On the occasion of the 2017 federal election, the concept of the „echo chamber“ was to be examined primarily on the basis of a significantly party-political selectivity in the choice of media on the party profiles studied. It turned out that there was a high degree of agreement – predominantly among established media – with regard to the top links. An overlap by well-known „leading media“ was used to conclude that the „echo chamber hypothesis widespread in the media and political debate [...] cannot be supported“.⁵³ Even if news sites are methodologically easier to categorise, at least in terms of categorical classifications, this does not rule out the possibility that the content may be reporting that is exploited for extremist purposes, for example.

The above-mentioned studies in the field of radicalisation research on the phenomenon of right-wing extremism have shown that this reinforces, for example, the above-mentioned narrative of „foreign criminality“. Similarly, reports on police operations in the field of left-wing extremism will be suitable for portraying the use of coercive measures by the police as „arbitrary repression by the state apparatus“. In this respect, a corresponding symbiosis of algorithmic distribution and affect-oriented journalistic processing could well appear suitable for conveying similar content and thereby spreading enemy stereotypes and inciting hatred.

46 See Garrett, R. K., Carnahan, D., & Lynch, E. K. (2011). A Turn Toward Avoidance? Selective Exposure to Online Political Information, 2004–2008. *Political Behaviour*, 35(1), pp. 113–134.

47 See Weeks, B. E., Ksiazek, T. B., & Holbert, R. L. (2016). Partisan Enclaves or Shared Media Experiences? A Network Approach to Understanding Citizens' Political News Environments. *Journal of Broadcasting & Electronic Media*, 60(2), pp. 248–268. <https://doi.org/10.1080/08838151.2016.1164170>.

48 See Garrett et al. (2011), p. 130 ff.; Weeks et al (2016), p. 265.

49 See Nelson, J. L., & Webster, J. G. (2017). The Myth of Partisan Selective Exposure: A Portrait of the Online Political News Audience. *Social Media + Society*, 3(3), 205630511772931. <https://doi.org/10.1177/2056305117729314>.

50 See *ibid.*, p. 9 f.

51 See Wegener, A.-C. (2020). Filter ohne Blase. Wie die rechtsextremistische Szene sich über das politische Tagesgeschehen informiert. In <https://lfv.hessen.de/infomaterial/paaf-analysen-ausgabe-2-filter-ohne-blase-wie-die-rechtsextremistische-szene-sich-ueber-das>. Landesamt für Verfassungsschutz Hessen.

52 See *ibid.*, p. 2 ff.

53 See Schünemann, W. J. (2019). (No) reason to panic? An empirical-critical look at concerns about democratic debate in the digital age. *Communicatio Socialis*, 52(2), pp. 159–174. <https://doi.org/10.5771/0010-3497-2019-2-159> (The Future of Democracy), p. 166; quoted from Adelmund (2021), p. 136.

In „Public Opinion Formation on the Far Right“,⁵⁴ for example, it was shown that sharing press coverage on right-wing extremist party profiles succeeds in achieving greater reach and thereby reinforcing relevant narratives (see Figure 4).

These posts enabled right-wing extremist organisations to achieve 37 per cent more shares and 51 per cent more comments.⁵⁵

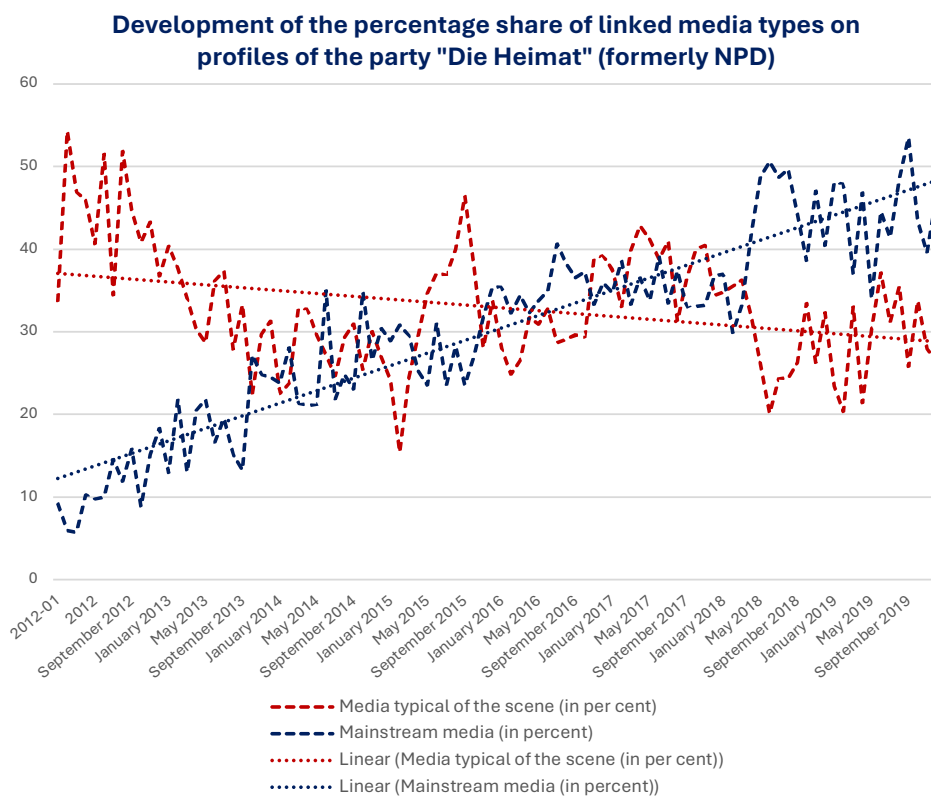
Contrary to the falsifying research, the verifying research dealt with the visibility of recommendation systems and the analysis of user behaviour: For example, the authors of „Rabbit Hole: The Extreme Right and Online Recom-

mender Systems“⁵⁶ and „Auditing radicalisation pathways on YouTube“⁵⁷ found that platform recommendation systems contribute to the dissemination and visibility of far-right extremist content, causing users to migrate to more extreme content.⁵⁸ The paper „The search engine manipulation effect (SEME) and its possible impact on the outcomes of elections“⁵⁹ examined how search engine rankings influenced the preferences of undecided voters. The researchers conducted five randomised double-blind expe-

54 See Adelmund, M. & Engel, U. (2021). Public Opinion Formation on the Far Right. In U. Engel, A. Quan-Haase, S. X. Liu, & L. Lyberg (Eds.), Handbook of Computational Social Science, Volume 1: Theory, Case Studies and Ethics (pp. 373 - 379). Routledge.
55 See *ibid.*, p. 377.

56 See O’Callaghan, D., Greene, D., Conway, M., Carthy, J., & Cunningham, P. (2015). Down the (White) Rabbit Hole: The Extreme Right and Online Recommender Systems. *Social Science Computer Review*, 33(4), pp. 459 - 478. <https://doi.org/10.1177/0894439314555329>.
57 See Ribeiro, M. H., Ottoni, R., West, R., Almeida, V. A. F., & Meira, W. (2019). Auditing Radicalisation Pathways on YouTube. <https://doi.org/10.48550/arxiv.1908.08313>.
58 See O’Callaghan et al. (2015), p. 16; Ribeiro et al. (2019), p. 10.
59 See Epstein, R., & Robertson, R. E. (2015). The search engine manipulation effect (SEME) and its possible impact on the outcomes of elections. *Proceedings of the National Academy of Sciences*, 112(33), 4512-4521. <https://doi.org/10.1073/pnas.1419828112>.

Figure 4 Percentage share of linked media coverage. (Source: 9780367456535 | Handbook Computational Social Science Vol 1 - Engel et al | Edn. 1 © 2021 UK, Reproduced by permission of Taylor & Francis Group.)



riments with a total of 4,556 undecided voters from the US and India, showing that biased search rankings influenced the voting preferences of undecided voters by 20 per cent or more. Seventy-five per cent of the participants stated that they were unaware of any manipulative influence. Even participants who suspected a manipulative effect were still influenced by it. Furthermore, the manipulative effect was greater in certain age groups (especially older people).⁶⁰

In Germany, the study „Polarisation on the social web and the intervening effect of education: an investigation into the consequences of algorithmic media using the example of approval for Merkel’s ‚We can do it!‘“⁶¹ confirmed for the first time that the use of social media has been shown to lead to polarisation of society in specific sections of the population and under certain conditions. The authors postulated that, with regard to Merkel’s ‚We can do it,‘ sections of the population with a lower level of formal education in particular have become polarised through the use of social networks.⁶²

Contrary to the early falsifying studies, which focused primarily on the possible heterogeneity of quantitatively recorded sources, but not on the associated content or actor perspectives and intentions, the verifying research also measures measurable effects of influence in this regard. In this respect, falsification appears possible, at least on the basis of the source structure, but a content-related and empirically measurable effect cannot be ruled out. Against this background, it is entirely conceivable that similar content can be condensed from different sources, some of which may be considered „mainstream“. The manner of assignment can nevertheless have a favourable effect on the course of radicalisation processes or the emergence and consolidation of hatred.

On the other hand, it should be noted that the verifying research focused less on the source structure and more on the profile categories examined and/or the users who appeared. For in-depth considerations in terms of the research question, the fragmentation of content in posts must also be explained in terms of a broad source struc-

ture in order to explain the facilitating effect on the progression of radicalisation processes and the emergence or consolidation of hatred. The emotional perceptibility of relevant content, as derived from the introductory explanations of the state of research, may be considered here.

3 Psychological aspects of online radicalisation

From a psychological perspective, the underlying problem of the interaction between „humans and algorithms“ is that posts spread rapidly or go viral when they are particularly easy to perceive and trigger strong emotions in those affected.⁶³ „Any form of interaction is associated with forwarding effects and generates reach, which means that users are confronted more frequently with emotional content that is all the more memorable.“⁶⁴ The decisive factor for selection and automated curation in the context of this problem is the importance of the emotional perceptibility of posts that affect feelings of threat and thus promote the emergence and/or consolidation of hatred.

The relevant general, cognitive and social psychological research is wide-ranging. However, intensive research into the research question revealed major gaps in empirical and, in particular, experimental findings on the specific functions and effects of emotions in the relevant scope and social space. The contributions presented here are therefore indicative in nature.

In order to understand the psychological aspects of the problem, it must first be noted that there is no uniform or undisputed definition of emotions. The American Psychological Association (APA) defines emotions as the complex pattern of reactions of an individual to an event or

60 See *ibid.*, p. 2 ff.

61 See Hagen, L. M., Au, A.-M. i. d., & Wieland, M. (2017). Polarisation on social media and the intervening effect of education: a study on the consequences of algorithmic media using the example of approval for Merkel’s ‚We can do it!‘ *Kommunikation @ Gesellschaft*, 18, 20. <http://www.ssoar.info/ssoar/handle/document/51503>.

62 See *ibid.*, p. 18 f.

63 „Measurements by Facebook in 2016 already showed that emotional posts achieved two to three times higher reach.“ See Roth (2016). 1.2 million posts with the new Facebook reactions evaluated: Emotional posts receive 2-3 times higher reach (Infographic. AllSocial.de, Social Media for Businesses, Starnberg, Rising Media Ltd, accessed on 13 March 2023 from <https://allfacebook.de/performance/reaktionen-reichweite-infografik>.; cited from Adelmund, 2021, p. 130).

64 „The neuromodulator norepinephrine is released during emotional arousal and influences memory regulation.“ „You can probably remember where you were when you heard about 9/11, but you probably don’t know where you were on 9/10.“ Cf. Hu, H., Real, E., Takamiya, K., Kang, M.-G., Ledoux, J., Huganir, R. L., & Malinow, R. (2007). Emotion Enhances Learning via Norepinephrine Regulation of AMPA-Receptor Trafficking. *Cell*, 131(1), pp. 160 - 173. <https://doi.org/10.1016/j.cell.2007.09.017>; quoted and translated from Adelmund, 2021, p. 140.

stimulus.⁶⁵ In psychology, there is only consensus on the components of emotional reactions: these are divided into physiological components (e. g. increased heart rate when afraid) and behavioural components (e. g. gestures or facial expressions). What is felt as a feeling is referred to as the subjective experience component.⁶⁶ Emotions also have a cognitive component, according to which they represent evolutionarily developed coping strategies⁶⁷ that are caused by an evaluation of events. Negative emotions are consequently the result of an evaluation of events that are inconsistent with an individual's goals or needs. If there is a prospect of being prevented from achieving one's own goals or needs, negative emotions such as anger, hatred, rejection or contempt arise.⁶⁸

Research from various perspectives suggests that basic/existential and security needs in particular are of central importance when it comes to a differentiated view of the development of emotions.⁶⁹ For example, it has been shown that a lack of satisfaction of these basic needs, compared to the other postulated needs, can explain greater variances in measured anxiety, depression and expressions of anger.⁷⁰ Threats, as depicted in extreme narratives or targeted disinformation, but also in sensationalist reporting, consequently trigger affective reactions that elicit feelings of fear and anger.

Research shows that these two feelings are closely linked and were already established as a common physiological

mechanism at the beginning of the 20th century as the fight-or-flight response.⁷¹

Both fear and anger are emotions that are triggered reactively by the perception of a threat. While the feeling of fear is attributed a preparatory function (e. g. provision of energy reserves), the feeling of anger concretises the preparation for a confrontation. Anger can be intensified by additional impulses of fear: experimental induction of feelings of fear has shown that this results in significant increases in anger.⁷²

Added to this are the social functions that can be attributed to these negative feelings, particularly from an evolutionary perspective, whereby they primarily serve as a signal function, enabling the group to respond to potential threats and dangers in the environment. For example, in „Intergroup emotions: Explaining offensive action tendencies in an intergroup context“, an experimental setting was used to show that group members who perceived their group as strong and collectively supported exhibited greater anger and a greater willingness to confront others.⁷³ The social-psychological effectiveness of fear and anger is also illustrated by the example of the „identity fusion“ approach:⁷⁴ According to this mathematically proven model, collectively perceived negative experiences strengthen the individual's bond with their group. The action-enhancing component of one's own threat – up to and including self-defence – becomes blurred with a threat to the entire group. Consequently, this leads to a greater willingness to take extreme steps, even to the point of self-sacrifice – interpreted as a form of self-defence.

From an evolutionary psychological perspective, the strong connection between fear and anger appears sensible and understandable as a coping strategy, and its escalating process can be vividly illustrated with the ana-

65 See American Psychological Association. (19 April 2018). APA dictionary of psychology. APA. <https://dictionary.apa.org/emotion>.

66 See Brandstätter, V., Schüler, J., Puca, R. M., & Lozo, L. (2018). Motivation and emotion. In Springer textbook. Springer. <https://doi.org/10.1007/978-3-662-56685-5>.

67 Lazarus, R. S. (1966). Psychological stress and the coping process. McGraw-Hill.

68 See Steele & Roseman (2022). Steele, A. K., & Roseman, I. J. (2022). Appraisals Associated with Interpersonal Negative Emotions: What Distinguishes Anger, Contempt, Dislike, and Hatred? *Psychology and Developing Societies*, 34(2), pp. 175 - 199. <https://doi.org/10.1177/09713336221115532>.

69 See, among others: Even though Maslow's hierarchy of needs (cf. Maslow, A. H. (1943). A Theory of Human Motivation. *Psychological Review*, 50(4), pp. 370 - 396. <https://doi.org/10.1037/h0054346>) has been little studied empirically and remains controversial in research, updates based on it also reinforce the outstanding importance of the basic levels (basic/existential and safety needs). See, for example, Wahba, M. A., & Bridwell, L. G. (1976). Maslow reconsidered: a review of research on the need hierarchy theory. *Organizational Behaviour and Human Performance*, 15(2), pp. 212 - 240. [https://doi.org/10.1016/0030-5073\(76\)90038-6](https://doi.org/10.1016/0030-5073(76)90038-6).

70 See Saunders et al. (1998). Saunders, S., Munro, D., & Bore, M. (1998). Maslow's hierarchy of needs and its relationship with psychological health and materialism. *South Pacific Journal of Psychology*, 10(2), pp. 15 - 25. <https://doi.org/10.1017/s0257543400000833>.

71 See Cannon, W. B. (1915). The utility of the bodily changes in pain and great emotion. *Bodily Changes in Pain, Hunger, Fear and Rage: An Account of Recent Researches into the Function of Emotional Excitement.*, pp. 184 - 214. <https://doi.org/10.1037/10013-011>.

72 See Zhan, J., Ren, J., Fan, J., & Luo, J. (2015). Distinctive effects of fear and sadness induction on anger and aggressive behaviour. *Frontiers in Psychology*, 6(725). <https://doi.org/10.3389/fpsyg.2015.00725>.

73 See Mackie, D. M., Devos, T., & Smith, E. R. (2000). Intergroup emotions: Explaining offensive action tendencies in an intergroup context. *Journal of Personality and Social Psychology*, 79(4), pp. 602 - 616. <https://doi.org/10.1037/0022-3514.79.4.602>.

74 See Whitehouse, H., Jong, J., Buhrmester, M. D., Gómez, Á., Bastian, B., Kavanagh, C. M., Newson, M., Matthews, M., Lanman, J. A., McKay, R., & Gavrillets, S. (2017). The evolution of extreme cooperation via shared dysphoric experiences. *Scientific Reports*, 7(1). <https://doi.org/10.1038/srep44292>.

logy of „feeling increasingly cornered“ or „the straw that breaks the camel’s back“. Particularly against the background that these negative feelings⁷⁵ are associated with increased memory performance (concept of enhanced consolidation) through activation of the nervous system⁷⁶ (arousal), the following key point emerges from a psychological perspective in terms of the specific research question: The gradual induction of feelings of fear, which particularly affect basic/existential and security needs, has a beneficial effect on bonding and intensifies feelings of anger.

This circumstance is supported by contributions from radicalisation research, which, through long-term observations, have been able to trace an increase in „anger“ reactions on relevant profiles, such as in the phenomenon

of right-wing extremism (cf. Figure 5).⁷⁷ Negative feelings are generally able to spread much more effectively than other emotions in the digital space and also reach new communities more easily.⁷⁸ This provides a further explanation for the efficiency of networking and influence by right-wing extremists in the digital space described above.

Through the gradual induction – and thus quantitative enrichment – of anticipated threats, fears were constantly appealed to, triggering increasing anger. Contrary to supposedly falsifying research on effects such as the „echo chamber“ or „filter bubble,“ it became apparent that shared media coverage in particular could generate the greatest resonance of anger and trigger the resulting reach effects.⁷⁹ The content of these articles appealed pri-

75 See, among others: McGaugh, J. L. (2015). Consolidating Memories. Annual Review of Psychology, 66(1), pp. 1 - 24. Sharot, T., & Phelps, E. A. (2004). How arousal modulates memory: Disentangling the effects of attention and retention. Cognitive, Affective, & Behavioural Neuroscience, 4(3), pp. 294 - 306.

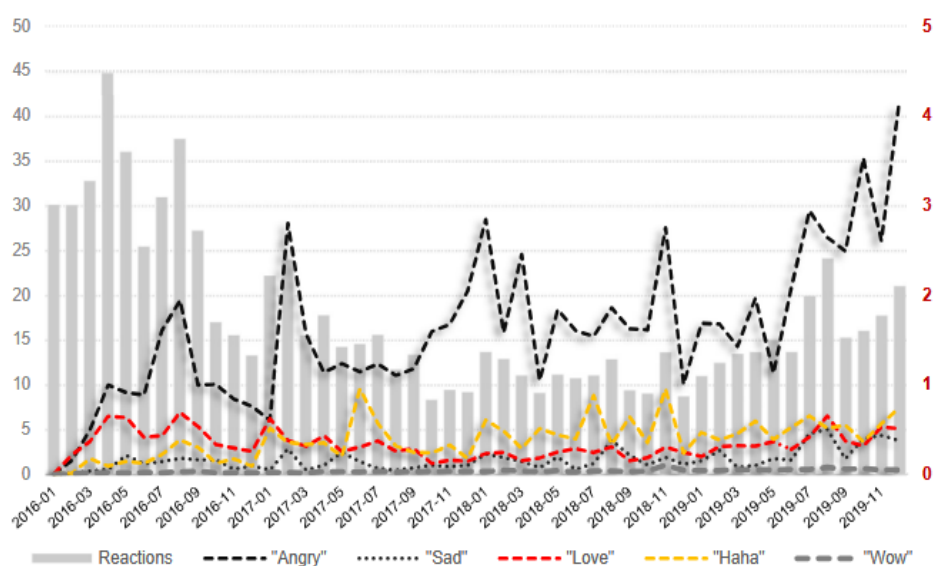
76 See, among others: Siebert, M. (2003). Amygdala, affect and cognition: evidence from 10 patients with Urbach-Wiethe disease. Brain, 126(12), pp. 2627 - 2637. <https://doi.org/10.1093/brain/awg271>. Ack, K. T., Hot, P., Patrick S.R. Davidson, & Talmi, D. (2017). How Emotional Arousal Enhances Episodic Memory. Elsevier eBooks, pp. 295 - 324. <https://doi.org/10.1016/b978-0-12-809324-5.21051-1>. Neurobiological evidence suggests that the amygdala plays an essential role in explaining this connection. In one study, patients who suffered from damage to the amygdala showed significantly reduced consolidation of emotional stimuli.

77 See Adelmund, M. & Conrad, M. (2024). Modern strategies for manipulating political opinion formation on social media platforms: How the party „Die Heimat“ (formerly: NPD) succeeds in influencing people. In M. Asche, L. Greuel, & T. B. Holland (Eds.), Liber Amicorum (p. 17). Verlag für Polizeiwissenschaft. p. 17.

78 See Fan, R., Xu, K., & Zhao, J. (2016, 11 August). Higher contagion and weaker ties mean anger spreads faster than joy in social media. ArXiv.org. <https://doi.org/10.48550/arXiv.1608.03656>.

79 See ibid. p. 18.

Figure 5 Average emotional responses per post by the right-wing extremist party „Die Heimat“ (formerly NPD; source: Adelmund, 2025)



marily to basic, existential or security needs and could be successfully exploited to reinforce relevant narratives. The symbiotic effects that can arise from this were examined using a standardised regression analysis, in which the sharing behaviour of corresponding media coverage on right-wing profiles was set as a dependent variable in relation to extended emotional reactions on Facebook. It was found that the emotional perceptibility of „anger“ within linked media coverage posts had a highly significant effect – many times greater than the other extended emotional response forms – on „sharing behaviour, reach and clicks“ (see Figure 5).⁸⁰

With regard to the broader spectrum of sources, the danger becomes clear at this point that an (albeit unintentional) interaction between media coverage and extreme aspirations – under the reach-oriented conditions of social media – leads to dangerous symbioses that promote radicalisation. The heterogeneity of the sources does not provide any grounds for falsification.

Furthermore, such content also affects people who feel defamed by it, either themselves or others. „This leads to both solidarity and segregation effects,“ triggering the same evolutionary psychological effects on the other side and thus promoting polarisation.⁸¹

In summary, the following interim conclusion can be drawn from a psychological perspective: Fear can be induced in the digital space by presenting a (even perceived) threat, especially if this affects basic, existential or security needs. Since prior and induced fear has bonding effects and intensifies the intensity of anger that arises later, constellations in which fear is initially generated and anger subsequently arises are particularly suitable for motivating collective, aggressive actions against an outgroup or person perceived as the cause, which are then perceived as serving the purpose of defence.

These functionalities of human emotions, which are firmly anchored in evolutionary psychology, form a danger

ous symbiosis with affect-oriented algorithmic regulation because they encourage the evocation of fears and the spread of increasing anger towards supposed enemy stereotypes (cf. Fig. 6).

4 Conclusion

As part of this study, a topic-focused summary theoretical overview was created, from which relevant factors for the emergence and consolidation of hatred within virtual environments were derived from common points of contact between affected interdisciplinary fields of research. This made it possible to present an overarching overview of the various stages of research on the topic of „humans and algorithms,“ which in turn made it possible to highlight important key points and needs in this regard while also conveying basic principles of media literacy and responsibility within virtual environments.

To this end, the theoretical framework of effects such as the „echo chamber“ and „filter bubble“ and their possible implications were first examined. The results of relevant research on online radicalisation were then compiled and reflected upon in terms of the insights that could be derived from them with regard to the state of research on the anticipated effects of virtual conditions. From this, specific social and evolutionary psychological factors were derived that offer an explanatory approach as to why the symbiosis of „humans and algorithms“ has a favourable effect on the emergence and/or consolidation of „online hate“.

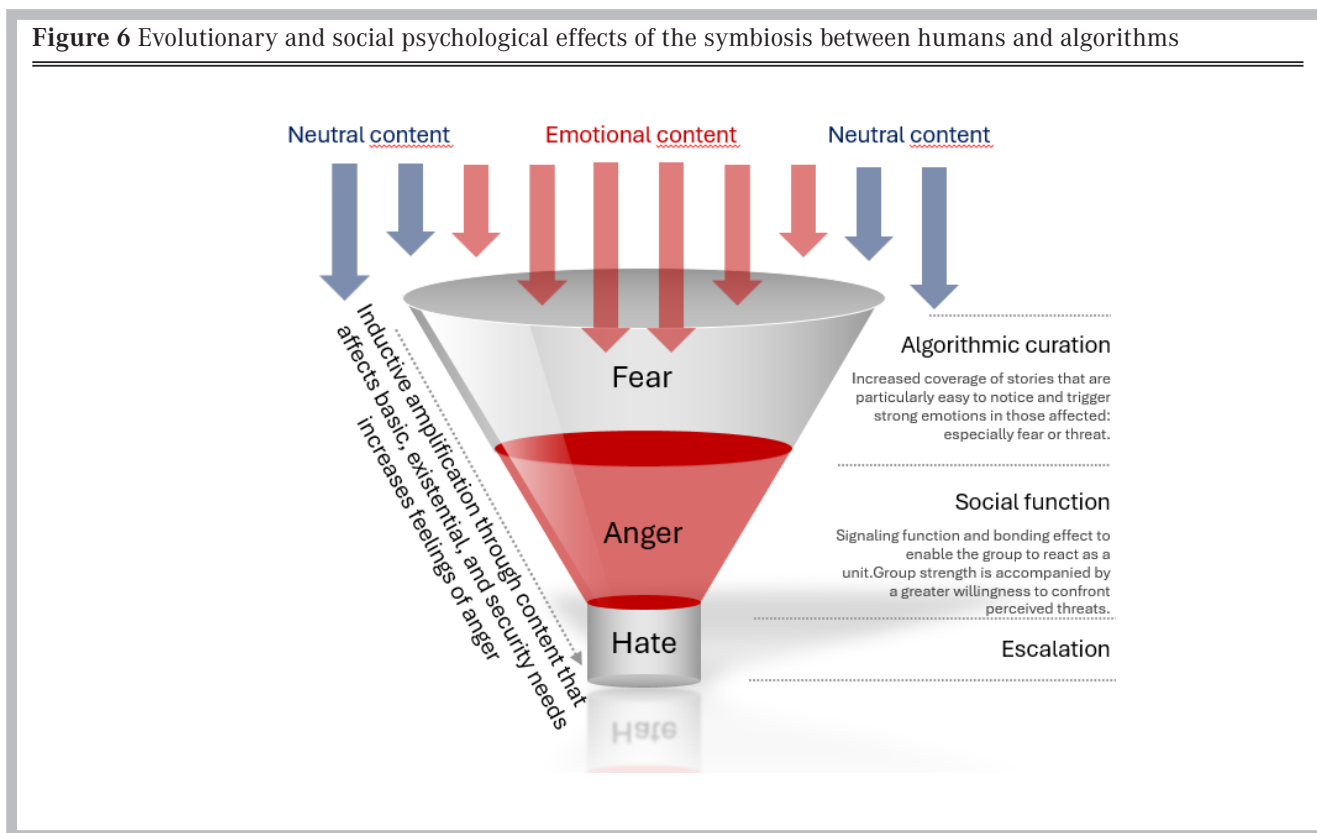
In summary, the interaction between „humans and algorithms“ creates the risk that the goal pursued on social media platforms of „to increase dwell times and generate advertising revenue“ is accompanied by an affect-oriented algorithmic connection of entities from evolutionary and social psychological factors, which results in an „inadequate prioritisation of information“,⁸² thereby increasingly promoting fears in socio-political terms, channeling anger towards enemy stereotypes and undermining democratic substance.

⁸⁰ See Adelmund, M. (2025). Modern right-wing extremism as a challenge for democratic security architecture. New approaches to combating extremism in social media with computational criminological science. Verlag für Polizeiwissenschaft. p. 86.

⁸¹ See Adelmund, M. (2021). Radicalisation in the age of digitalisation. Data science approaches to effectively combating extremist threats from social media. In A. Pfahl-Traughber (Ed.), Yearbook for Extremism and Terrorism Research 2019/2020 (I) (pp. 127 - 169). Federal University of Applied Administrative Sciences. p. 152.

⁸² See National Academy of Sciences Leopoldina, acatech – German Academy of Science and Engineering, & Union of German Academies of Sciences and Humanities. (2021). Digitalisation and democracy. https://www.leopoldina.org/uploads/tx_leopublication/2021_Stellungnahme_Digitalisierung_und_Demokratie_web_01.pdf, p. 4.

Figure 6 Evolutionary and social psychological effects of the symbiosis between humans and algorithms



It has become apparent that assessments of this danger, which were primarily based on a supposed diversity of sources in relevant communities, were too short-sighted and also underestimated the digital transformation in press reporting and its effects. On the contrary, there are signs of an additional amplifying effect here, because affect-oriented algorithmic distribution and media reporting – financed by online advertising – interact and thus encourage extremist instrumentalisation.

With regard to the fragmentation predicted by Sunstein and Pariser, it should be noted that a heterogeneous spectrum of sources tends to lead to a defragmentation of content in the form of „pro and, above all, contra impulses“, which gradually induce similar fears and concerns – especially with regard to basic, existential and security needs – and thus increasingly fuel anger.

In summary, this explanatory approach not only explains the indicative potential effects of virtual atmospheres perceived as aggressive, increasing hate speech and PMK/hate crime, the electoral successes of extreme parties, and the global erosion of democratic substance.

It also provides approaches that can be used to shed light on growing scepticism or loss of trust in state institutions or government representatives, as well as the emergence of conspiracy myths, from a broader perspective, rather than limiting them to the success of disinformation or misinformation posts, which also benefit from these conditions.

Against this backdrop, concerns about the consequences arising from the symbiosis between „humans and algorithms“ are justified: the phenomenon of right-wing extremism in particular is taking on a new dimension, as the effect of this „connecting anger in social media“⁸³ affects national fears and concerns and therefore impacts particularly large populations.

⁸³ See press conference held by the Senator for the Interior of the Free Hanseatic City of Bremen on 12 February 2018 (see State Office for the Protection of the Constitution in Bremen. (2018). Lecture: Michael Adelmund; quoted from Michel. (2018).

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