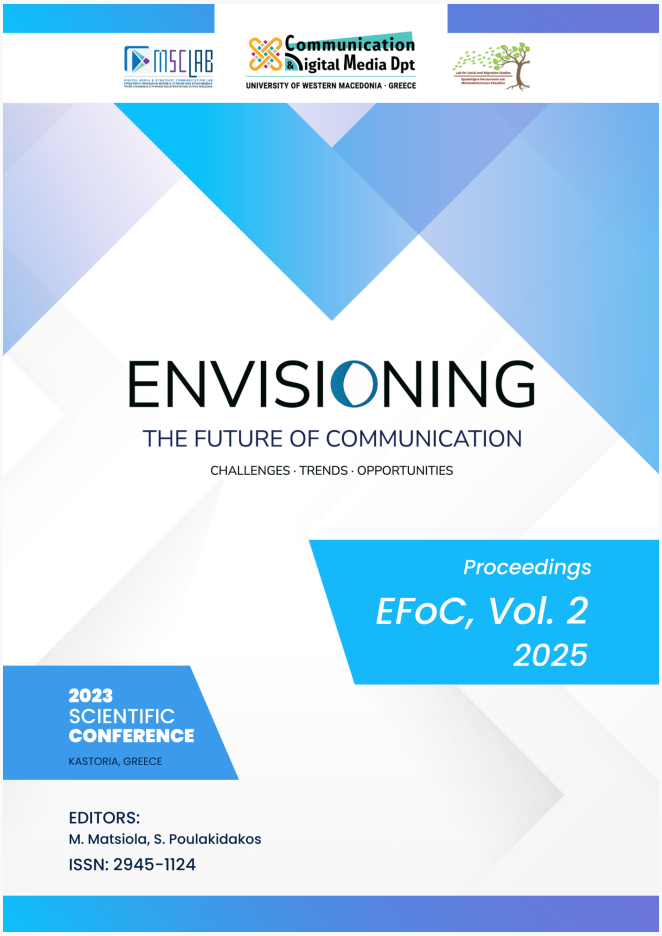
Envisioning the Future of Communication

Vol 2, No 1 (2025)

Envisioning the Future of Communication - Conference Proceedings vol. 2



Artificial intelligence in journalism

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doi: 10.12681/efoc.7907

Artificial intelligence in journalism: The new era in news and communication

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Abstract

This article examines the impact of algorithms and artificial intelligence in journalism. Firstly, it attempts to define and explain what we call robot journalism or automated news content creation. Also, this article tries to define and explain the use of artificial intelligence in the creation of news content in journalism. It emphasizes the utilization of these developments in journalism, the creation of news content by algorithms, what we call robot journalism as well as the use of artificial intelligence in journalism. In addition, it presents the positive and negative effects of this use and the consequences of the use of algorithms and artificial intelligence in journalism. Moreover, the article presents the consequences of the use of algorithms and artificial intelligence in the labor relations of journalists. Furthermore, it describes the ethical problems that exist, the efforts that must be made in general as well as all the challenges and risks that derive for newsrooms, editors, journalists and the citizens. The article uses surveys in order to explain all the above and finally examines all the aspects of the use of algorithms and artificial intelligence in journalism.

Keywords: Journalism, robot journalism, algorithms, artificial intelligence, journalists' avatar, ChatGPT.

Introduction

We live in a new era, the era of technological developments, which are particularly rapid. They take place at a speed that no one could have imagined, especially before the discovery of the internet, which Leandros (2005) considers to be of equal importance to the discovery of printing. Moreover, they have significantly influenced the media industry worldwide, changing the nature of journalism and information and shaking the hierarchy that already existed. The changes are fundamental and journalism has changed a lot. The journalist no longer has exclusive access to the information. Their role in the information chain is changing in a way that is being questioned, while researchers in the field, such as Fulton (1996), Rottwilm (2014) and Singer (1998), state that new media technologies challenge one of the most fundamental "truths" in journalism, that the journalist is the one who determines what the public knows about the world. Researchers such as Anderson, Bell and Shirky (2014) called this new landscape that has been created in journalism "post-industrial journalism" and, according to them, this means that the entire organization of the profession has changed. All the above show

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that there is a new landscape in journalism, which is not only redefining the profession of the journalist. This new landscape also requires the acquisition of new skills, both for existing and new journalists, in order to be able to respond to the demands of the new era and the transformation process of the media industry on a global level (Leandros, 2011; Picard, 2015).

All the above are drastically changing the ecosystem of information. In this new ecosystem, there is a big change and a huge challenge for journalism, which is called Artificial Intelligence (AI). According to Mitrou (2023), AI is the technology that allows computers to do things that require intelligence, when performed by humans. Also, AI is a collection of ideas, technologies and techniques that relate to a computer system's capacity to perform tasks normally requiring human intelligence (Brennen, Howard & Nielsen, 2018).

Artificial Intelligence appeared in journalism in 2014, but got a big boost with the discovery of ChatGPT, in 2022. A new term that is used after the discovery of ChatGPT is Generative AI, which is a sub-field of machine learning that involves generating new data or content based on a given set of input data. This includes generating text, images, code or any other type of data. Typically, genAI uses deep learning algorithms in order to learn patterns and features in each dataset and then generates new data based on the underlying input data (Foy, 2022).

Methodological approach

The methodological approach of this article was based on the use of qualitative research methodology, such as literature review and the use of secondary data from the internet. In particular, studying a field under constant and rapid transformation, it was deemed appropriate to investigate its current state through the presentation of applied examples of AI in media organizations.

Therefore, the following methods of collecting and generating qualitative data were used in combination:

- literature review through primary sources: books, journal articles, industry studies and surveys

- extensive collection, processing and analysis of secondary data from the internet: information material, articles, applied examples, reports

Through a systematic and updated literature review as well as the use of secondary data from the internet, this article aspires to document the current state in the field of journalism with the increasingly systematic use of AI tools, to highlight the important effects of AI and the challenges faced by media organizations. Essentially, this article aims to serve as a reference framework for building, in the near future, applied research in the field of media in the AI era.

Robotic journalism

The evolution of the internet and of new forms of media has resulted in a very important development in journalism, the production of news content without human mediation.

Automated journalistic content or robotic journalism (robot journalism) or algorithmic journalism, as it is called, started from sports and financial reporting (Clerwall, 2014; Gunter, 2003; Lecompte, 2015). It has now expanded to a wide range of reporting and it is used by many major media organizations resulting in a very big change in the journalism ecosystem (Triantafyllou, 2020).

There are two forms of robotic journalism: the first form, in which the journalist enters structured information and the algorithm produces the article based on a template, and the second form, in which natural language processing (NLP) is used and the article is algorithmically produced from unstructured information. News generating software usually uses predefined phrases to generate the news. There are, in fact, companies that deal with this subject and that cooperate with the media[1]. (Albeanu, 2016c & 2016d; Clerwall, 2014; Lecompte, 2015). According to Anderson et al (2014), scientists claim that, in the future, 80% to 90% of the news will be generated algorithmically, which will probably mean the loss of jobs in the media sector (Triantafyllou, 2020).

As Veglis (2015, p. 3,4) typically states about automated journalistic content: "In the near future, the following scenario no longer seems so fantastic: A car is moving on a dark road. Suddenly, a big cow crosses the road. The driver does not have time to react and hits the cow at high speed. The car, which is equipped with a modern collision detection system and a GPS unit, sends information about the collision to the relevant authorities. At the same time, information about the crash is collected by a news service and in a few seconds a short story is created and distributed to the contracted online newspapers. In online newspapers, Content Management System (CMS) decides that the particular story will attract the interest of the readers and forwards it to the online editor with a proposal for the position in which the news should be placed. The latter approves of the news that appears in the online newspaper. Automated content is part of algorithmic news, related to SEO (Search Engine Optimization) techniques, and news related to internet searches (articles based on popular searches on Google, Bing, etc.). News which is produced by an algorithm is not concerned with what the public should know in order to make good decisions and behave as proper citizens in a democracy, but with what the public, at a given moment, appears to want to be informed about (and thus the public is treated as a consumer and not as "citizens").

Automated journalistic content, however, is not much different from the one produced by journalists, and readers can hardly tell the difference. In a survey conducted in 2013 among journalism students in the USA concerning texts written by humans and by computers without human mediation, it emerged that in some categories the human factor prevails, while in others the computer (algorithm), and the conclusion finally was that there are no major differences between human-generated content and algorithm-generated content.

[1]One of these companies is Wordsmith (https://automatedinsights.com).

17 students from a website production program and 46 media and communication students took part in the survey. They were assigned to read a recap of an American football game (rugby, NFL), either written by a journalist or generated by software, and then they were asked to rate the text using several variables (Clerwall, 2014). Research in the Netherlands and in Denmark had exactly the same results and showed that for texts written by a computer, readers thought they were written by a human. This somehow suggests and confirms that the quality of automatic texts is on a par with human texts, at least for routine news, which also leads to human-machine collaboration. The role of the computer will be to analyze the data, find interesting stories and provide a first draft and material about a topic, which journalists can then enrich with in-depth analysis and interviews (Triantafyllou, 2020).

For example, in the USA, a relevant program has been launched in polls. The bot (algorithm) writes the typical story about the poll, i.e., the results, the sample size, who took it and when. It also compares it with other polls and afterwards the political conclusions are drawn by journalists and the analysis is taken over by them. In these cases journalists are greatly assisted by machines, which cannot replace commentary, research and very significant events (Graefe & Haim, 2016).

The Associated Press is one of the media pioneers in the use of robotic journalism. They were initially involved in funding research programs of automated news content production systems and, in 2014, they started using them (Beaujon, 2014; Sawers, 2016; Weber, 2014). In collaboration with the Automated Insights Company, they use Wordsmith news platform to produce automated news. They have their own algorithm, programmed to write in the style of the Associated Press. At the end of each report written by the algorithm, there is a related note that indicates it and makes it clear. The AP now makes extensive use of this system, which is able to produce about 4,400 reports a quarter. Thus, they cover a wide range of facts validly and quickly. They also cover sports events, such as all US baseball leagues, i.e., 142 teams in 13 divisions and 10,000 games per year. Because of their baseball coverage with automated journalistic content, the AP also announced that they hired their first automation editor in 2016 (Holmes, 2016; Mullin, 2016; Sawers, 2016; Triantafyllou, 2020).

Among the pioneers in the use of robotic journalism is the Washington Post. They make extensive use of algorithms in their online edition, especially in the coverage of important events, as was the case of the Rio Olympics, in August 2016, and the presidential elections of the USA, in November 2016. These two events were covered by the Washington Post with the help of the Heliograf algorithm that was manufactured by themselves (Albeanu, 2016d; Hare, 2016; Triantafyllou, 2020).

The use of an automated system can provide extremely high speeds in the coverage and publicity of events and this is one area in which machines can do better than humans, while also offering cost reduction (Anderson et al, 2014). Norwegian News Agency covers a lot of football games every weekend and the text of the game is published 30 seconds after the end of the

match. In this way, the number of matches covered is constantly increasing, while the texts are well written, accurate and with rare errors, since the system never makes the same mistake twice and all this happens with the help of the algorithm and without human intervention (Albeanu 2016c; Triantafyllou, 2020).

The English newspaper The Telegraph, in its online edition, uses a form of automated content in order to generate an instant graphic called Roboblogger, which started with rugby and extended to football. It is an animated graphic created directly by feeding the algorithm with specific data for which, in fact, The Telegraph received €300,000 in funding from Google's European Digital News Initiative to experiment with and then use (Lichterman, 2016; Southern, 2016; Triantafyllou, 2020).

Bots[2] are also a part of robotic journalism, i.e., "intelligent" computer programs that provide news content and other services through chat with users generated by algorithms. There are two forms of bots, those guided only by a computer with algorithms without human intervention and those guided by both a human and a computer. With chat bots, as they are called, users can constantly access news and perform other actions, such as calling a taxi or finding food recipes. News bots, in particular, produce content either by automatic renewal through a social media account, every time they receive a new update (new news), or by answering user queries on specific topics. Facebook widely uses this innovative technology on Facebook Messenger platform, while bots are used by Skype, as well as by several media, such as CNN, The Wall Street Journal, The Economist, the BBC and The Guardian (Albeanu, 2018; Newman, 2017; Triantafyllou, 2020).

Artificial Intelligence

Artificial intelligence, the use of which is now widespread in journalism, can be characterized as the evolution of robotic journalism, which in part, as we have mentioned, is based on artificial intelligence. With the help of artificial intelligence in addition to content production, there are now virtual news anchors on TV. This is a shocking development, which has created a new reality.

News organizations, such as China's Xinhua News Agency, have built such robot news anchors. Xinhua built and displayed, for the first time in April 2018, with the help of a computer, the simulation of one of the news anchors, an avatar, which has the same movements and speech as the journalist used. The similarity with the real journalist is such that, even in this case, one would hardly be able to tell the difference (Newman, 2019). In November 2018, the Chinese news agency Xinhua produced a second news anchor, this time a woman, and today they have increased their virtual news anchors. Xinhua has been experimenting with artificial intelligence for years. In 2017, they introduced a robot called Inspire that was working experimentally at

[2] The word bot comes from robot.

the agency. This practice is now followed by several television stations and websites around the world (Triantafyllou, 2020).

Recently, artificial intelligence took a very big leap with the discovery of ChatGPT. ChatGPT (Generative Pre-trained Transformer) is a chatbot that was released by OpenAI, in November 2022, and seems to be changing the landscape with detailed answers, which are provided in many fields of knowledge, despite the fact that the application also provides incorrect answers. ChatGPT has already been tested on a huge body of text data and can perform a variety of natural language processing tasks, such as answering questions, translating languages and summarizing texts. It is designed to be highly flexible and capable of understanding and producing text in a wide range of styles and formats. It has been used in various applications, such as customer service chatbots, language translation and text-to-speech systems and it is expected to become a game-changer in journalism as well as in news content production.

According to WAN-IFRA (2023), generative AI is not a new technology. In fact, it has been used since 2014 in some form and as from November last year, OpenAI, the founder of ChatGPT, decided to release a test version of the chatbot for the public. It was admittedly a last resort for the company to see how users might interact with the tool after numerous setbacks over the previous year. Within five days of the release, ChatGPT already had 1 million users; after 100 days, 100 million – making it the fastest-growing consumer application ever, according to a number of sources (WAN-IFRA, 2023).

Some of the leading tech minds in the world and, most particularly, in the media have heralded Generative AI as THE next-generation technology. For publishers, it seemingly offers great potential for workflow efficiencies, text creation, correction, search/research, translation – things that most claim will free up journalists and editors in order to focus on producing core, quality content, but also improve along the way. Moreover, it offers opportunities in personalization but, on the contrary, Generative AI, particularly chatbots, present a number of questions, challenges and serious concerns. However, it is developing rapidly. Mistakes have already appeared. Essentially, the tools need to "learn" more and more, and they also need to be tested repeatedly – both by the creators behind the technology and those on the frontlines, like publishers experimenting with them. The prevention of the spreading of misinformation, data privacy, regulation –cases just like those, for example with social media, for which we continue to litigate– are even more at play with GenAI (WAN-IFRA, 2023).

According to a survey of WAN-IFRA[3], which took place in 2022, 70% of the respondents recognizes artificial intelligence as a useful tool for journalists and newsrooms. 49% of the respondents of the survey says their newsrooms are already using tools like ChatGPT and 51% claims they do not do so, which is a clear indication of the fact that publishers view the technology as a very important component, since it came onto the scene in the latter half of 2022. On the other hand, it shows the caution that many newsrooms are demonstrating with

[3]See the full survey: https://wan-ifra.org/insight/gauging-generative-ais-impact-in-newsrooms/

such nascent, evolving (disruptive) tools that still entail many questions (and real concerns). Nevertheless, the quick adoption of this technology shows how the old aircraft carrier analogy of traditional news organizations adopting or recognizing critical trends has sped up significantly (WAN-IFRA, 2023).

According to the same survey, most newsrooms recognize the supportive role of Generative AI tools. The tools are considered an important way to increase productivity and efficiency in a number of processes. A number of newsrooms is already working with Generative AI to create summaries and bullet texts. One could argue that this function reflects both content creation (quality improvement) as well as workflow help (supportive). 39% of respondents sees the use of AI as such. 50% acclaims the purely supportive role of these tools for newsrooms. 8% considers them indeed a quality improvement.

Furthermore, with all the varied types of content, journalists and editors need to produce different platforms today. Text summaries/bullets seem a logical and practical use of tools like ChatGPT, as it can learn from a text a journalist wrote, as opposed to the riskier version of asking it to write a summary about "Joe Biden's speech to the Congress,". 54% of the survey participants is doing just that. More than 40% also uses it for simplified search/research, correcting texts and improving workflows (WAN-IFRA, 2023). While respondents rated text creation as the most useful role of GenAI tools (63%), newsrooms are clearly promising in the areas of workflow/efficiency, translation and personalization for further development – compared to the actual usage so far. 61% rated workflow/efficiency as an area where GenAI can help the most. In fact, 43% of the newsrooms already uses the tools for this purpose. While "translation" is considered valuable by 51%, only 32% says they have used tools in this domain so far. 42% sees potential in extra personalization, but only 19% in usage. For the highly rated text creation, 54%is already active in this area (WAN-IFRA, 2023).

Effects and risks

However, the use of algorithms in journalism as well as in social media, which use them widely, and the use of artificial intelligence in general, is something that raises many questions as to the effects they may have. There are three main issues that need to be discussed: the professional, the moral and the political dimension; in addition there are issues that touch on democracy itself.

The involvement of Facebook, a widely used social network that uses an algorithm, in electoral processes, such as the 2016 US presidential elections and Brexit, as it emerged from the Cambridge Analytica scandal, has raised a huge question, concerning whether it can influence the vote of part of the electorate by the use of such systems. The Cambridge Analytica scandal showed that the danger is real and, in particular, that the danger for the democracy is becoming even greater. The scandal involving the data analysis company Cambridge Analytica has long been at the forefront of global news since March 2018. The company was accused of violating the personal data of millions of Facebook users in order to influence their final vote. A second

key issue arising from the use of algorithms has to do with the loss of jobs and the exclusion of journalists from producing news content. It seems that until now in the media where these systems are used, their role is auxiliary and complementary to the work of journalists, who are free to do in-depth journalistic work; this could be the most optimistic view and development. The Washington Post makes extensive use of algorithms in their online edition and especially in their coverage of major events, such as the 2016 Rio Olympics and the US presidential elections in the same year. The model implemented in the Olympics, in August 2016, had to do with the fact that the results and graphics were produced by their own Heliograf algorithm and in this way, as the newspaper officials reported, liberated journalists who had more time at their disposal to engage in reporting, research, interviews and in-depth coverage of the Games (Albeanu, 2016d).

The Rio Olympics served as a test event for The Washington Post concerning the coverage of the November 2016 US presidential elections, which, –along with the campaign period,– were covered for the first time in their history with automated content, using the same algorithm. The coverage was realized in a similar way as in the Olympics; the algorithm produced the graphs and figures of the polls and then the electoral contest in a continuous stream and in cooperation with the Associated Press and the journalists did the analysis and reporting (Hare, 2016). In the same way, the British news agency Press Association started using algorithms. On October 18, 2016, the launch of bots (automated content) was announced along with the fact that they would not replace journalists, but would cover statistics on sporting events and election contests (Ponsoford, 2016).

However, the latest developments, especially after the expansion of artificial intelligence in the media, are not auspicious. The German newspapers Die Welt and Bild, owned by Germany's largest publishing house, announced in the first months of 2023 large staff cuts due to the use of artificial intelligence. The two newspapers are set to replace several journalists with artificial intelligence systems and this is indicative of the great risk concerning jobs from using these systems.

So, it seems that algorithms can produce fast and reliable journalistic content, and one thing they can certainly do better than humans is produce large amounts of data at high speeds. However, traditional as well as new forms of media need journalists, because they can do something that machines can't. Journalists can research, report and analyze the facts in depth (Anderson et al., 2014; Lecompte, 2015).

On the other hand, of course, Van Dalen (2012) states that journalists are concerned about the use of automated content, because this can be a very good reason for media organizations to reduce labor costs by laying off journalists, who will no longer be needed. And, also, because it can deprive them of their usual journalistic duties (Clerwall, 2014). The predictions for the use of robots in the labor market, in general and not only in the media, are not favorable. Oxford University research reports that in the next two decades in the US, 47% of workers will lose

their jobs due to the use of robots (Newman, 2017). Whether and to what extent these predictions will be verified is unknown, although beyond the predictions there are already the first examples of layoffs. In the summer of 2016, Sky News fired 50 employees (technicians, cameramen) from the studios, due to the fact that they started using robotic cameras (Karabini, 2017; Sky News, 2016).

The Confederation of European Trade Unions, in which the European Federation of Journalists (EFJ) also participates, adopted a resolution in June 2016, according to which reference was made to the use of robots at work. With this resolution, European unions called on the European Union to take measures and establish the necessary framework to avoid mass redundancies due to the digitization of work (EU must actively shape digitization, 2016).

A resolution on the impact of robotics on the labor market was also adopted by the European Parliament on February 16, 2017, according to which the European Commission was asked to consider the establishment of pan-European rules for the spread of robotics and artificial intelligence and the possibility of creating a European organization that will provide the necessary know-how and expertise in regulatory and ethical matters to support the relevant public bodies on the EU level (Robotics & Artificial Intelligence, 2017).

In addition to the work aspect, the ethical and political dimension of the use of algorithms enter the discussion. On March 8, 2017, experts from the European Federation of Journalists (EFJ) met in Brussels with robotic journalism expert Laurence Dierickx to discuss and learn about all dimensions of the use of algorithms in journalism. In this meeting, the ethical dimension of the use of robots in journalism was examined and it was mentioned that one of the issues that scientists and companies that use robot journalism do not take into account is the ethical one, that is, in articles produced by algorithms there is no mention that they are written by computers, which may cause confusion to the readers, while raising issues of liability, intellectual property and transparency (European Federation of Journalists, 2017).

Laurence Dierickx also said, at the meeting with EOD experts, that robotic journalism is a reality that is constantly evolving around the world and across the spectrum of journalism and gave the example of China, where robots are even replacing TV presenters. The expert in automated content production told EOD members that robotic journalism should not be seen as a threat for traditional journalism, as its use allows journalists to spend more time doing in-depth research. The two sides agreed on the need to train journalists in robot journalism and dialogue between journalists with scientists and companies that use algorithms, in order to have transparency and define a standard of ethics that will govern their use (European Federation of Journalists, 2017).

Another risk that emerges from the use of these systems is the changing role of the journalist and substitution. According to the WAN-IFRA survey, artificial intelligence has often been associated with replacing human jobs or tasks. In fact, 38% of the survey respondents claimed that job security was one of their major concerns. Most management staff and experts have

argued that this will not be the case in the newsroom; however, the point on which most agree is that job roles and responsibilities will likely change with the increased use of GenAI. A full 82% said the roles will change slightly or significantly, while 45% said that they will change significantly. Only 14% assumed that the roles will not change. We have already seen that some publishers have introduced AI roles, but it is easy to imagine that roles concerning copying/editing/proofreading will change (WAN-IFRA, 2023).

Also, in the survey of WAN-IFRA, there has already been a number of cases reported, in which publishers used some form of artificial intelligence to produce content and the mistakes the tools made went unnoticed and were published or user-generated content went awry, i.e. hoaxes. So, it is not surprising that respondents overwhelmingly chose inaccuracies (85%) as their top concern. Plagiarism also was rated as a top concern followed by data protection and privacy issues, which is where, again, regulation will play a vital role. It is possible that the lack of clear guidelines will lead to uncertainty and potentially insufficient control. The development of clear policies, staff training and open communication around the responsible use of Generative AI tools should therefore be a priority (WAN-IFRA, 2023).

According to Reuters (2023, p. 32), the rapid growth of these "distributed" platforms in the first part of the twenty-first century was initially accompanied by excitement and enthusiasm, but over time it transformed into concerns about possible negative effects – first expressed by the speculative notion of "echo chambers", some years later, "filter bubbles", and, more recently, the spread of misinformation. To measure people's attitudes towards algorithmic news selection, the survey of Reuters (2023)[4] asked respondents whether they agree that "having stories automatically selected for me on the basis of 'what I have consumed in the past' or 'what my friends have consumed' is a good way to get informed?". To help interpret the results, we also asked respondents a similarly expressed question about news selected by editors and journalists. The headline results reveal that audiences are quite skeptical about all these ways of selecting news. Just 19% across all countries where these questions were posed agree that having stories automatically selected for them on the basis of what their friends have consumed is a good way to get informed, with 42% disagreeing. People have a more positive view of automatic selection based on past consumption, but just three in ten (30%) agree it's a good way to get informed – with equal numbers disagreeing. Perhaps surprisingly, this is slightly more positive than people's views of news selection by editors and journalists (27%). People are clearly quite skeptical of all forms of news selection, whether done by humans or by algorithms – something we have referred to in the past as "generalized skepticism" (Fletcher & Nielsen 2018). Part of the reason we refer to this skepticism as "generalized" is because people's views on all these methods of news selection are fairly strongly correlated, meaning that people tend to have a similar view on all three. If someone thinks that editorial selection is a good way to get informed, they usually think the same about algorithmic selection – and vice versa. Journalists, academics, and industry observers, often with good reason, tend to see these

[4]Digital News Report 2023, https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2023

selection methods as being contrary to one another – but it is important to recognize that audiences do not think about the issue in this way.

According to Reuters (2023, p. 33), if we compare these results to those from the same questions in 2016, we can see that people's views on the issue have not changed much in the last seven years – at least at the headline level. Averaging the data across the same set of countries, we see there has been a 6 percentage point fall in the proportion that think their past consumption is a good basis for automated news selection, and a smaller 3pp fall in the approval of editorial selection and social recommendations. It is important to note that the proportion which does not think these are good ways to get informed has remained stable, with 4–6pp increases in the middle "neither agree nor disagree" category. This suggests that approval has turned into ambivalence – but ultimately these are small changes, especially considering the seven-year gap and everything that has happened in between. As ever these averages mask variation at the country level. The report shows that the UK, Denmark, and Hungary have the lowest levels of approval for both types of algorithmic news selection, whereas in Spain, South Korea, and Brazil approval is almost twice as high. Although it's not immediately clear, there is a small number of high-trust, newspaper-centric countries in Northern and Western Europe –such as Austria (33%), Sweden (30%) and the Netherlands (34%)– where the figures for editorial selection, though still low, are slightly higher than those for both types of algorithmic selection. Australia is something of an outlier, as it is the only country where approval has risen across the board. In some countries, such as Canada, Brazil and the UK, the changes from 2016 are relatively large – especially for news selected by algorithms on the basis of past consumption. However, although the downward trends are fairly consistent, in many cases the falls are of 3pp or less and not statistically significant. And we must always bear in mind that in most cases approval has been replaced with ambivalence.

Conclusions

The developments in the production of news content without human mediation are rapid. The steps that have been taken in recent years are very important and this is the purpose of this article, to record these developments, and, at the same time, to record the positive and negative effects of the production of news content without human mediation.

The ways in which this production is effected are the so-called robotic journalism or algorithmic journalism or the production of automated news content. This way of producing news content should be divided into the first form, in which the journalist enters structured information and the algorithm produces the article based on a template, and the second form, in which, using natural language processing (NLP), the article is algorithmically produced from unstructured information. News generating software usually uses predefined phrases to generate the news. In recent years, the production of news content without human intervention has evolved considerably with the use of artificial intelligence, which is now widely used in the news industry. With the help of artificial intelligence in addition to content production, there are now

virtual news anchors on TV. This is a shocking development, which has created a new reality in the media. This new situation obviously creates a new landscape with positive and negative effects.

The use of algorithms in journalism, but also in social media, in which they are widely used, and the use of artificial intelligence in general, is something that raises many questions as to the effects they may have. There are three main issues that need to be discussed: the role of algorithms and artificial intelligence, the labor issue of job losses that are at great risk, the ethical issue of being clear about who is producing the content and the political dimension, in which questions concerning democracy itself are raised. Another risk that emerges from the use of these systems is the change of the role of the journalist and his replacement, which is part of the labor issues, but is broader, since the change of the role of the journalist in the production of news content entails risks in terms of the manufactured product. Finally, society's acceptance of these news content production systems is no longer as great as it once was, when they first started and became widely known.

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