We and AI
Living in a Datafied World: Experiences & Attitudes of Young Europeans

August 2021

Weizenbaum Institute for the Networked Society – The German Internet Institute

Dear Readers

Digital technologies are characterized by a high degree of complexity. The consequences of their use are often difficult to anticipate. For this reason, we need research that accounts not only for the technical side but also for the social side and explores people's expectations, perceptions, and knowledge related to digital technologies such as artificial intelligence. We are proud to present in partnership with the Goethe-Institut the following report on the project "Generation A=Algorithm – Reflecting on Artificial Intelligence."

The Weizenbaum Institute for the Networked Society is a consortium of seven partner organizations—five universities and two non-university research institutions—from Berlin and Potsdam. We are doing research in the spirit of Joseph Weizenbaum (1923–2008), who was not only a computer science pioneer but also one of the first critics who analyzed the impact of computers on society. He warned against believing in the omnipotence of computers and emphasized that digital technology can be designed in a way that contributes to individual and collective self-determination.

The institute is funded by the Federal Ministry of Education and Research. We have excellent conditions for conducting fundamental, interdisciplinary, and long-term oriented research on the digitally networked society. Currently, around 160 scientists work in 21 research groups at the Weizenbaum Institute. They come from many different disciplines: social sciences, economics, law, design research, and computer science.

In the light of the critical research into digitalization, this survey's results document the uncertainty and ambivalence that young people have with regard to artificial intelligence. The concluding recommendations, which are addressed to education institutions and political decision-makers, call for more self-determination and participation of citizens. I hope that the results of the study and these recommendations will receive the attention they deserve.

Prof. Dr. Christoph Neuberger
Managing Director /
Weizenbaum Institute for the Networked Society

Dear Readers

Artificial intelligence (AI) is a key technology of the 21st century that is deeply impacting our societies and will decisively influence future developments.

Through its many projects around the world, the Goethe-Institut is shedding light on the changes that the automation of our lives will bring and how each and every one of us can influence them. It aims to offset resignation toward digitalization and dystopian scenarios when considering AI developments not only with critical perspectives but with positive narratives as well.

For instance, 250 developers, creatives, and researchers from 24 European countries participated in a hackathon to develop innovative AI solutions to help tackle the climate challenge. In the dialogue series "EU Digital Futures," artists and researchers discussed the future design of AI applications in Europe. In addition, the fellowship program "The New New", realized in collaboration with the Bertelsmann Foundation, supports young activists in the creation of digital tools for the public good. All three formats are part of the project "Generation A=Algorithm," which aims to sensitize young adults across Europe to the risks, challenges, and opportunities of AI. As part of this project, we have also created a survey with the Weizenbaum Institute that focuses on the fears and hopes of young Europeans regarding AI applications and will serve as a reference for the Goethe-Institut's further engagement with technological developments in this field.

"We and AI — Living in a Datafied World: Experiences & Attitudes of Young Europeans" highlights the imperative to better prepare a young generation for a life shaped by algorithms and to take the discussions on AI to broader sections of society. It also demonstrates that even "digital natives" underestimate the dangers of digital data collection and analysis. And it points out that young people often find information in social media satisfactory, even though it is now known how the "echo chambers" resulting from sorting algorithms can endanger democracy.

The opportunities offered by AI applications must always be critically examined and, if necessary, regulated. They should be guided by values such as the rule of law, human rights, and democracy. This will be difficult to realize, however, as long as power is in the hands of a few high-tech corporations. In addition to educators, politicians are therefore also called upon to shape the use of AI transparently, sustainably, and in the spirit of European values and norms. It is to be hoped that young people's engagement will soon no longer be limited to the demand for a necessary and sustainable climate policy but will also include a politically responsible approach to AI.

Wishing you an enjoyable read.

Johannes Ebert
Chairman of the Board /
Secretary General Goethe-Institut

Acknowledgements

We would like to thank the many people who helped us strengthen this project through their contributions, advice, and critiques.

We thank Dr. Stefan Ullrich, Karoline Helbig, Sana Ahmad, Reiner Rehak, and Ferdinand Müller for their contributions to the early stages of the questionnaire. We would also like to thank Laura Leißner, Marlene Kunst, Christina Hecht, and Michael Kukula for their time and effort spent reviewing the questionnaire along the way.

Furthermore, we thank the Goethe-Instituts Athens, Paris, Rome, Stockholm, and Warsaw for providing the translations of the survey. The survey design was enriched by the expertise of Dr. Nakeema Stefflbauer and Sarah Chander, who consulted us on issues of AI biases and racialized discrimination and whom we thank for their insights.

Particular thanks to the European A(i)lliance for their support of the project "Generation A=Algorithmus" and the initial mapping of the themes relevant to the questionnaire.

This project was generously funded by the Federal Foreign Office, within the framework of the German EU Council Presidency 2020, for which we are especially grateful. The team expresses sincere thanks to Dr. Jeannette Neustadt, the lead of "Generation A=Algorithmus," for her trust and dedication, without which this project would have not been carried out.

Introduction

Artificial Intelligence (AI) is probably the most dazzling of the many current developments in the context of digitalization. Though Joseph Weizenbaum's chatbot ELIZA appeared like a technical intelligence to its first users as early as 1966, it was a rather simple system based on the combination of preformulated expressions [1]. Nevertheless, even very simple ELIZA fascinated her users, who quickly entered into very personal interactions with her. This alerted Joseph Weizenbaum to the far-reaching power of autonomous computer systems, which have potential to not only solve elaborate computing problems but even to influence our social interactions and psychological well-being.

Since then, we have seen a revolution in computing and the development and application of much more advanced, "real" AI systems in almost every sphere of our societies. How we speak about AI changed too: we no longer refer to systems just *simulating* intelligence by running well-developed but predefined algorithms; instead, we talk about software that is, for example, based on neural networks and able to "learn" from sensor information and develop solutions to problems that human coders did not even know we had.

Still, is intelligence the right term for characterizing technical systems? Is the concept asserting an autonomy of computers that is far from reality? Is it mystifying AI rather than clarifying potentials and limitations of it? For non-experts in the field (which characterizes 99.99% of citizens), media stories and political debates on AI, its potentials, and its threats are hard to separate from science fiction. However, as AI applications are being increasingly interwoven in all spheres of society, it is of utmost importance that basic understanding of AI's use, risk, and potential becomes common knowledge. We are not mere *users and consumers* of AI systems such as smartphones or smart assistants such as Alexa or Siri; more importantly, we are democratic *citizens and political beings* with the responsibility and power to decide about the current and future architecture of our physical and digital environment. As a consequence, our society needs thorough knowledge and skills related to AI on all levels—politicians and other decision-makers as well as industry members, citizens, and users of AI-based systems. This is challenging, particularly for our education system—including vocational education—as well as for the media, who have to devote sustaining and substantial attention to the AI issue.

The most relevant group when it comes to a development with such unforeseeable consequences in the future is the social group, comprising the youth and younger generations in general. Young people are the ones who "domesticate" and integrate these technologies into their everyday lives more than any others. From social science we know perceptions and practices when interacting with new technologies are being quickly transformed into habits, meaning that a skillful and self-reflected handling of new technologies should be learned as early as possible, if we are to see a self-determined application of these technologies in the future.

This report allows insights not only into young Europeans' knowledge and perceptions of AI but also into their ideas about future development and regulation of AI. The report dives into different spheres where AI is increasingly relevant and looks at AI as a general technology as well as in specific applications. As such, we worked with a broad definition of AI as algorithm-based technologies capable of performing tasks that typically require human intelligence. We hope the data provided in the report will serve as a basis for future initiatives and research that may contribute to a positive development of AI applications in Europe.

Report Summary and Key Findings

This report examines young Europeans' attitudes toward and experiences with AI in a broad societal context. It explores how young people experience and perceive an increasingly datafied world and shed light on their attitudes toward AI in various domains. The findings show that young Europeans are aware of the imminent change brought about by the emergent technology but are still **divided on how to evaluate** these developments. Overall, the ongoing datafication of everyday life as a precondition for the application of AI systems, is viewed critically by young Europeans. The future of young people will be shaped by AI applications in many ways, and there are already examples in the present that show how people consciously or unconsciously interact with AI systems, such as the news feeds on social media platforms. Notably, we found that **Europe's youth share many similar viewpoints** and that country-specific deviations occurred less frequently than initially assumed. But while there are shared attitudes toward AI and datafication across European countries, the report also reveals fault lines related to education.

Datafication is met with concern for privacy and democracy. About 70% of respondents were worried to some extent about potential data misuses and the distribution of their data between companies. Forty-two percent described users as rather powerless when it comes to data ownership and power over what happens to their data. The majority of respondents (63%) perceived that social media's data-collection practices could prove harmful to democracy.

Data-collection practices are not common knowledge among young people. A majority of respondents believed that companies did not know about their political beliefs (57%), religion (68%), or sexual orientation (51%) based on the data provided through their digital communication.

Respondents voiced considerable distrust of state institutions' handling of data. The majority of respondents (57%) expressed a certain degree of worry that data about their online behavior may be made available to their governments. Only about a third of respondents (35%) believed that their government was committed to using AI in the best interest of citizens.

Young people have a positive outlook on the opportunities of AI in education. 58% of respondents believed that integrating AI technology into the learning process would enable greater personalization and improve learning. At the same time, about the same number of participants (61%) did not believe that teachers will be replaced by AI. Thus, AI applications in education are perceived as an addendum rather than a replacement for teachers.

Young Europeans believe that "news will find them." Seventy-four percent of respondents indicated that they felt rather comfortable or indifferent knowing that an algorithm is used to recommend news. A considerable number of respondents (58%) believed that they can be well informed even without actively seeking news.

Respondents anticipated a change in their field of work and had mixed feelings about it. Young people believe that people will lose (47%) rather than gain (26%) jobs thanks to AI. Around 40% of respondents across education levels expected job losses within their professions as a result of technological advancement. The use of tracking and monitoring on the job was met with skepticism, as the majority (60%) believed it will lead to an exploitation of employees.

Automated decision-making systems were met with less discomfort in the context of low-risk applications, such as getting a parking ticket or a fitness recommendation. However, even

if higher risk domains were met with more skepticism, a notable number of respondents did not mind obtaining a medical treatment (46%) or having a criminal lawsuit initiated (32%) on the basis of automated decision-making. Fifty-eight percent felt comfortable or indifferent about predictive policing. Knowing that a human operator oversees the system, obtaining an explanation, and having the option to appeal to a human specialist tended to make respondents more comfortable with the use of automated decision-making.

Methodology

The study has been commissioned by the Goethe-Institut in the framework of the project "Generation A=Algorithm" to understand how young people across Europe relate to AI in its different forms. The study was conceptualized by a team at the Weizenbaum Institute for the Networked Society. Data collection was conducted between February and March 2021 by the online panel provider respondi using a standardized online questionnaire.

∗ The countries included in the study were chosen following the logic of regional diversity of European Union (EU) countries in terms of geography (North/South/East/West) and size, bearing in mind similarities and differences in education systems and economic standards. Countries included in the study were Germany, France, Greece, Italy, Poland, and Sweden.

∗ Samples in each country were assembled via online panels using census-based quotas for education in the age group between 18 and 30 years. Where such quotas were not available, respondi calculated them based on the data available at Eurostat.

∗ It should be noted that despite the use of quotas, non-probability sampling via voluntary online panels cannot be considered fully representative of the larger population. Even though most people in the EU, and particularly in the age group covered in this study, have access to the internet and use the internet on a daily basis, online panels tend to overrepresent well-educated, digitally savvy individuals. In addition, online panels tend to reinforce self-selection bias: members of the panel are typically invited to fill in a questionnaire, and those who find the topic of the study interesting are more likely to participate in the study.

∗ The original survey was constructed in English and translated by a group of professional translators in German, French, Greek, Italian, Polish, and Swedish. The translated questionnaires were then checked by another group of professional translators for coherence between languages. The final differences in wording between the questionnaires were minor and served only to address particularities of a national and linguistic context.

∗ The survey took approximately 20 minutes to complete.

∗ You can find more information about the methodology here: https://www.weizenbaum-institut.de/media/Publikationen/WE_AI/methodology_documentation.pdf

∗ For any further inquiries, please contact emilija.gagrcin@fu-berlin.de

Demographic Profile of the Research Sample

The dataset consists of responses to a standardized questionnaire provided by young people between the ages of 18 and 30 in six European countries—Germany, France, Greece, Italy, Poland, and Sweden. In total, 3,000 Europeans[1] participated.

The overall sample was gender-balanced, with half of the sample consisting of respondents identifying as female[2]. The average age in the sample was 25 years, with the highest average in Germany (26) and the lowest in Sweden (24).

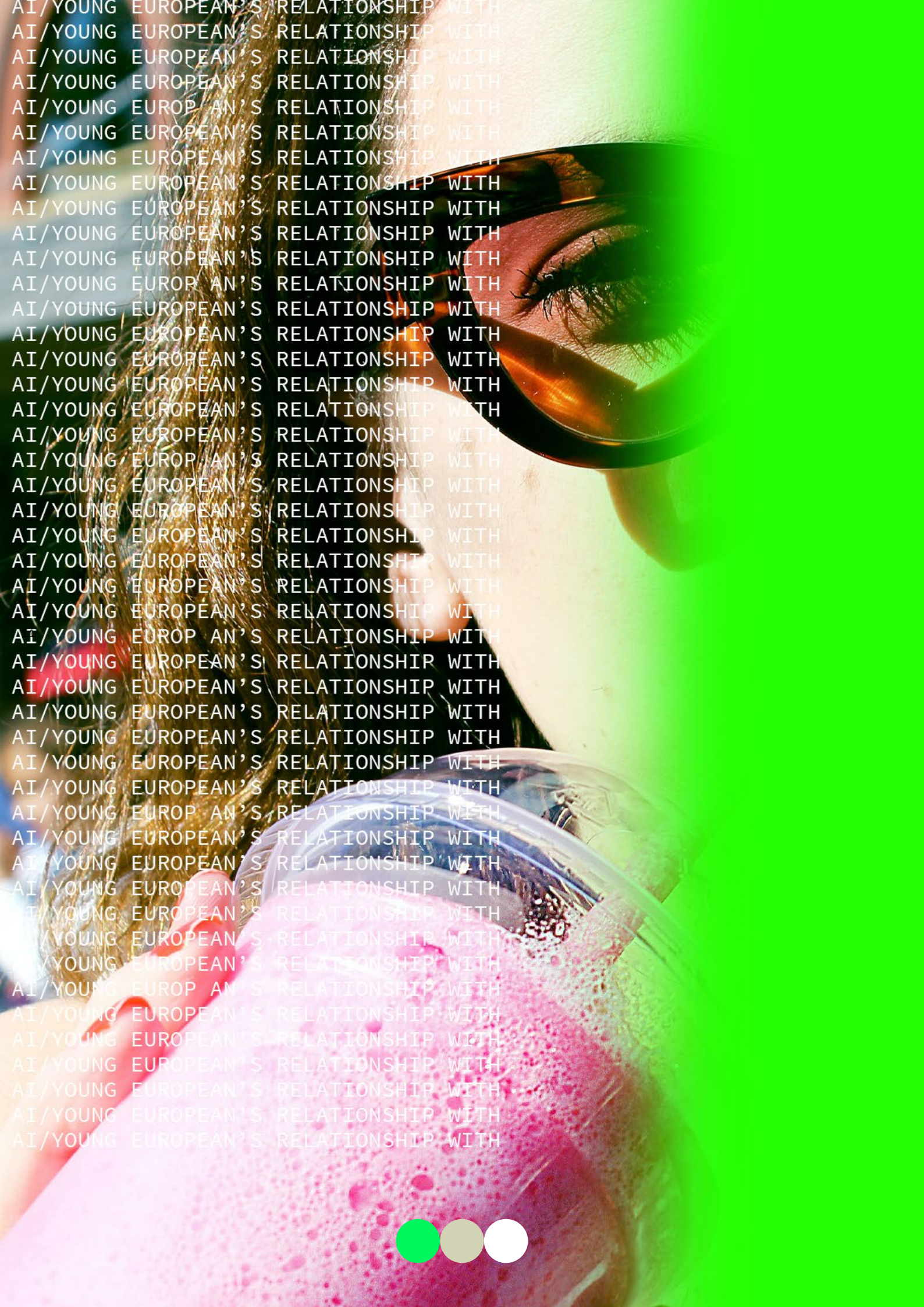
Fifty-four percent of the surveyed sample had reached a medium level of education, 27% of the sample had reached a high level of education, and 19% of the respondents had acquired a low level of education, according to the International Standard Classification of Education categorization.

The majority of the sample identified as white European, while there were minorities of respondents in each country who identified as either Black European; person of African descent, North African descent, Middle Eastern or Arabic descent, East Asian descent, or South Asian descent; or Roma, Sinti, or Traveller[3].

[1] After the adjustment of raw data, the dataset contained 2889 respondents.

[2] Respondents were asked to identify as either men or women or to self-describe their gender identity.

[3] Respondents were asked to name the racial or ethnic group(s) they most identified with. They were able to choose one or several of the following categories: Black European; Person of African descent [African, Carribean], East Asian descent, Middle Eastern or Arabic descent, North African descent, or South Asian descent; White European or ethnic; White European ethnic minority; Roma; Sinti; Traveller; or Other. Respondents who did not want to disclose their racial identity had the opportunity to select “Prefer not to say.”


AI/YOUNG EUROPEAN'S RELATIONSHIP WITH

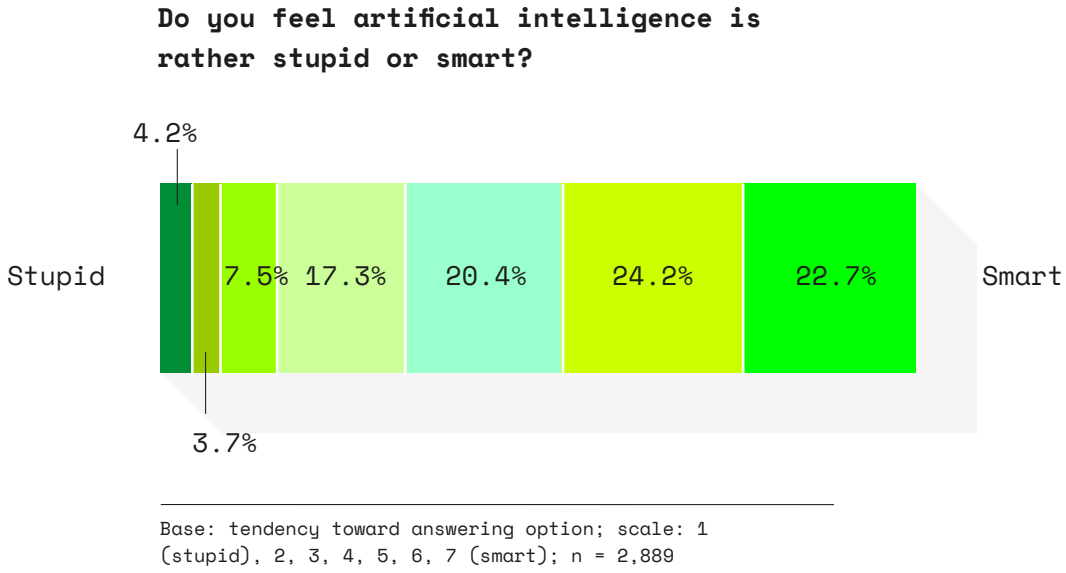
I.
Young European's Relationship with AI

Currently, AI is largely viewed as one of the key technologies of the 21st century. However, whether AI presents a potential for social progress or a particularly profound risk to individual self-determination is a matter of debate. As we think of younger generations as the vehicle of social change, it is crucial to understand the extent to which young people are prepared to accept, shape, and challenge the integration of AI technologies in their daily lives.

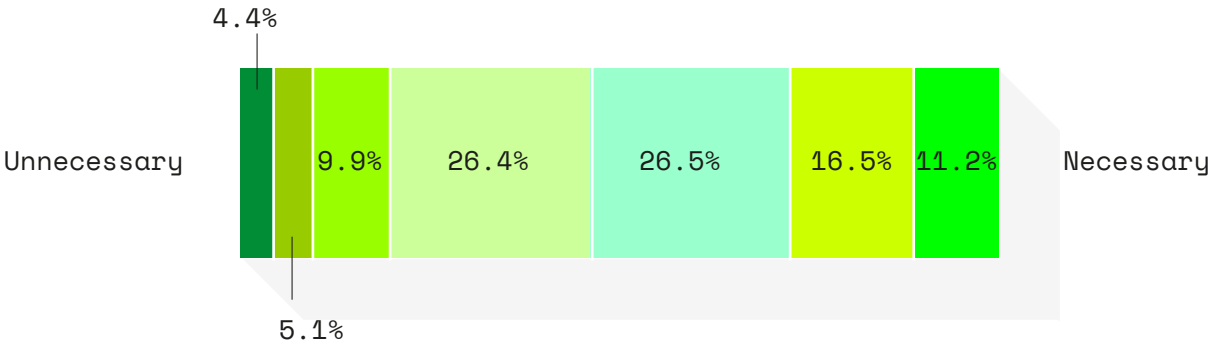
We asked young Europeans for the terms they associated with AI, for self-assessments of their knowledge related to AI, and about the frequency with which they have come into contact with AI-related topics.

AI considered to be accurate, convenient, necessary… and complex

Even though AI is difficult to understand and describe in all of its aspects and consequences, people typically associate technologies with certain traits. Therefore we asked young Europeans about their associations with AI by positioning them between two bipolar adjective pairs. The data were relatively consistent across all surveyed countries and with no major differences in the attributions given by male and female respondents. Results indicate that AI is associated with positive traits: it is considered to be rather smart and accurate. Yet AI is still not perceived as uniformly *necessary*. Perhaps unsurprisingly, AI is largely considered to be *complex*. All four examples illustrate that a fair share of young people position themselves in the middle, signaling an absence of a strong value attribution.

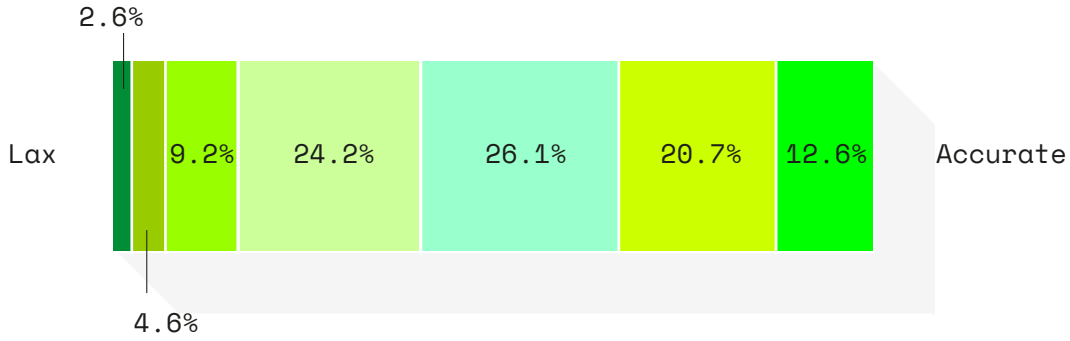


Do you feel artificial intelligence is rather unnecessary or necessary?



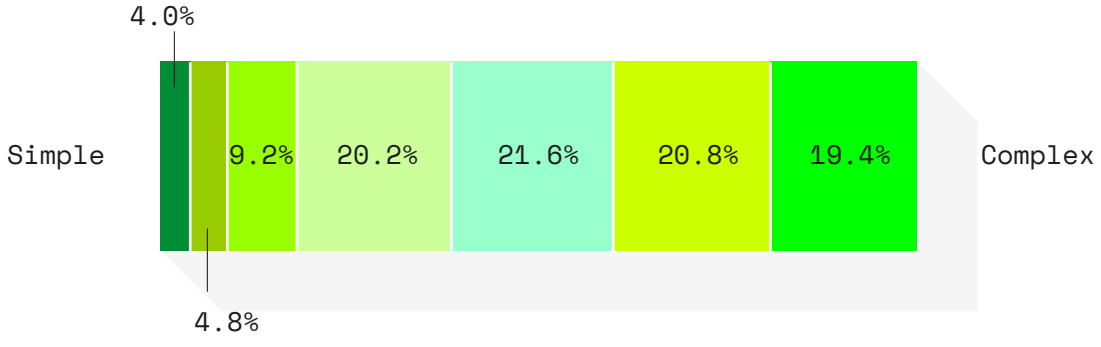
Base: tendency toward answering option; scale: 1 (unnecessary), 2, 3, 4, 5, 6, 7 (necessary); n = 2,889

Do you feel artificial intelligence is rather lax or accurate?



Base: tendency toward answering option; scale: 1 (lax), 2, 3, 4, 5, 6, 7 (accurate); n = 2,889

Do you feel artificial intelligence is rather simple or complex?



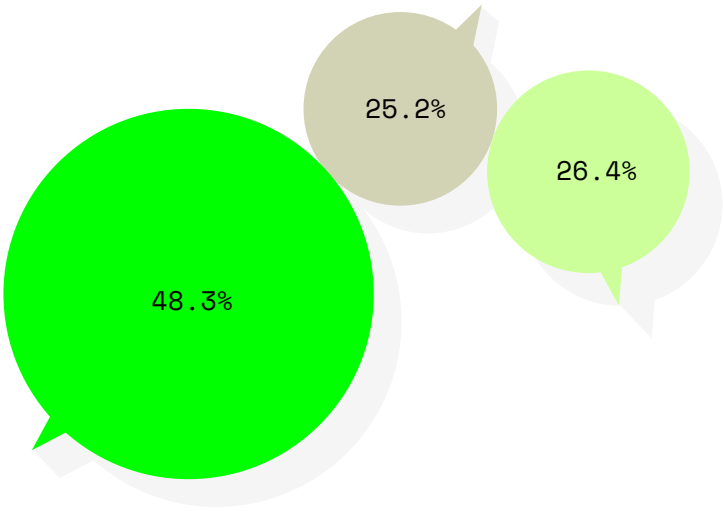
Base: tendency toward answering option; scale: 1 (simple), 2, 3, 4, 5, 6, 7 (complex); n = 2,889

Debates on user data and social media algorithms reach young Europeans

Young people were most exposed to topics related to the use of AI applications on social media platforms, perhaps because these relate most obviously to the lifeworld of young people. About half of all respondents indicated having frequently heard or read news or discussions about data collection online and the use of social media algorithms in the past 12 months. Yet during the same period, considerably fewer respondents heard or read about the use of artificial intelligence in the context of employee management in companies and in education. Topic exposure varied across the surveyed countries. For example, around half of the Greek and Polish respondents indicated that they had frequently encountered news about the collection of user data and the use of social media algorithms in the past 12 months, while only around one-third of German respondents indicated the same.

In the last 12 months, how often have you heard or read news reports about opportunities and risks of...

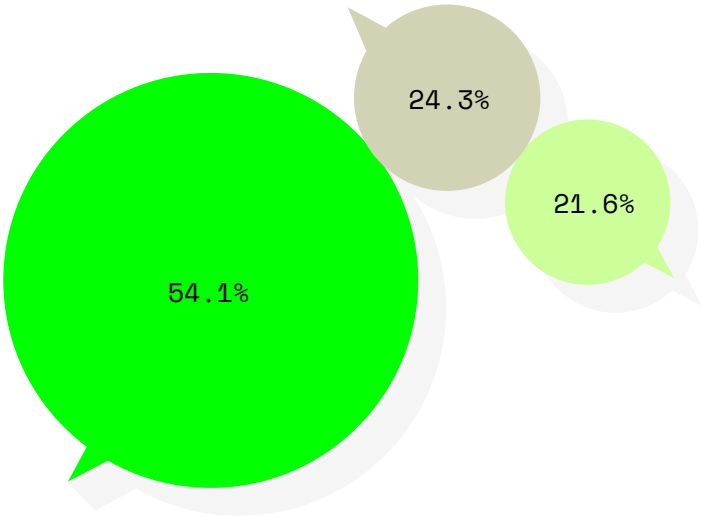
the use of social media algorithms?



- Frequently
- Occasionally
- Rarely

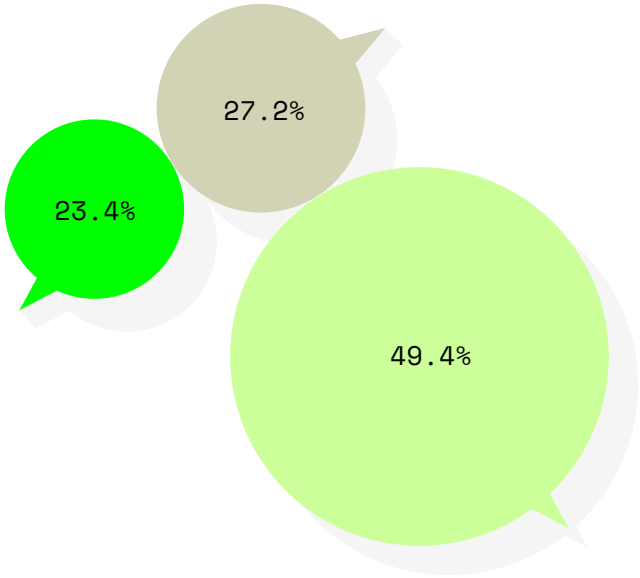
Base: agreement; scale: rarely (agg. from never, rarely), occasionally, frequently (agg. from frequently, very frequently); n = 2,820

the collection of user data online?



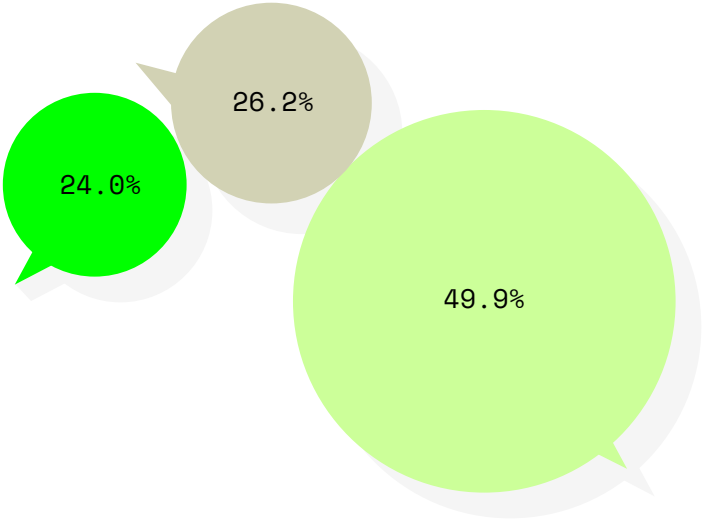
Base: agreement; scale: rarely (agg. from never, rarely), occasionally, frequently (agg. from frequently, very frequently); n = 2,814

the use of artificial intelligence in education?



Base: agreement; scale: rarely (agg. from never, rarely), occasionally, frequently (agg. from frequently, very frequently); n = 2,803

companies using artificial intelligence to manage their employees?



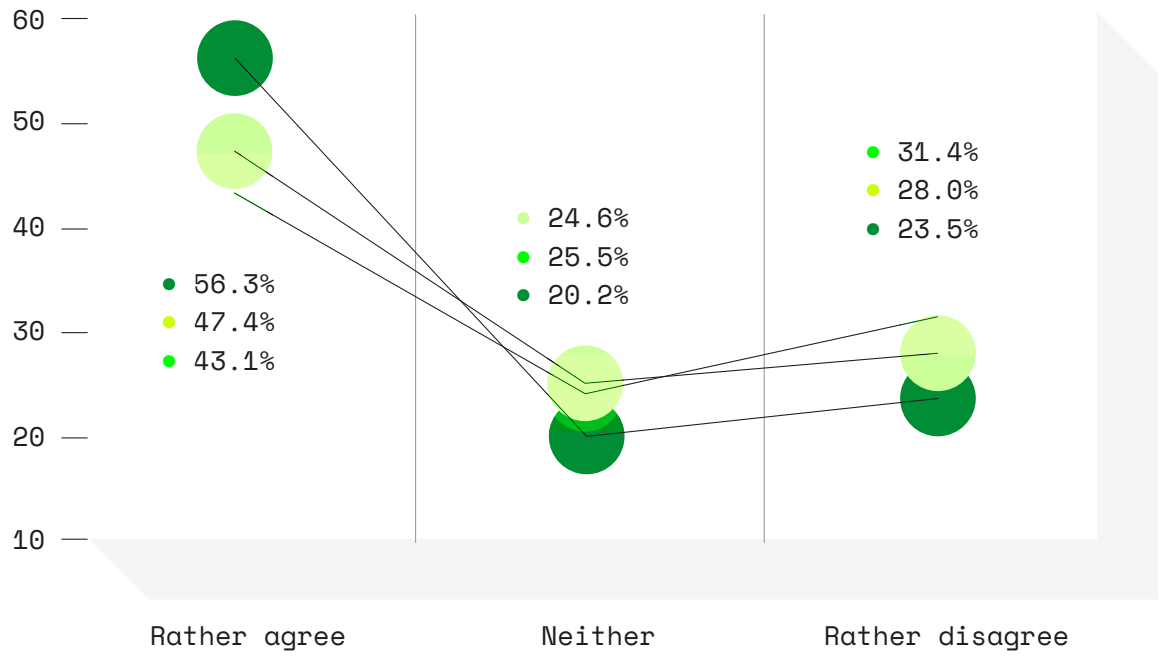
Base: agreement; scale: rarely (agg. from never, rarely), occasionally, frequently (agg. from frequently, very frequently); n = 2,820

- Frequently
- Occasionally
- Rarely

A need for more accessible AI conversations

Related to young Europeans' perceived understanding of AI, around half of the respondents believed that they were able to understand and assess the risks and opportunities of AI, however with notable differences with regard to the educational background of respondents, as illustrated in the graph. There are also gender differences: men were more likely to indicate a higher level of confidence in their ability to assess implications of AI than women. This finding underscores the need to make discussions about AI and its impact on society more accessible and relevant to different groups of people.

I am perfectly able to understand and assess risks and opportunities of artificial intelligence



- High education
- Medium education
- Low education

Base: Agreement ; scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, rather agree (agg. from somewhat agree, agree, strongly agree); n = 2,788


EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/
EDUCATION AND ARTIFICAL INTELLIGENCE/

II.
Education and Artifical Intelligence

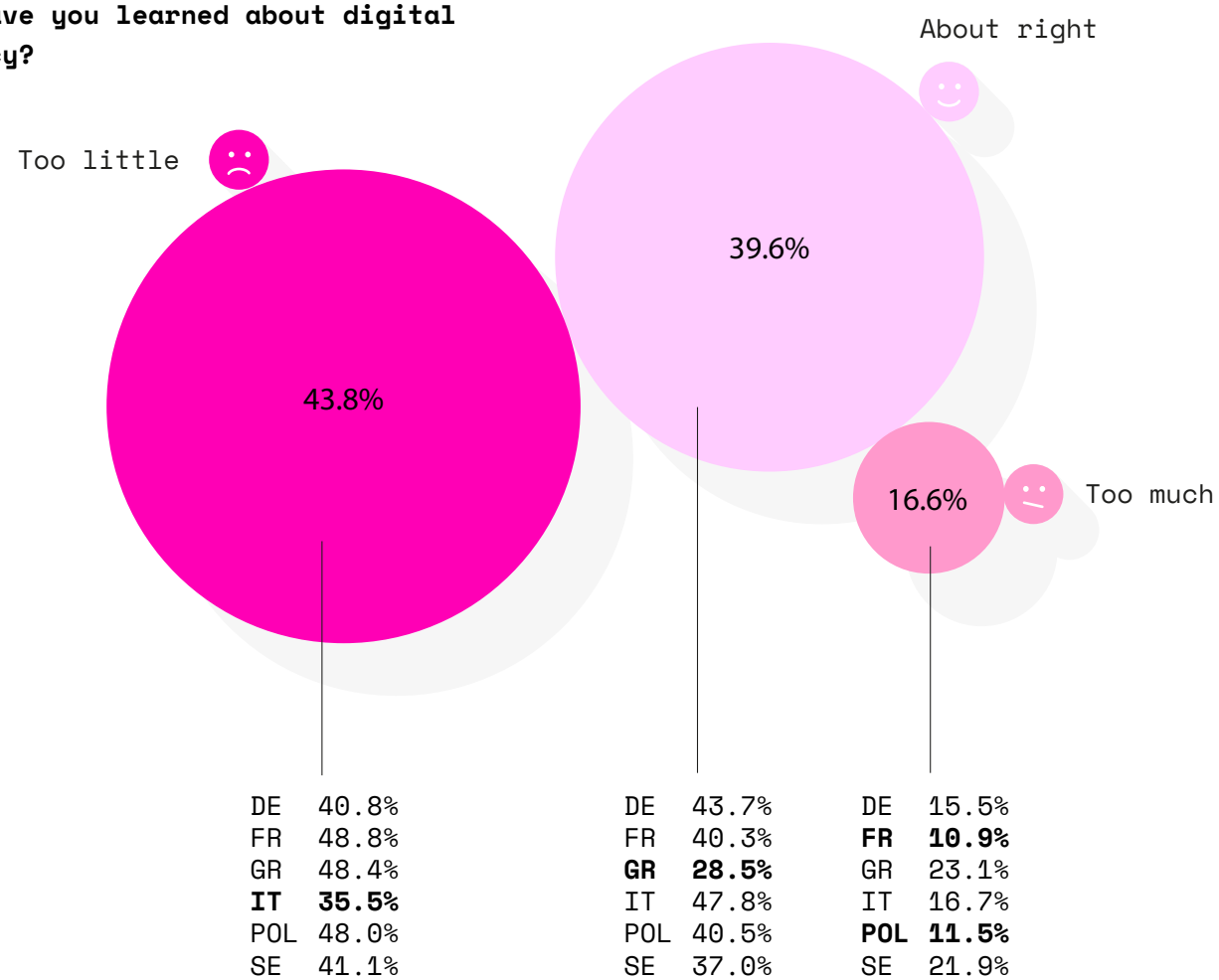
Schools and universities are increasingly incorporating AI-based solutions. Educational tools such as digital assistants or chatbots aiming to personalize the experience of students or tools to help teachers reduce their administrative workload or assist in grading are transforming how we learn and teach today. AI in education (AIED) can be used for tracking students' attendance, tailoring schedules and coursework to their needs, and grading and assessing students' individual performances, with the aim to provide deeper insights into students' learning behaviors, reaction times, or emotions [2], [3]. As such, many hope that AIED will make education more inclusive, flexible, personalized, and effective while complementing traditional pedagogical methods and dissolving traditional hierarchies of standardization [4], [5]. AIED has yet to live up to such expectations. At the same time, the development and use of AIED are accompanied by a host of ethical and legal concerns about data collection, data storage, and data processing and whether data collection is warranted for such purposes.

In the following, survey participants were asked about the extent to which they were satisfied with the digital literacy education they received in the course of their formal education; we also asked respondents to evaluate some of the common expectations toward AIED.

School education is on a good, but not yet on the best path

The participants evaluated digital literacy in their own formal education relatively poorly: 40% stated that the amount of digital literacy education was about right, while 44% thought they learned too little. In contrast, the programming knowledge taught was rated as too low. Sixty-three percent of respondents believed that pupils should be taught digital literacy and 68% believed that pupils should learn about digital ethics more extensively in the future. Findings suggest that respondents acknowledged a need to develop new skills that would allow them to navigate challenges and seize opportunities of emergent technology.

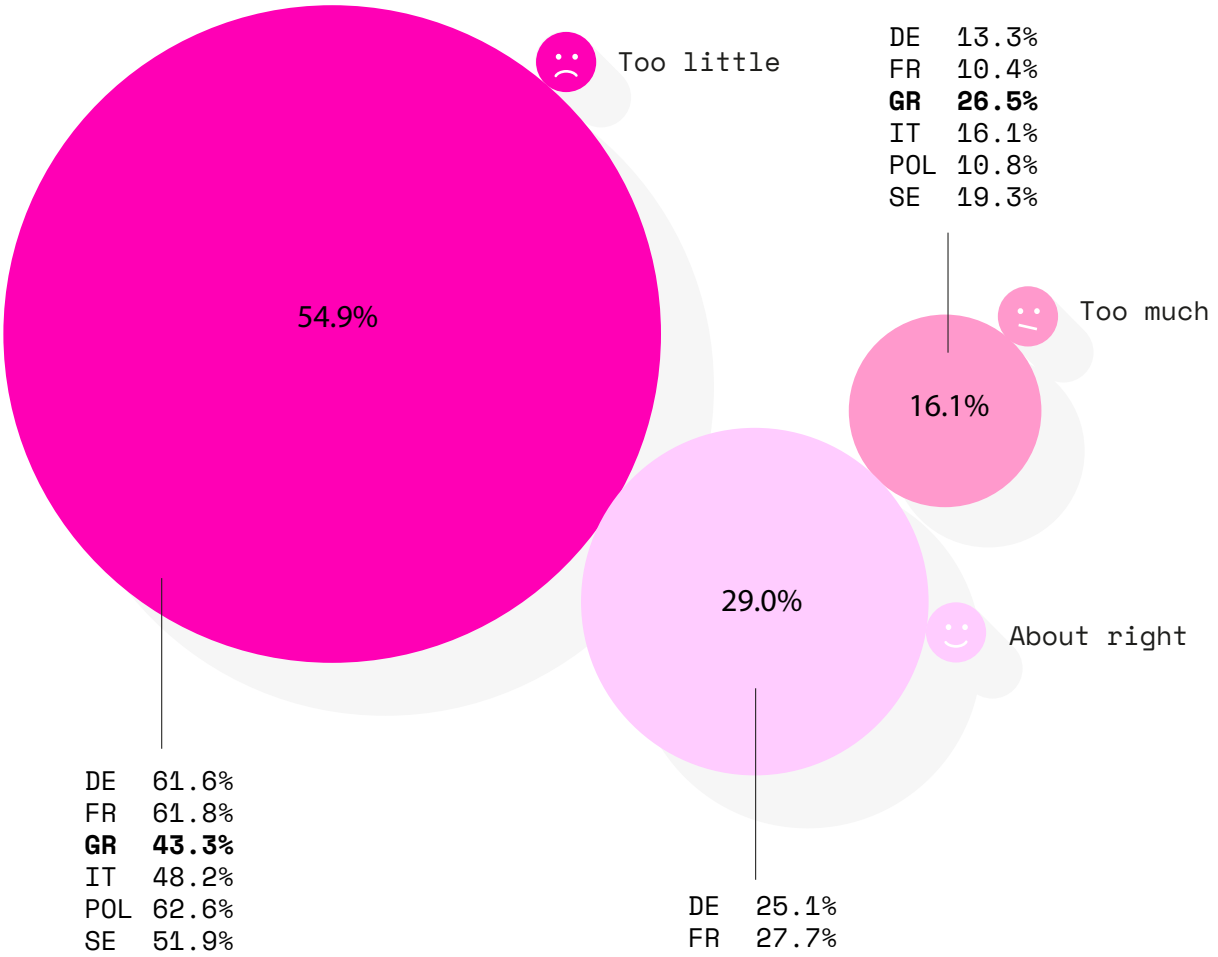
In the course of your education, how much have you learned about digital literacy?



	Too little	About right	Too much
DE	40.8%	43.7%	15.5%
FR	48.8%	40.3%	**10.9%**
GR	48.4%	**28.5%**	23.1%
IT	**35.5%**	47.8%	16.7%
POL	48.0%	40.5%	**11.5%**
SE	41.1%	37.0%	21.9%

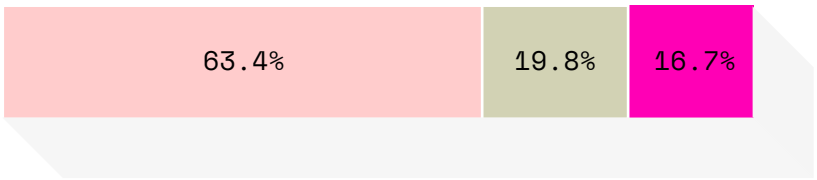
Base: amount (by country); scale: too little (agg. from far too little, too little), about right, too much (agg. from too much, far too much); n = 2,743

In the course of your education, how much have you learned about programming?

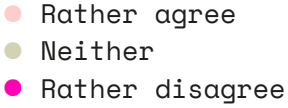


Base: amount (by country); scale: too little (agg. from far too little, too little), about right, too much (agg. from too much, far too much); n = 2,748

Pupils should be taught more about digital literacy



Pupils should be taught more digital ethics at school

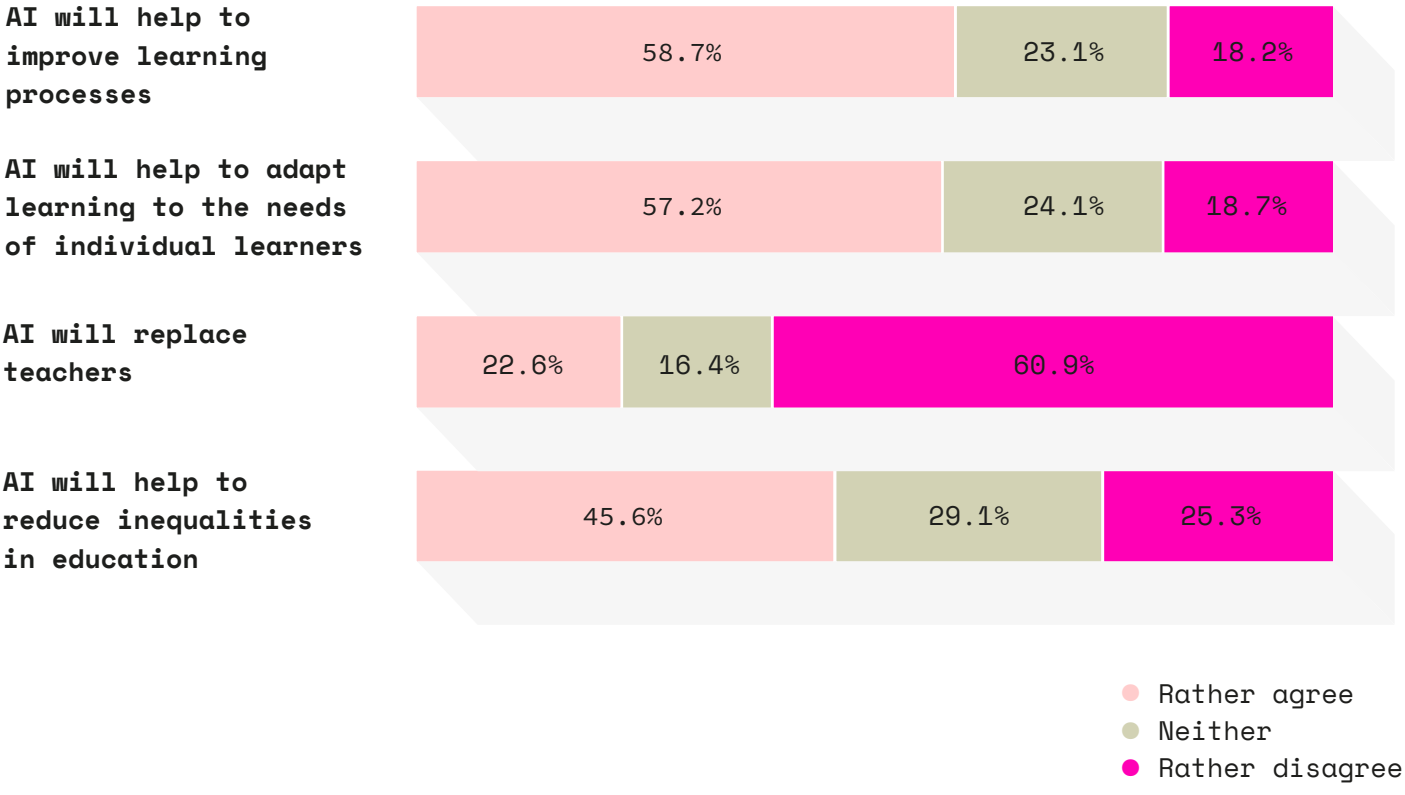


Upper bar. Base: agreement by country; scale: disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, agree (agg. from somewhat agree, agree, strongly agree); n = 2,818

Base: agreement by country; scale: disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, agree (agg. from somewhat agree, agree, strongly agree); n = 2,826

AI is expected to improve and personalize learning processes

The results echo the common expectations that integrating AI technology into the learning process will enable greater personalization and improve learning. As the majority did not believe that teachers will be replaced by AI, findings contradict popular concerns among practitioners and educational institutions related to being replaced by AI [6]. Finally, respondents were not completely convinced about the possible positive outcomes of AI-based education for everyone—perhaps this is a reason that the demands for more digital literacy receive strong support.



Top bar. Base: agreement; scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, rather agree (agg. from somewhat agree, agree, strongly agree); n = 2,809

Second bar. Base: agreement; scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, rather agree (agg. from somewhat agree, agree,

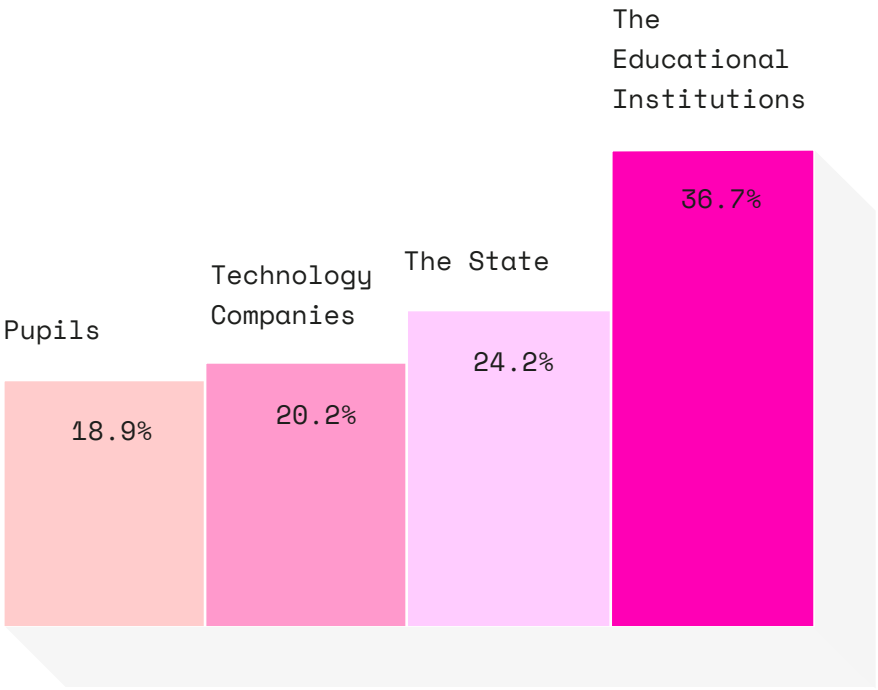
Third bar. Base: agreement; scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, rather agree (agg. from somewhat agree, agree, strongly agree); n = 2,809

Lower bar. Base: agreement; scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, rather agree (agg. from somewhat agree, agree,

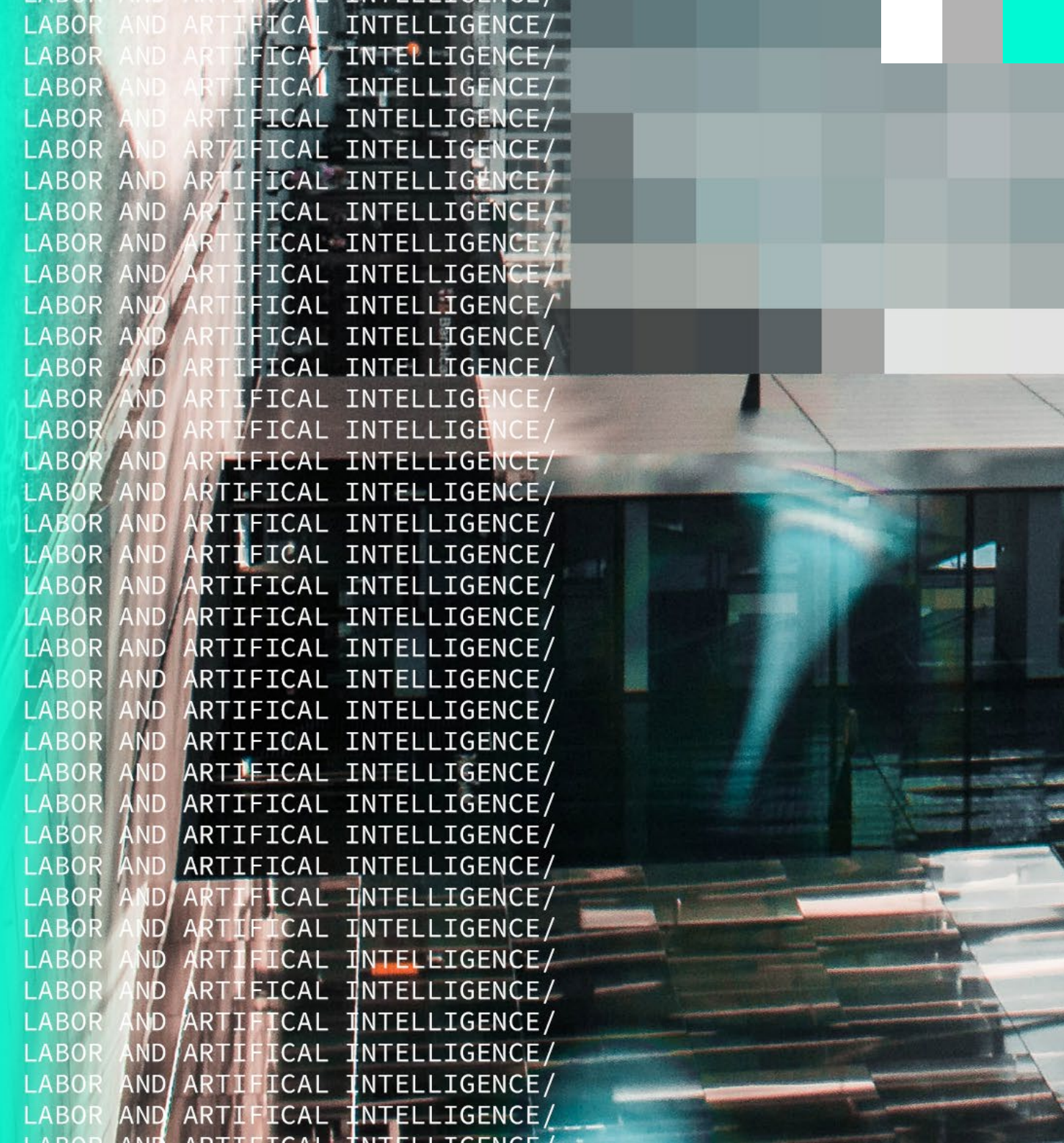
Educational institutions as preferred standard setters, not tech companies

As AIED tools are being developed at a fast pace, we asked young people whom they thought should be setting standards for development and use of AIED. The results are consistent across genders, educational backgrounds, and surveyed countries and indicate that respondents clearly favored educational institutions, while tech companies were least favored as standard-setters next to students themselves. The findings clearly contest the status quo, according to which educational institutions and teachers are mostly excluded from the development process by commercial technologies [7]. Moreover, students are typically not part of these conversations: technologies developed *for* them are rarely developed *with* them.

In your opinion, who should be deciding on how artificial intelligence should be used in education?



Base: sorted preference; options: the state, educational institutions, students, technology companies; n = 2,889


LABOR AND ARTIFICAL INTELLIGENCE/

III.
Labor and Artifical Intelligence

While the extent is not yet clear, it is very likely that most occupational fields will be transformed by the introduction of AI to some degree [8]. Physical and routine tasks can be replaced by technology [9], and the role played by humans is changing. New roles emerge such as guiding and accompanying the work of the machines and ensuring that the machines are effective and responsible [10]. However, not only are technological competences becoming indispensable; there is also a higher demand for nontechnical competences (soft skills), such as problem-solving, analytical thinking, and other social and emotional skills [11].

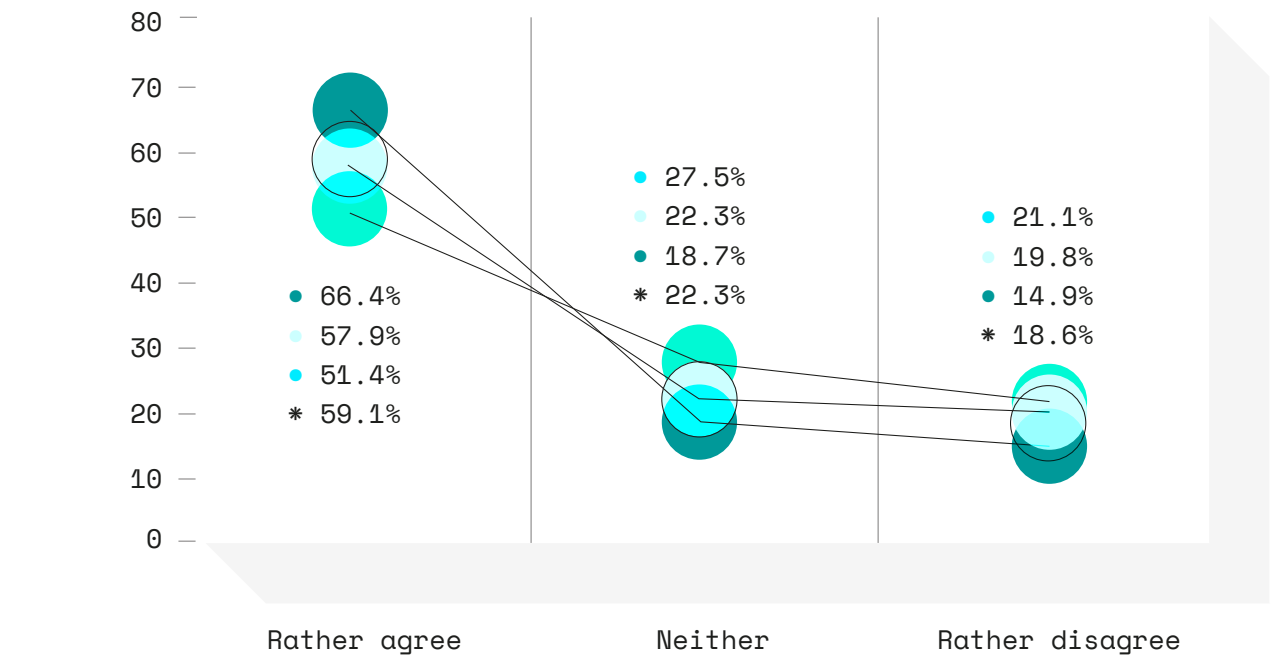
AI technologies also bear new challenges for workers' rights. Companies can (and do) track and monitor their employees and analyze their behavioral data with the help of AI technologies to increase efficiency and productivity. Such technology deployment can jeopardize not only workers' privacy but also their right to just, safe, and healthy working conditions. Furthermore, principles of equality and fairness in the context of employment may be undermined [12], [13], particularly when managers uncritically rely on the evaluations made by AI applications [14].

The perspective of young Europeans is particularly significant here, as young people are at the beginning of their professional lives and will be affected to a greater extent by the potentials and challenges of AI systems in labor contexts.

Tracking and monitoring of employees associated with exploitation

The ability to monitor and track workers through digital technologies will increase with AI systems. Future employees view this trend with concern. Notably, 59% of participants believed at least to some extent that tracking and monitoring on the job would lead to an exploitation of employees. Educational background makes a slight difference: respondents with a higher level of education believed more strongly that tracking and monitoring employees through technology would lead to exploitation.

Tracking and monitoring employees through technology leads to exploitation of employees



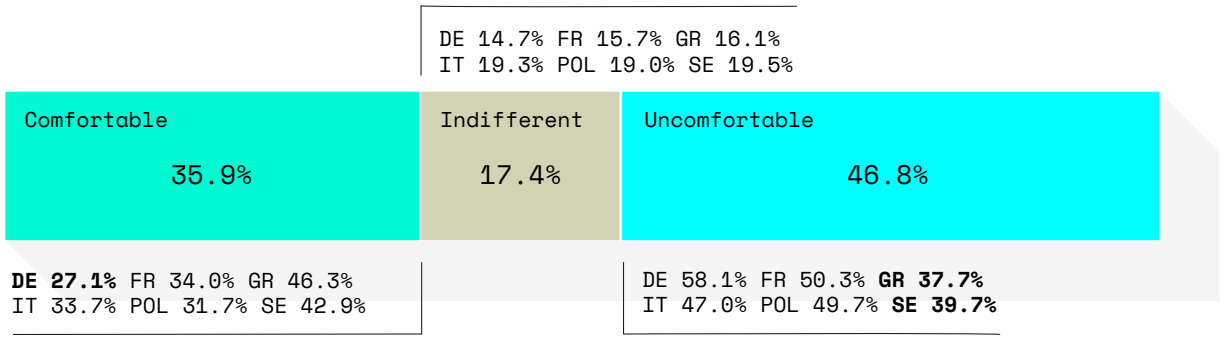
- High education
- Medium education
- Low education
- Average

Base: agreement; scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, rather agree (agg. from somewhat agree, agree, strongly agree); n = 2,768

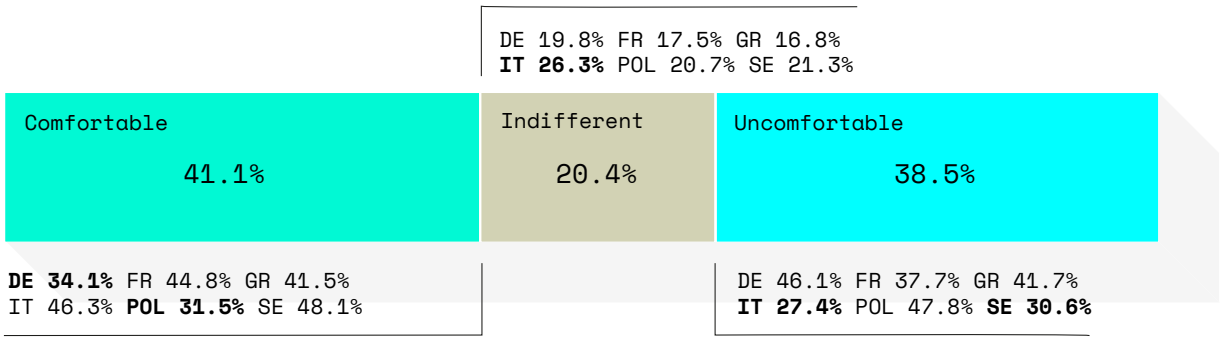
Mixed feelings regarding the use of AI in managerial tasks

Organizations may employ AI applications to enhance various workflows and increase productivity and efficiency. For example, AI applications are used to automatically search, filter, select, and recommend job applicants [15]. Moreover, some companies use AI to automatically assign workers to tasks or to schedule their working shifts based on different parameters [16]. We asked our respondents how comfortable they felt with AI being applied in these domains. In the case of job applications, more respondents felt rather uncomfortable (47%) than comfortable (36%). Prominently, about half of the German (58%), French (50%), Italian (47%), and Polish (50%) samples felt uncomfortable with this, while the same was true for only 38% respondents from Sweden and Greece. Regarding the automatic scheduling of working hours, the majority in the sample (62%) indicated feeling either comfortable or indifferent with the use of AI. Here, too, country differences are visible: while less than one third of Italian (27%) and Swedish (31%) respondents indicated feeling uncomfortable, this was the case for almost half of German (46%) and Polish (48%) respondents.

How would you feel about an artificial intelligence system scanning CVs for unqualified applicants for a job?



How would you feel about an artificial intelligence system scheduling your working hours?



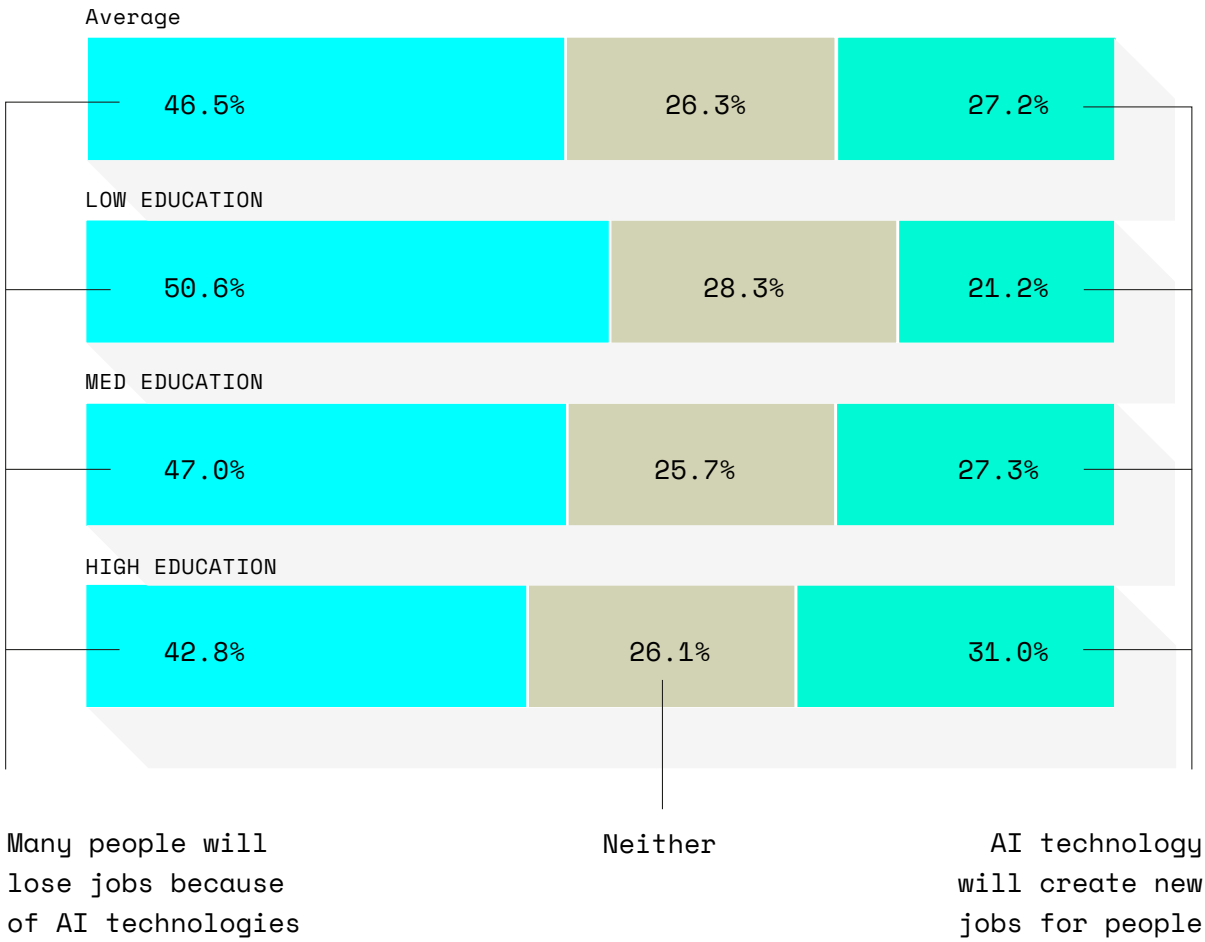
Top bar. Base: level of comfort; scale: uncomfortable (agg. from very uncomfortable, uncomfortable, somewhat uncomfortable), indifferent, comfortable (agg. from somewhat comfortable, comfortable, very comfortable); n = 2,805

Lower bar. Base: level of comfort, scale: uncomfortable (agg. from very uncomfortable, uncomfortable, somewhat uncomfortable), indifferent, comfortable (agg. from somewhat comfortable, comfortable, very comfortable), n = 2,809

Job-related fears among respondents

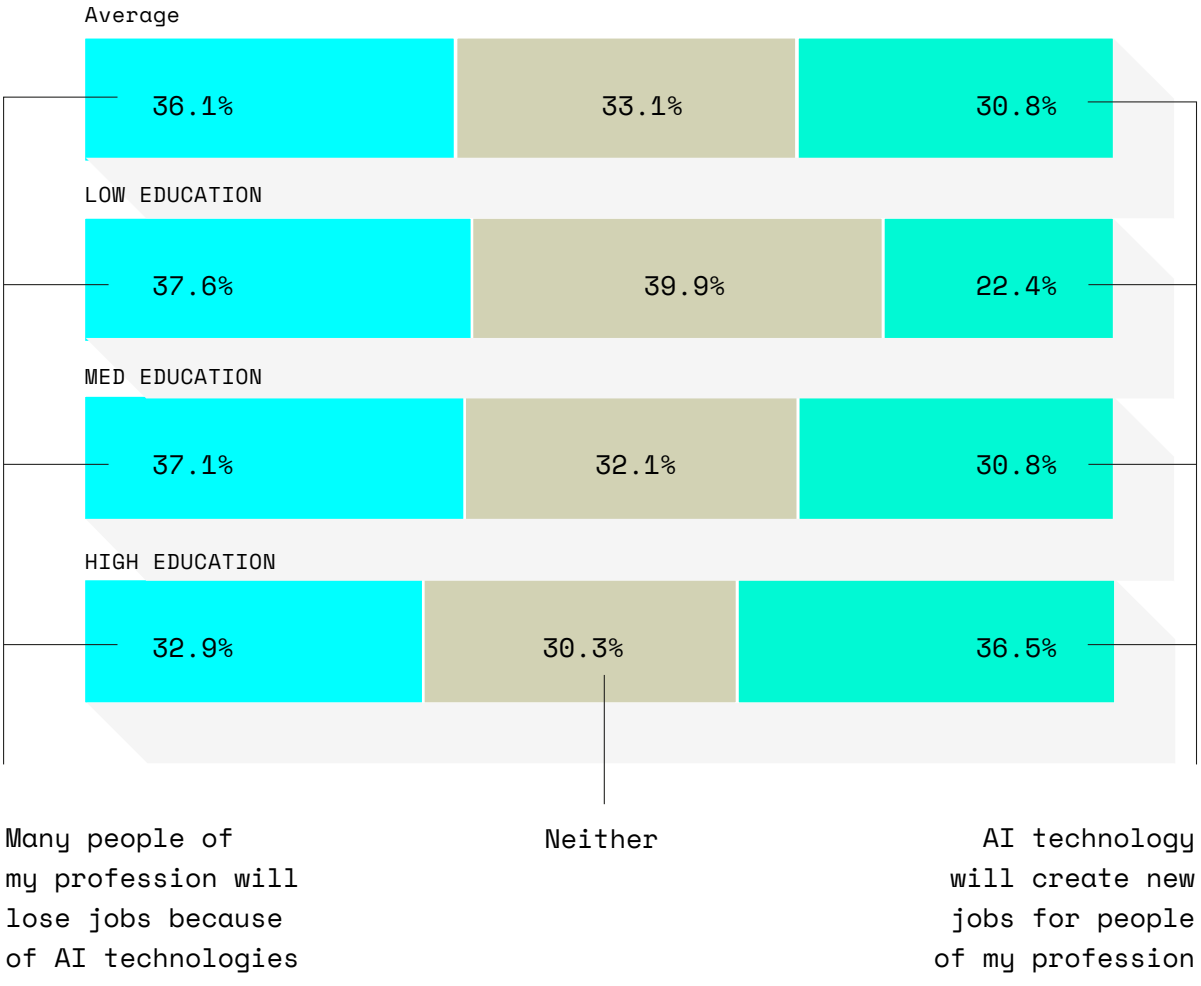
Given the ongoing discussions regarding job creation versus job loss due to technological advancement [17], we analyzed young people's perceptions of job-related opportunities in light of the emergence of AI technologies. Young Europeans tend to have a more pessimistic view. Overall, our respondents believed that people will lose (47%) rather than gain (27%) jobs due to AI. When it comes to their own professions, however, no clear tendency in expectations is observable: one-third was rather positive, while another third had a rather negative perspective on the matter. Particularly, respondents with high educational levels had a positive outlook on the potential of AI for creating jobs in their profession.

Job loss because of AI technologies



Base: tendency towards answering option (by level of education); scale: 1, 2, 3 (leaning towards many people will lose jobs because of AI technologies), 4 (neither), 5, 6, 7 (leaning towards AI technology will create new jobs for people), n = 2,889

Job loss in my profession because of AI technologies



Base: tendency towards answering option (by level of education); scale: 1, 2, 3, (leaning towards many people of my profession will lose jobs because of AI technologies), 4 (neither), 5, 6, 7 (leaning towards AI technology will create new jobs for people of my profession), n = 2,889


DATAFICATION AND PRIVACY///

IV.
Datafication

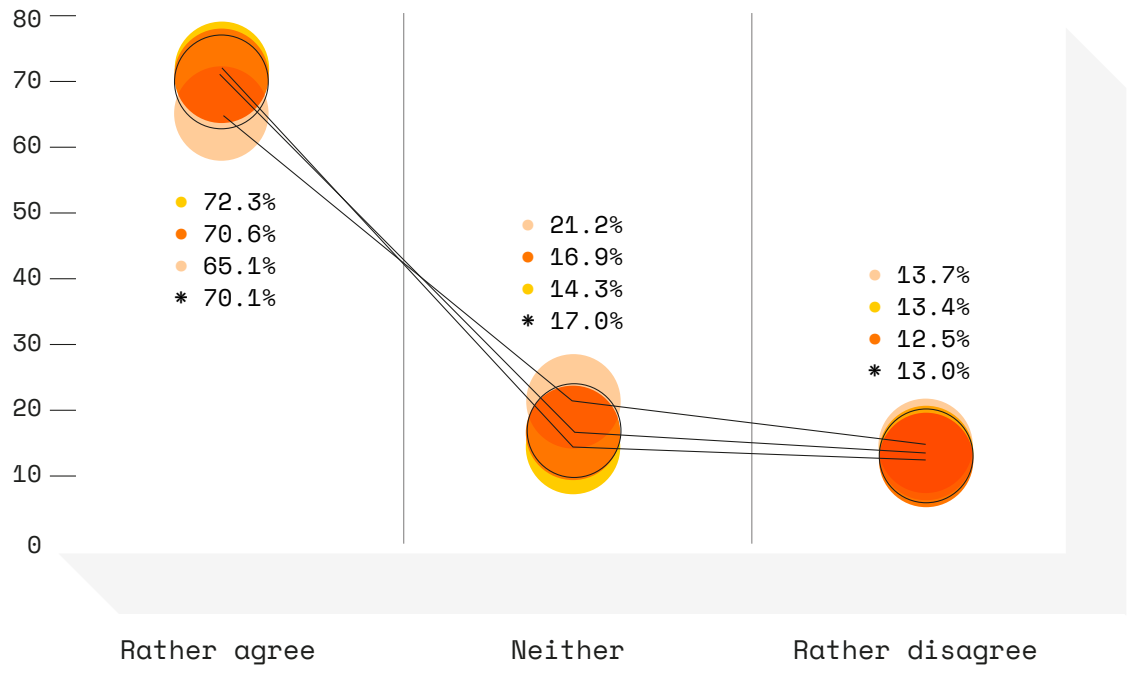
Data collection and its use for commercial purposes and surveillance affect all aspects of our lives: how we communicate, work, and rest. It impacts our chances to find a job or receive a loan and it even shapes the ways in which we form personal relationships. There are few aspects of our lives that tech companies have yet to translate into data. While some argue that technologies driven by data can benefit society, critics continue pointing out that benefits are unequally distributed and can reinforce social inequalities [18], [19] and violate human rights [21]. This, in part, is a consequence of what has been described as *surveillance or data capitalism* [22], [23]. These concerns reflect that, beyond individual harms, datafication practices can generate privacy harms for whole groups or communities [24]. In addition to privacy harms, datafication has resulted in power asymmetries between those with access and resources to collect and make use of data [25] and those whose data is being used.

As conversations over the regulation of data collection, its use, and its abuse are ongoing across Europe (e.g., European Commission, Council of Europe, Organisation for Economic Co-operation and Development) [26], too little is known about how (young) Europeans perceive and experience datafication at the intersection with privacy.

Great concern over data collection

Despite widespread beliefs that people—and especially young people—do not care about privacy, this report provides evidence for the opposite. About 70% of respondents were worried to some extent about potential data misuse and distribution of their data.

I am worried that my personal data (such as my browsing and search behavior, name, and location) are misused by others



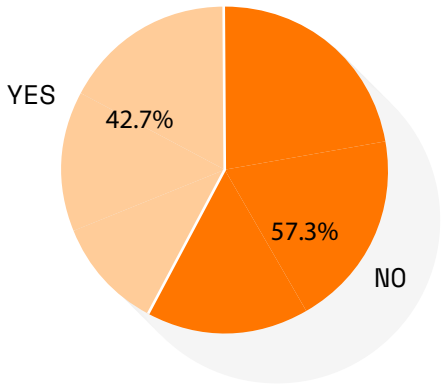
- High education
- Medium education
- Low education
- Average

Base: agreement (by level of education); scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, rather agree (agg. from somewhat agree, agree, strongly agree); n = 2,810

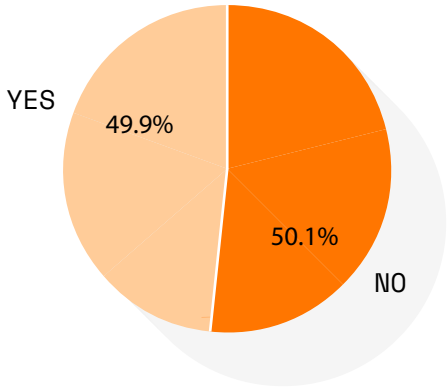
Data collection practices are not common knowledge

We asked respondents whether they believed that companies could gain sensitive and political information about their identity and personal lives from data. Respondents were divided over these questions. About half of the overall sample believed that companies could know about their race, sexual orientation, or ethnicity based on their data, whereas 50% didn't. A majority of respondents believed that companies did not know about their political beliefs (57%) or their religion (68%). These findings underscore that young people underestimate the potential of AI-based data analytics. This is particularly important as a lack of knowledge in regard to the depth of datafication is likely to impede people's ability and eagerness to evaluate the consequences and potential harms of datafication.

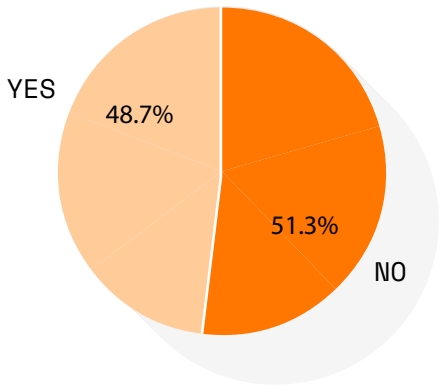
What do you think companies know about you based on what you do online?



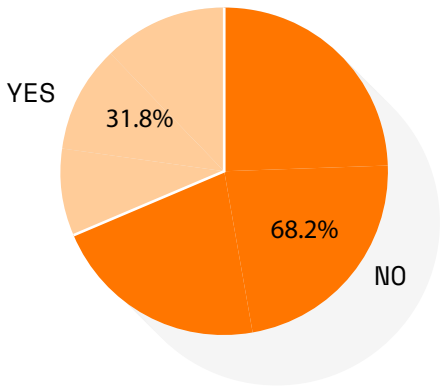
My political beliefs



My race or ethnicity



My sexual orientation



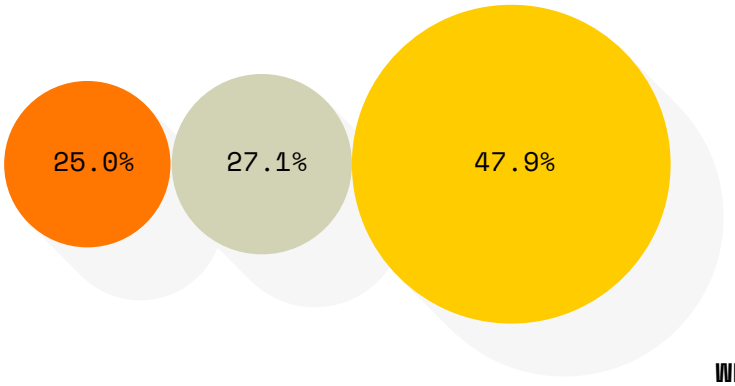
My religion

Base: belief about companies knowing about indicated practice; scale: no, yes; n = 2,889

Companies perceived to disregard users' needs

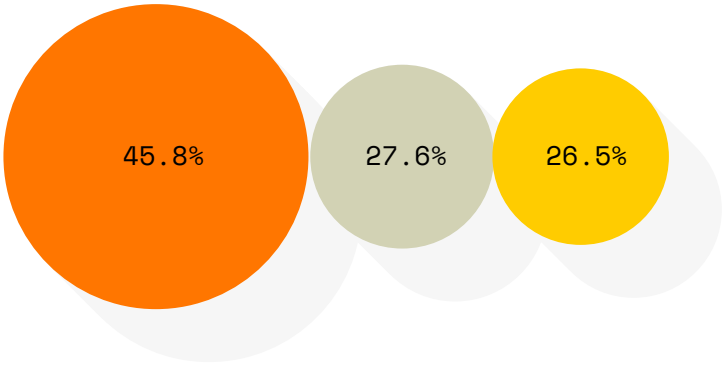
The notion that mass data collection is necessary and justified for creating technological advancement has been promoted alongside data-collection practices that are carried out with minimal caution or consent [24]. As many disagree that these ends justify the means, many questions are left unanswered: Whose interests are protected and reflected in the AI systems that are being built using our data? Only around 25% of respondents believed that social media companies prioritize their needs as a user over the company's needs.

When it comes to data collection, social media companies prioritise my needs as a user over the company's needs

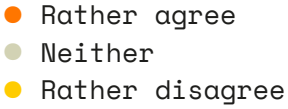


Base: agreement; scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, rather agree (agg. from somewhat agree, agree, strongly agree), n = 2,775

When it comes to data collection, my interests as a user matter little in comparison to the company's interests.



Base: agreement; scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither, rather agree (agg. from somewhat agree, agree, strongly agree), n = 2,771



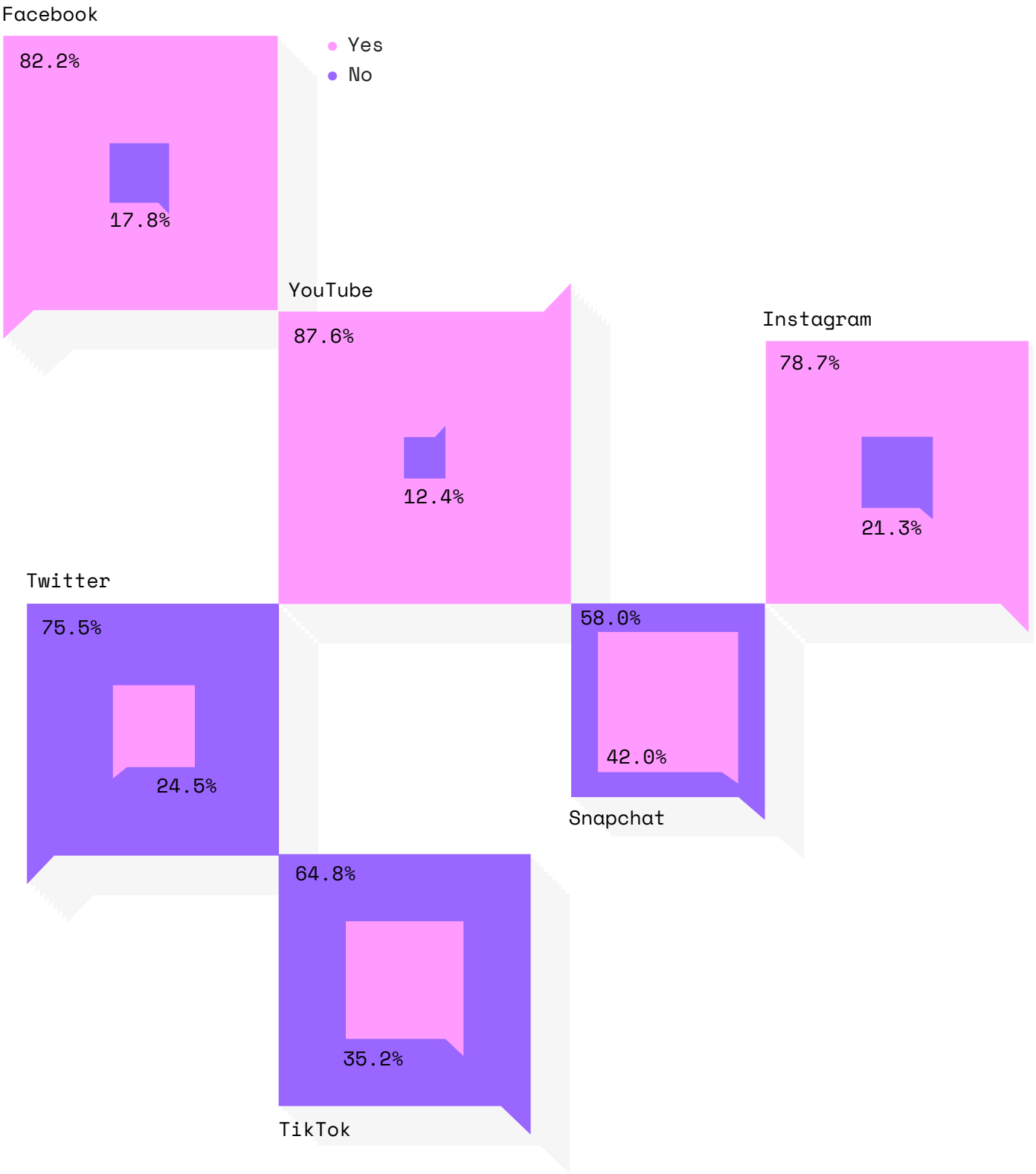
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS
+PLATFORMS-&-ALGORITHMS

V.
Platforms & Algorithms

Even though social media platforms such as Facebook, Twitter, Instagram, and TikTok differ in terms of infrastructure, they all rely on algorithms for sorting and selecting the information that is presented to users. Algorithms are used to recognize patterns behind users' behavior—whom we interact with, what we click on—and sort, rank, filter, and recommend information that composes their social media feed [27]–[29]. Generally speaking, algorithms used by social media platforms promote content that wins the most engagement from users. Because content that provokes negative emotions—such as anger or fear—draws the most engagement, researchers and members of civil society have, for many years, argued that social media platforms amplify tribalism and radicalization.

Notwithstanding, social media platforms are central spaces where young people experience and practice political communication [30]. They are places for young people not only to seek information, voice their political opinions, and organize for civic and political purposes but also to engage in a host of other activities, such as keeping up with their friends and creative self-expression (e.g., [31]). Moreover, social media platforms are perhaps the most direct space where young people interact with AI systems. This is why it is particularly important to understand young people's relationship with algorithmic content curation, young people's algorithmic awareness, and their attitudes toward automated decision-making deployed by social media platforms.

Which of the following platforms do you use?

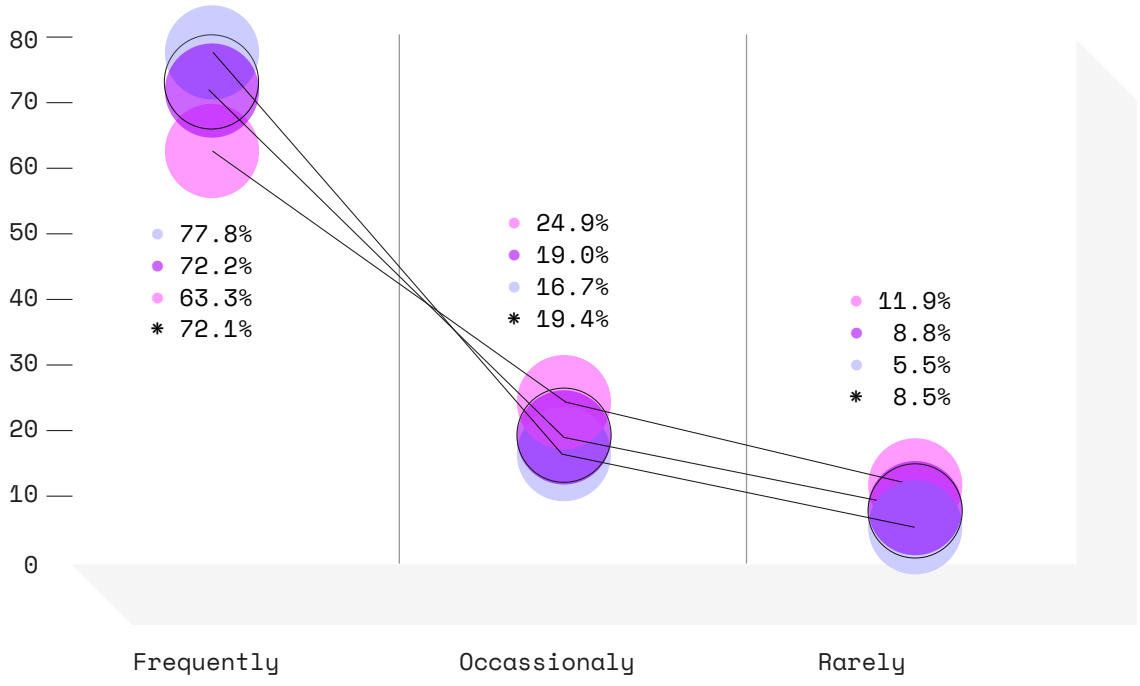


Base: use of the indicated platform; scale: no, yes;
n = 2,889

High awareness of personalized content curation

It is common that people do not notice that algorithms are at work until they produce unexpected or surprising results [32]. Consequently, people develop what has been called *algorithmic awareness* over time through learning by doing. Given that most of the respondents used social media daily, it may not be surprising that 72% of all respondents indicated they would frequently become aware that their social media feed was based on their previous online behavior; less than 10% said they never or rarely noticed this. Education matters for algorithmic awareness: while almost 80% of highly educated respondents were aware of personalized algorithmic curation frequently, this was only true for only about 60% of those with low levels of education (cf., [33]).

While online, how often do you become aware that recommendations, advertisements and other content presented to you are based on your online behavior in the past?

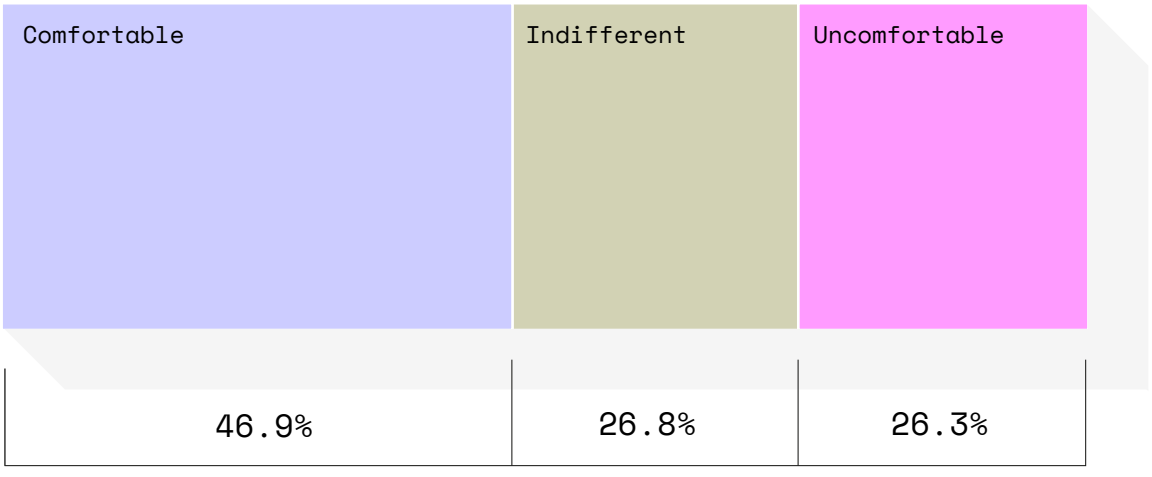


Base: frequency (by level of education); scale (frequency): rarely (agg. from never, rarely), occasionally, frequently (frequently, very frequently); scale (education): low, medium, high; n = 2,833

Automated news recommendations widely accepted

While news recommender systems are prevalent in today's information environments, they are not uncontroversial due to issues of transparency, data use, diversity of news content, and user control [34]. Nonetheless, across all the surveyed countries, 74% of respondents indicated that they felt rather comfortable or indifferent knowing that an algorithm was used to recommend news to them. While differences between countries were generally neglectable, Poland posed an exception: almost 40% of respondents indicated some level of discomfort with automated news recommendations.

How would you feel about an artificial intelligence system deciding about news recommendations you get at the end of an article?

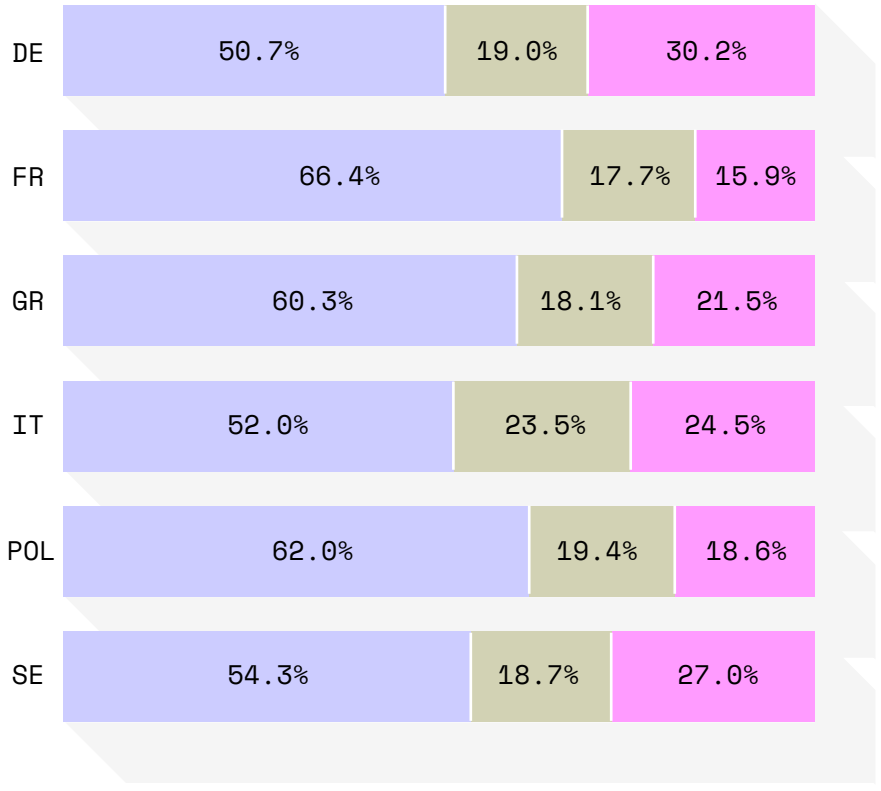


Base: level of comfort; scale: uncomfortable (agg. from very uncomfortable, uncomfortable, somewhat uncomfortable), indifferent, comfortable (agg. from somewhat comfortable, comfortable, very comfortable); n = 2,807

Widespread belief that “news will find me”

As social media platforms are steadily replacing traditional media channels [28], [30], a considerable number of respondents (58%) in all six countries believed they could be well informed even without actively seeking news [20]. Given the fact that algorithmically curated social media feeds do include news recommendations based on our general media use, peer connections, and our peers’ social media use, this might not come as a surprise. However, these developments do warrant concern, as not all users “attract” news in the same way. Research shows that those who consume more political content online are more likely to be shown news content [35]. In other words, relying on algorithmic curation consolidates information inequalities and puts those who are, for various reasons, already less informed at a disadvantage.

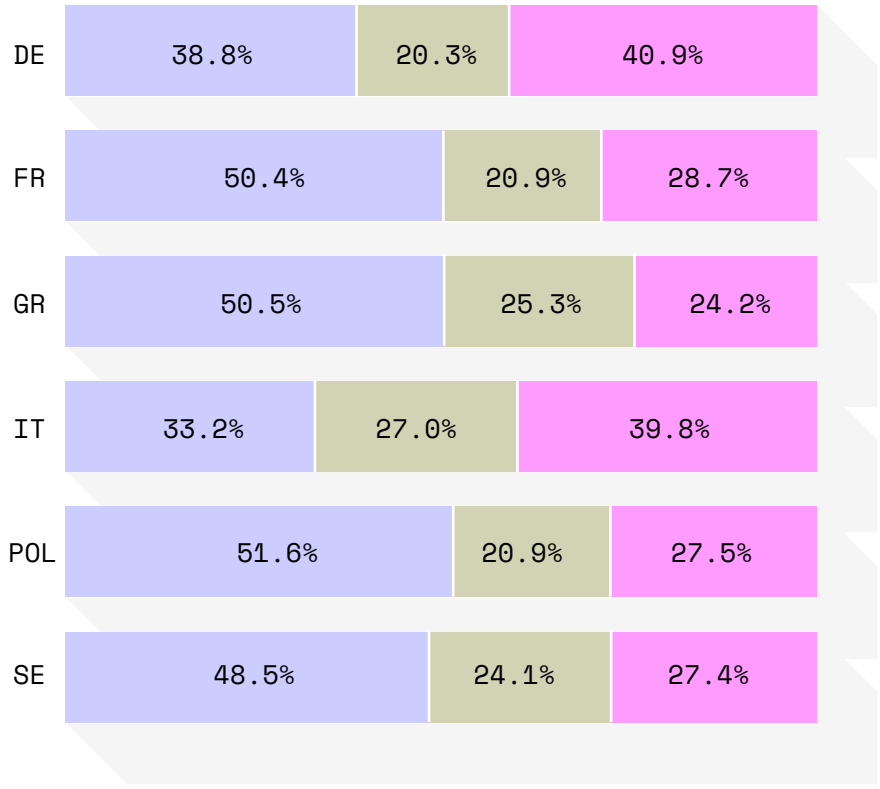
I can be well informed even when I don’t actively follow the news.



- Rather agree
- Neither
- Rather disagree

Base: agreement (by country); scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither agree not disagree, rather agree (agg. from somewhat agree, agree, strongly agree); n = 2,840

I don’t worry about keeping up with the news because I know news will find me.



- Rather agree
- Neither
- Rather disagree

Base: agreement (by country; scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither agree nor disagree, rather agree (agg. from somewhat agree, agree, strongly agree); n = 2,826

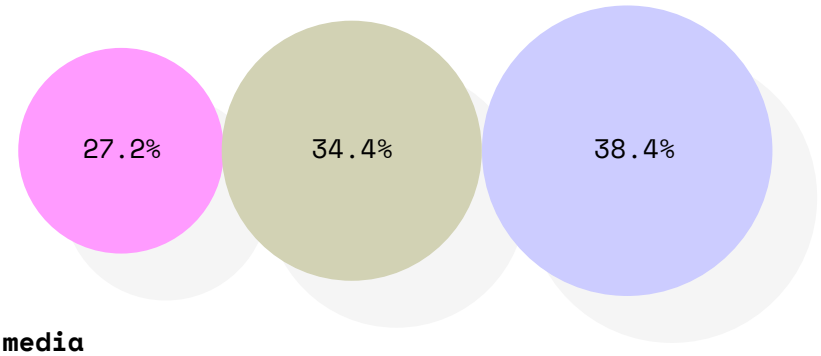
Low appreciation of political ads

The possibility of reaching social media users through personalized advertising is also increasingly used in political election campaigns (so-called political microtargeting). The Cambridge Analytica scandal has led to an extensive debate about the permissibility and limits of such measures. In general, young people feel that they benefit from algorithmic recommendations: 38% of participants said they benefit a lot. Half of the respondents stated that they benefit to some extent.

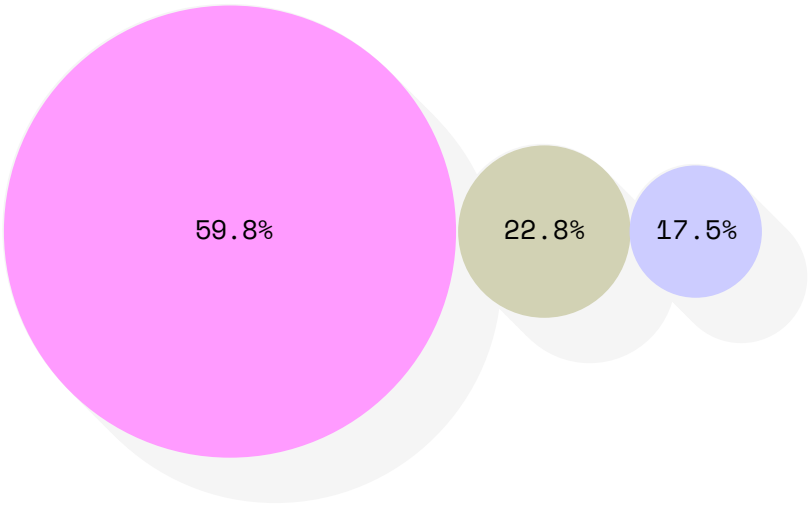
However, not all algorithmically curated content is seen as equally beneficial. In the surveyed sample, political advertisements were not particularly appreciated.

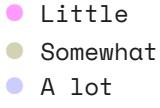
To what extent have you benefitted from...

content recommendations on social media platforms?



political advertisements on social media platforms?





Base: extent of benefit; scale: little (agg. from not at all, slightly), somewhat, a lot (agg. from moderately, extremely); n = 2,733

Base: extent of benefit; scale: little (agg. from not at all, slightly), somewhat, a lot (agg. from moderately, extremely); n = 2,658

GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP
GOVERNING/DATA/&/DEMOCRATIC/CITIZENSHIP

VI.
Governing Data & Democratic Citizenship

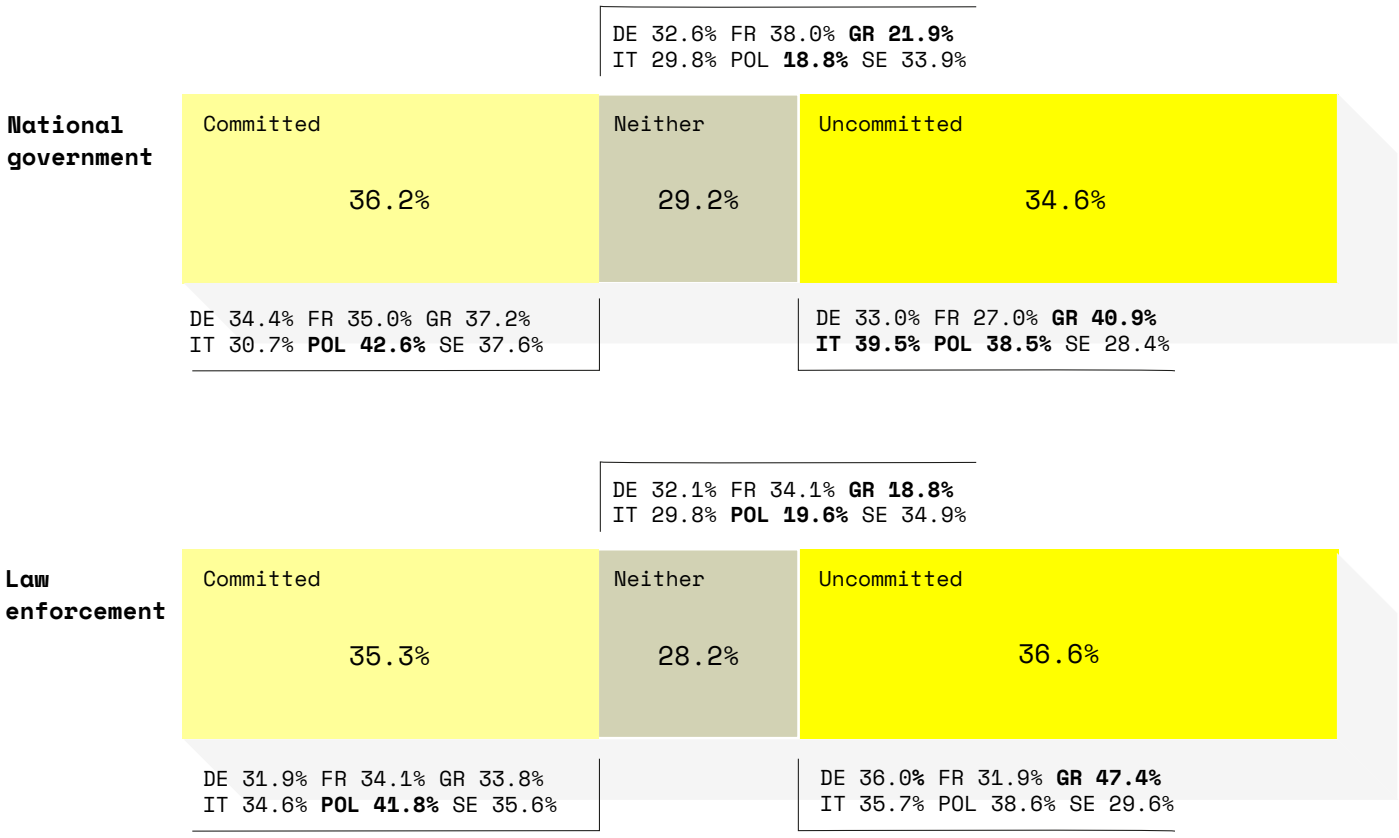
Evidence of the large impact that AI and datafication have on our political lives is omnipresent. Whether it is bots deployed by foreign governments to disrupt European and national elections, security breaches that facilitate the misuse of personal data for political purposes, or algorithmic content moderation that motivates extremism, our rights to privacy and political participation are in need of attention and protection.

On the individual level, our democratic values require data sovereignty to ensure individual self-determination. On the collective level, as ever more AI applications are used to filter content and moderate speech online, control over data and the design of the public sphere is a deeply democratic issue [36]. Scholars, politicians, and activists have thus been urging for a use of AI that does not narrow political action but protects self-determination by allowing for alternative action and contestation. While AI can assist democratic governance, it must not undermine democratic participatory processes [37]. In the following, we show how young people evaluate datafication practices and their consequences for their own civic agency and democracy at large.

Institutions not fully trusted with AI

Our findings suggest that few respondents trusted the institutions that ought to protect their interests when it comes to the use of AI. Only 36% of participants believed that their government was committed to using AI in the best interest of the people. There were differences between countries: while about 28% of French and Swedish respondents believed their government was uncommitted, this is the case for about 40% in Greece, Italy, and Poland. Similarly, only 35% believed that law enforcement was committed to using AI systems in their best interest. Here, too, countries differ. Greece is leading with almost half of the sample (47%) perceiving their law enforcement as uncommitted. Overall, only 36% of respondents believed that public service was committed to using AI in their best interest, again with Greeks being the most skeptical of this commitment (43%).

How committed are the following bodies to using artificial intelligence systems in the best interest of people like yourself?

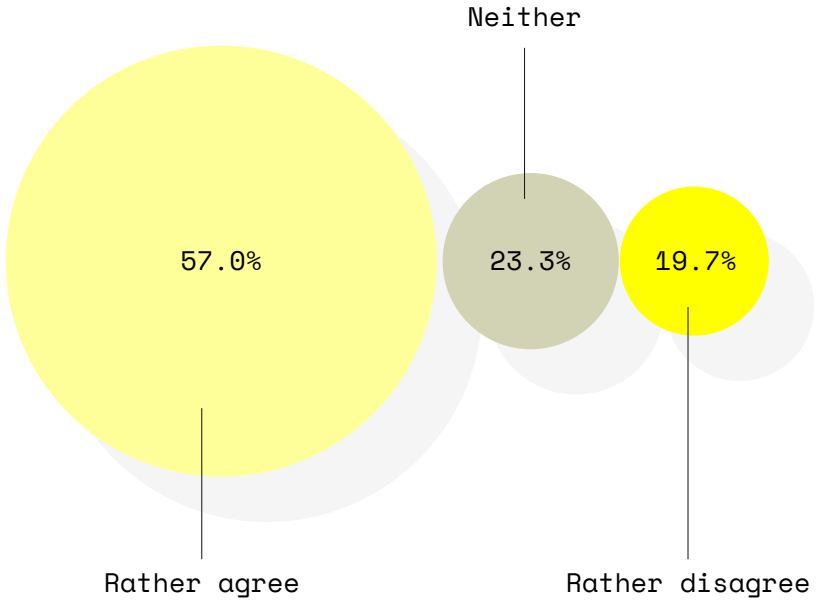


Base: belief about commitment of indicated body (by country); scale: uncommitted (agg. from completely uncommitted, mostly uncommitted, somewhat uncommitted), neither committed nor uncommitted, committed (agg. from somewhat committed, mostly committed, completely committed); n = 2,703 (national government, 2,706 (law enforcement), 2,713 (public service)

Concerns about governmental access to digital behavioral data

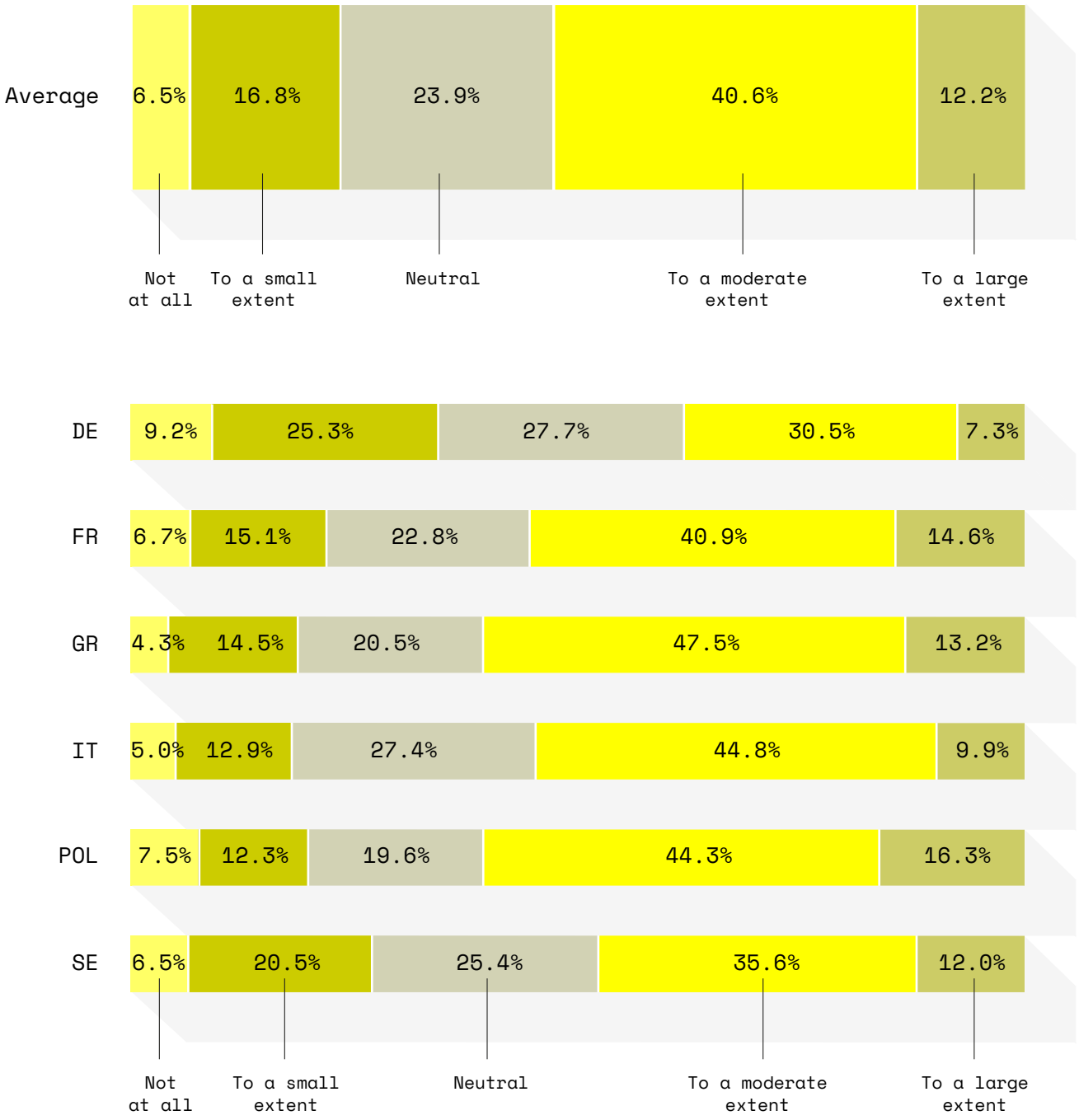
The majority of respondents (57%) said they were rather concerned that data about their online behavior indeed may be made available to their governments. Interestingly, those most worried were respondents with the highest and lowest levels of satisfaction with democracy: this applies to almost 60% of those with a very low level of satisfaction with democracy in their country and to around 42% of those most satisfied with democracy. Furthermore, around half of the respondents (53%) believed they could face at least moderate harm if social media companies made data about their online behavior available to their government, one-quarter was neutral, and one-quarter thought it could harm them only to a small extent or not at all.

I am worried that my personal data online may be made available to my government



Base: agreement, scale: rather disagree (agg. from strongly disagree, disagree, somewhat disagree), neither agree nor disagree, rather agree (agg. from somewhat agree, agree, strongly agree); n = 2,810

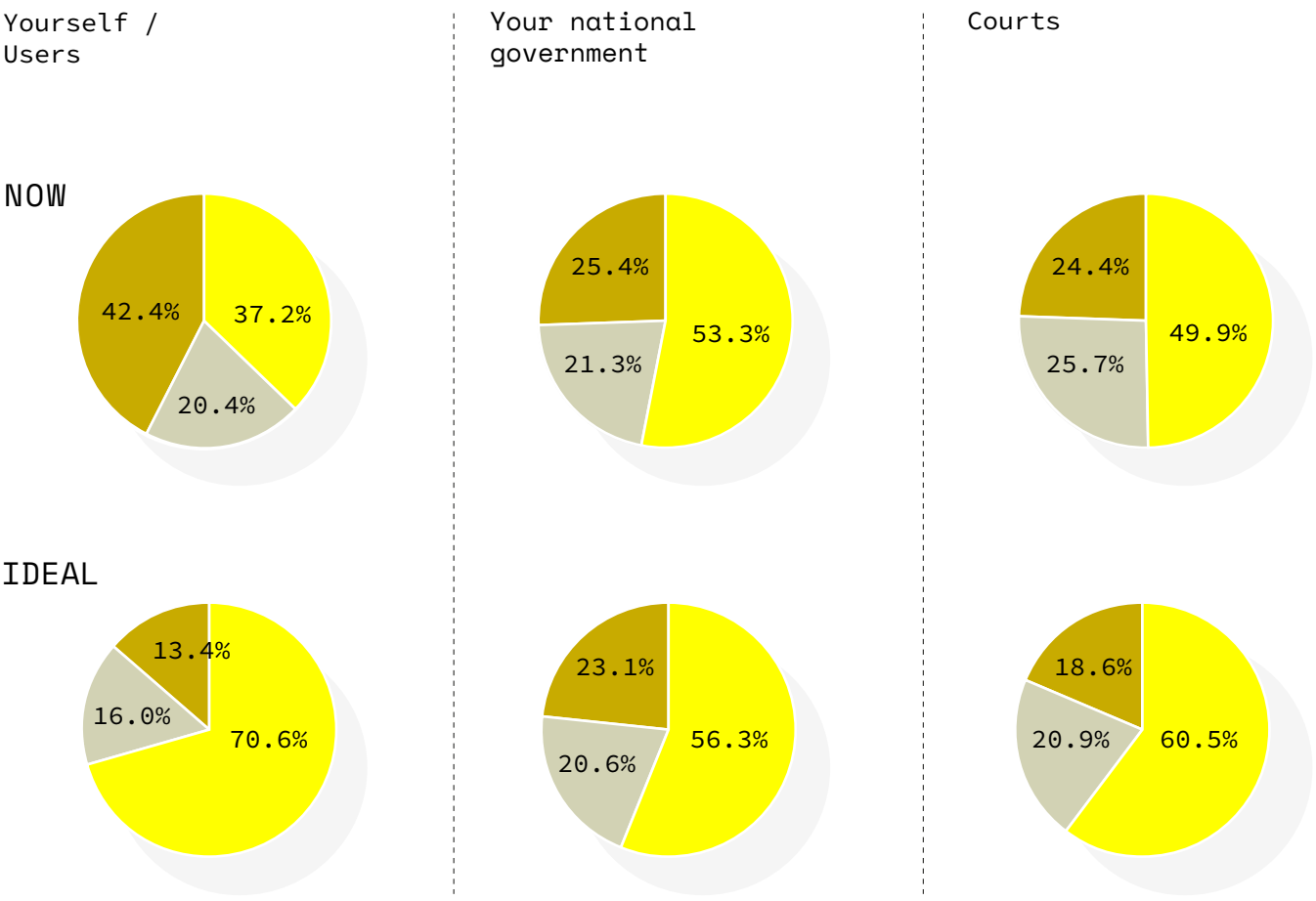
To what extent do you think social media companies sharing data about your online behavior with my government may harm you?



Base: extent of perceived harm (by country), scale: not at all, to a small extent (agg. from to a very small extent, to a small extent), neutral, to a moderate extent (agg. from to a moderate extent, to a large extent), to a large extent (from to a very large extent); n = 2,767

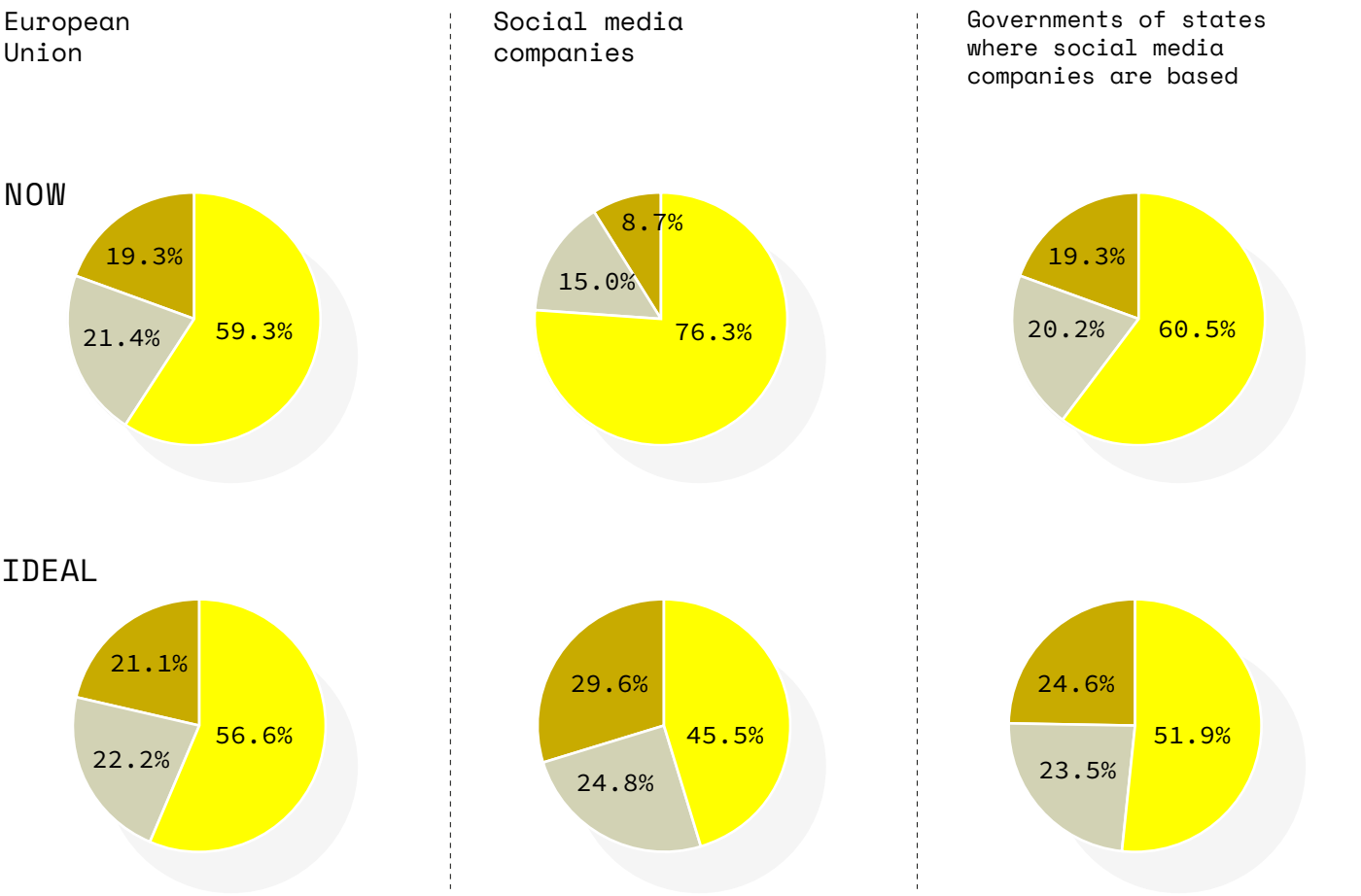
Feelings of powerlessness over data and desire for more ownership

In your view, how much power do the following actors have in deciding what happens to our digital data?



Base: degree of perceived power; scale: rather powerless (agg. from completely powerless, mostly powerless, somewhat powerless), neither, rather powerful (agg. from somewhat powerful, mostly powerful, completely powerful), n (yourself/user now) = 2777, n (yourself/user ideal) = 2777, n (national government now) = 2764, n (national government ideal) = 2767, n (courts now) = 2746, n (courts ideal) = 2765

While governments, courts, and the EU were altogether considered somewhat in power in regard to how users' data is handled, respondents perceived social media companies as having most power over what happens to users' data: more than half of respondents considered social media companies to be mostly or completely powerful, while only a small minority described them as *powerless*. Users were considered least powerful: more than 40% described users as *rather powerless*. On the contrary, 55% of respondents indicated that ideally, users would have the most power over what happens to their data. Surprisingly, however, no particular authority was strongly preferred as the main regulator of data collection and use. On one hand, this may point to the relevance of having different institutions working together; on the other hand, this finding may manifest knowledge gaps related to the regulatory landscape in this field.



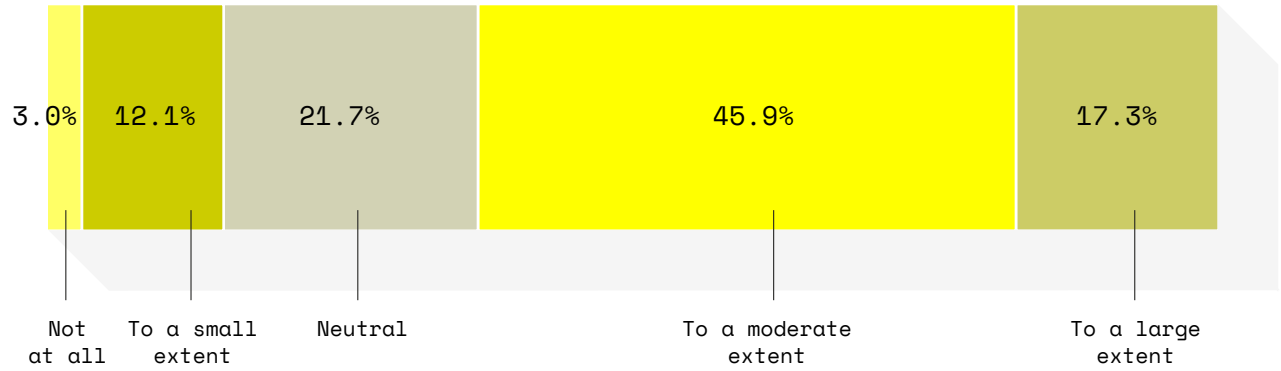
Base: degree of perceived power; scale: rather powerless (agg. from completely powerless, mostly powerless, somewhat powerless), neither, rather powerful (agg. from somewhat powerful, mostly powerful, completely powerful); n = (EU now) = 2741, n (EU ideal)= 2763, n (SMC now) = 2778, n (SMC ideal) = 2770, n (Governments of states where SMC are based now) = 2749, n (Governments of states where SMC are based ideal) = 2750

Data collection perceived as harmful to democracy

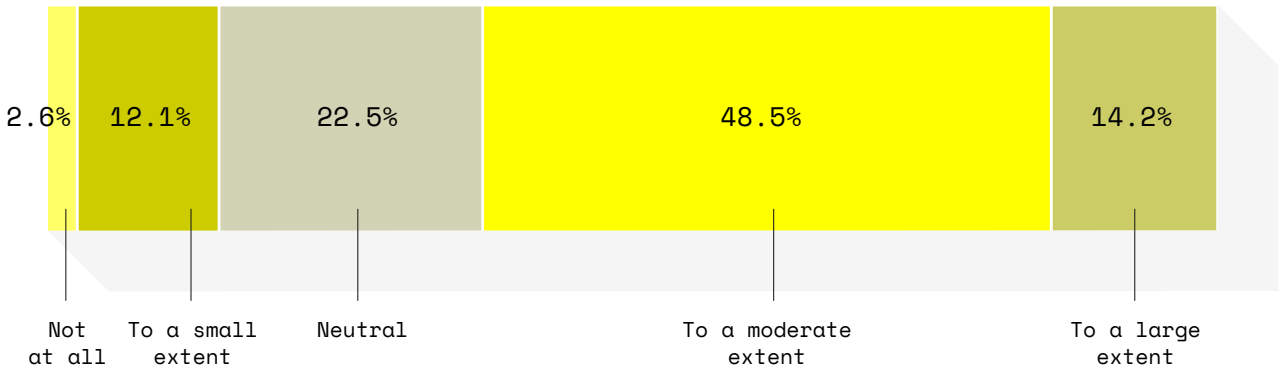
Beyond possible harms of data collection to the individual, the respondents were asked to evaluate possible harms to democracy. The majority of respondents perceived that social media's data-collection practices could be at least moderately harmful to democracy. Social media companies sharing data about users' behavior with governments is perceived as at least moderately harmful by two-thirds of the sample. It is relevant that people are able to contextualize datafication practices in relation to democracy and democratic ways of life, not least in order to demand that these practices are in line with democratic principles and civic rights. The data paints a hopeful picture; however, more insights are needed to understand the extent to which young people have a democratic and technical vocabulary that allows them to evaluate such developments critically.

To what extent do you think that the following may harm democracy?

Social media companies sharing information about citizens' online behavior with the government



Social media companies collecting information about citizens' online behavior



Top bar. Base: extent of perceived harm; scale: not at all, to a small extent (agg. from to a very small extent, to a small extent), neutral, to a moderate extent (agg. from to a moderate extent, to a large extent), to a large extent (from to a very large extent); n = 2,743

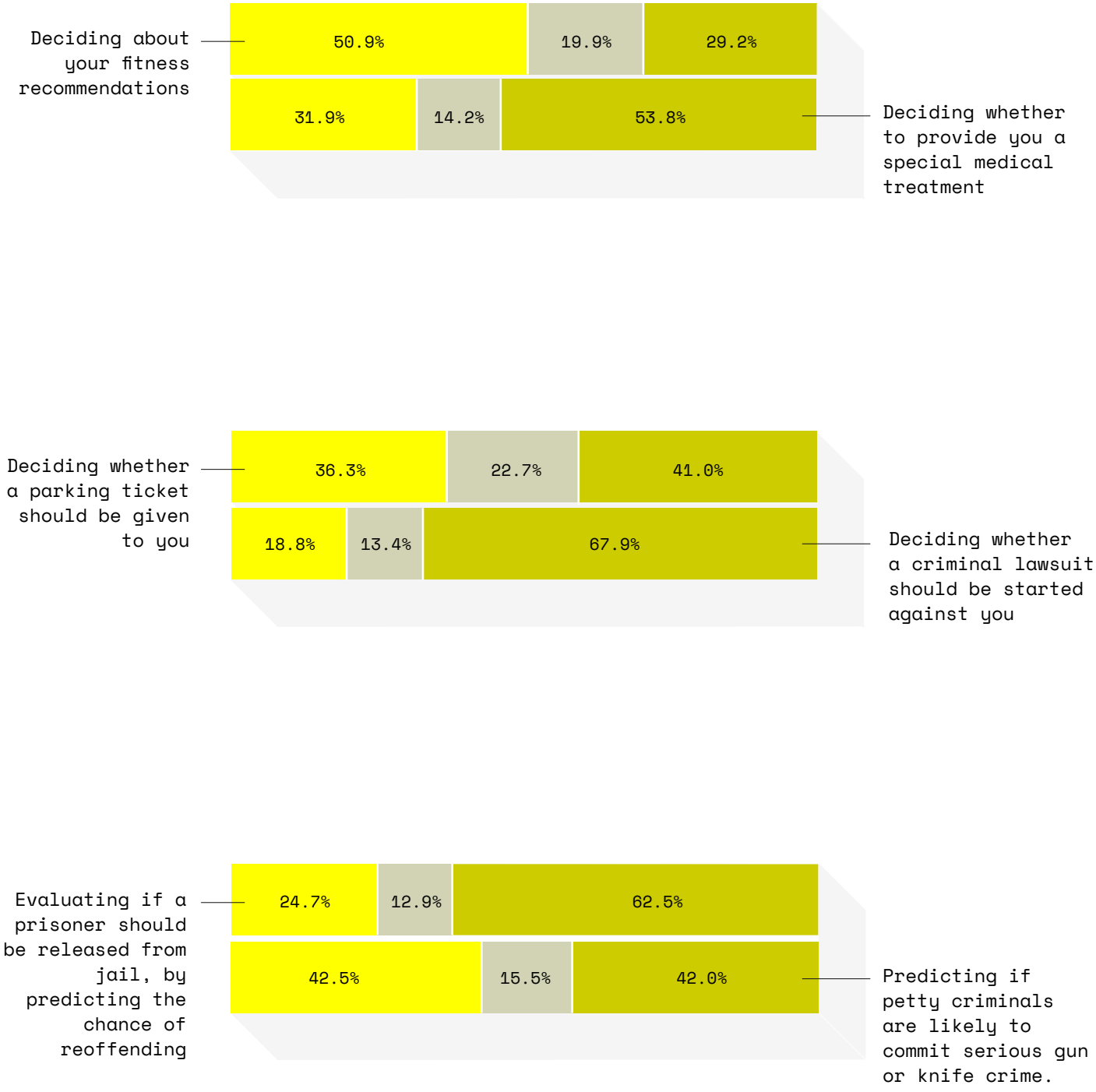
Bottom. Base: extent of perceived harm; scale: not at all, to a small extent (agg. from to a very small extent, to a small extent), neutral, to a moderate extent (agg. from to a moderate extent, to a large extent), to a large extent (from to a very large extent); n = 2,758

Acceptance of automated decision making stronger in low-risk domains

Since automated decision-making (ADM) systems are gaining relevance in the areas of public health, law enforcement, and recruitment and management of employees [38], we asked respondents how comfortable they felt with an employment of AI in these areas. Overall, it appears that ADM creates less discomfort in the context of low-risk applications. For example, while fitness recommendations appear largely uncontroversial, people are less comfortable with getting medical treatments via ADM.

Similarly, people are far less comfortable with an ADM deciding on a lawsuit compared to giving them a parking ticket. However, strikingly, the majority of respondents felt either comfortable or indifferent about predictive policing. The extent to which young people currently have the resources to assess the democratic consequences or harm of such applications adequately is questionable.

How would you feel about an artificial intelligence system deciding on the following?



Base: degree of comfort; scale: uncomfortable (agg. from very uncomfortable, uncomfortable, somewhat uncomfortable), indifferent, comfortable (agg. from somewhat comfortable, comfortable, very comfortable); n = DEPENDS ON ITEM

- Comfortable
- Indifferent
- Uncomfortable

Human oversight assuages discomfort with automated decision-making systems

Of all suggested remedies, human oversight and the possibility to appeal to a human specialist appears to ease people's discomfort with ADM the most. In addition, obtaining an explanation for an ADM system's decision assuages the discomfort. Particularly well-educated respondents felt more comfortable knowing they would have the opportunity to appeal a decision. However, it is noteworthy that the inability to effectively appeal against ADM and the removal of human oversight were most dramatically felt by the poorest and most vulnerable citizens [20]. Interestingly, having an institutional seal of approval of certain technologies did not impact the levels of discomfort much. This again speaks to young people's distrust in institutions and the gap between young Europeans and the institutions aiming to develop and facilitate AI technology that is in service to young people and their diverse socioeconomic backgrounds.

To which extent would the following make you feel more or less comfortable with AI being used?

Base: change in comfort; scale: less comfortable (agg. from much less comfortable, less comfortable, slightly less comfortable), about the same, more comfortable (agg. from slightly more comfortable, more comfortable, much more comfortable); n = DEPENDS ON ITEM

- More comfortable
- About the same
- Less comfortable

VII.
Regional Spotlight

At the end of our study, we would like to briefly highlight a few country-specific findings. On the whole, young Europeans in Germany, Greece, France, Italy, Poland, and Sweden answered our questions very similarly. However, there were peculiarities here and there.

Germany

75% would feel more comfortable with an AI being implemented if a human operator had the final say. **11%** indicated the opposite.

Only **16%** of German respondents felt rather comfortable with the prospect of an AI system deciding if a prisoner should be released from jail. **73%** of respondents expressed their discomfort.

73% rather agreed that pupils should be taught more about digital literacy.

50% believed that tech companies do not follow the rules set by the government. **26%** believed companies do their best.

78% would like users to have more say in deciding what happens to their personal data online.

Greece

65% had frequently heard or read about the collection of user data in the past 12 months.

73% rather agreed that pupils should be taught more digital ethics at school.

50% between the age of 18 and 30 spent three or more hours per day on social media. Only **6%** spent less than one hour.

4% of Greek respondents believed that social media companies sharing data about their online behavior with their government would not harm them at all. **61%** believed it could be at least moderately harmful.

70% expressed discomfort with the idea of an AI system deciding whether a criminal lawsuit should be initiated. **20%** felt comfortable with it.

France

60% believed they learned too little about programming in school. **10%** said they learned too much.

55% stated that they benefited a lot from commercial recommendations on social media platforms. Only **20%** benefited a lot from political content.

22% felt confident that they could secure their privacy online. **60%** indicated the opposite.

79% feared at least to some extent that the data collection of social media platforms could harm them in some way.

61% feared that tracking and monitoring workers could lead to more exploitation in the work context. **19%** believed it would not.

Italy

One in four Italians would feel rather uncomfortable having work scheduled by an AI system. **73%** would not mind.

65% believed that political microtargeting was at least moderately harmful for democracy.

35% felt rather powerful in deciding how their personal data online is handled.

65% believed that political microtargeting was at least moderately harmful for democracy.

34% believed that the public sector was committed to protecting their personal data.

Poland

Two-thirds had frequently heard or read about the collection of user data online in the past 12 months.

67% were rather uncomfortable with an AI deciding on their access to social media.

Two-thirds of respondents from Poland believed that social media companies use AI systems in the best interest of the people.

70% indicated feeling more comfortable knowing that a human operator had the final say over an AI decision.

Over **two-thirds** worried that personal data online was made available to their government.

Sweden

27% indicated feeling able to protect personal information online. **52%** felt the opposite.

51% believed their national government was rather powerful in the questions related to personal data protection. **24%** believed them to be rather powerless.

32% of young Swedes believed that technology would bring more equality in the workplace. **40%** disagreed with this idea.

48% relied on friends to tell them what was important when news happened.

63% of Swedish respondents would not mind an AI scanning CVs for unqualified applicants for a job. **38%** indicated discomfort with this idea.

Recommendations for Educators and Policy-Makers

Education

Bridge knowledge gaps about datafication practices to develop a more comprehensive understanding of the depth of data collection and AI and its consequences for individuals and society.

Promote a critical understanding of datafication and AI, especially by showcasing how automated data-practices interact with forms of discrimination such as racism, sexism, ableism, and classism.

Provide adequate resources to assist young people in assessing both the opportunities and risks of AI on the individual and societal level and strengthen their ability to navigate and exercise agency in algorithmic environments.

Incorporate education on social and workers' rights, including workers' unions, into the school curricula. As young people are facing changing working conditions, it is paramount that they are aware of their rights, have the capacity and knowledge to recognize threats to and violations of their rights, and are able to protect their rights by, for example, effectively organizing for decent working conditions.

Familiarize young people with already existing structures and organizations that advocate for their rights and interests relating to datafication and AI.

Involve students in decision-making processes on the level of educational institutions. This would provide students with opportunities to actively reflect on and discuss AI systems used for educational purposes.

Examine AI applications critically before implementing them in classes, especially but not only related to their compliance with EU General Data Protection Regulation (GDPR).

Use AI applications based on students' and teachers' needs rather than based on technological possibilities.

Policy

Shift responsibility for data protection from the individual level to states, intergovernmental organizations, and companies.

Commit to an international multi-stakeholder AI governance approach across borders that is focused on long-term investment in sustainability, equity, equality, accessibility, and accountability.

Promote international collaboration to allow for knowledge and policy transfer among states and civil society. We see a need for international research and international coordination on law and policy.

Engage with young Europeans who feel like institutions are not committed to using AI in the best interest of the people and develop policy-making processes rooted in meaningful youth participation.

Allocate resources to equip the formal and non-formal education sector—particularly youth organizations on the national and European level—to offer programs tailored to address issues related to datafication and AI.

Facilitate a closer and more sustainable cooperation between nongovernmental organizations (NGOs) and formal education systems with the aim to enhance complementarity of their educational programs. For example, NGOs could support schools in delivering relevant content at a faster and more dynamic pace.

Recognize that AI practices are intertwined with and often exacerbate social inequalities.

AI governance needs to address issues of equality and equity at the outset to avoid treating AI and social inequality as separate matters.

Adopt a risk-based approach rooted in respect for human rights to development and implementation of ADM systems and guarantee that ADM processes are not executed without human oversight.

Communicate transparently and comprehensively about the use of ADM in public institutions as an ongoing trust-building measure.

Ensure that mechanisms for filing complaints over data and AI abuses are accessible to everyone, not just those who have capacities to inform themselves and vast resources for legal action at their disposal.

Require special audits for AI applications used in education to ensure that applications focus on teachers' and students' needs rather than mere technological possibilities.

Glossary

Artificial Intelligence in Education (AIED)
AI in education refers to AI-enhanced technologies and systems designed to make the learning process more flexible, adaptive, and personalized, with the aim of optimizing the learning experience. AIEDs are supposed to complement traditional education and training formats [6].

Algorithm
Broadly defined, algorithms are a sequence of instructions for solving a problem or reaching an end goal from a defined initial situation. Understood this way, a cooking recipe can be considered an algorithm, as can a bureaucratic procedure, such as getting a credit at a bank [39]. In this report, *algorithms* refer to instructions at the core of computer programs that tell these programs how to process information. Algorithms are also at the basis of AI systems. Here, algorithms provide instructions for statistically analyzing huge amounts of data and searching for patterns that enable us to gain insights about complex issues that would not have been possible otherwise. A variety of functions of platforms on the internet—such as information search, news or product recommendations, and filtering—are based on algorithms.

Algorithmic skills
Algorithmic skills are one type of internet skills that refer to people's awareness and understanding of systems that operate at the back end of platforms [40], [41]. Algorithmic skills are of particular relevance in contexts where users' agency is steered by algorithms—for example, related to newsfeeds on social media platforms or video recommendations on streaming platforms. Algorithmic skills entail an awareness of content filtering, awareness that algorithms make decisions on how to tailor content to users, awareness of an interplay between users' behavior and algorithmic decisions, awareness of the possible impact of algorithms on our behavior, and, finally, awareness of the ethical concerns related to all of this [42].

Automated decision making
Automated decision-making refers to the process in which systems use data-driven technologies to automate procedures, practices, or policies. On the one hand, ADM can be useful in many sectors, as it leads to quicker and more-consistent decisions especially when we need to analyze huge amounts of data to come to a decision. On the other hand, it bears many risks. For example, ADM is mostly invisible to individuals who are subject to it, data upon which decisions are made may be flawed, the algorithms may be written—consciously or unconsciously—in a way that reproduces discriminatory practices (also called *algorithmic bias*), and human operators may be inclined to treat such decisions uncritically [43]. In the end, ADM can be used for the purpose of surveilling, policing, and targeting individuals or collectives [44].

Datafication
Datafication is a contemporary phenomenon and ideology that proclaims that every aspect of our lives can and should be translated into data, very often for economic profit [45]. In practice, this means that all our experiences—from walking through the city, sleeping, connecting with friends and family, working, traveling, or dating—are viewed as sources of data that can be extracted and sold. Critics of datafication oppose datafication's imperative to extract data from all spheres of life, by any means possible, and with minor regard for consent [46].

Data capitalism
*Data capitalism r*efers to a system in which the monetization of personal data produces asymmetric power relations that benefit those who have access and resources to extract data for profit [47]. Data capitalism is enacted through capitalism and reproduces its logics and structures, including social inequity, uncompensated labor, and social control.

Political microtargeting
Microtargeting is a process that intends to influence voters by targeting them with stimuli based on the preferences and characteristics of individuals [48]. This process depends on the availability of huge amounts of data, including individual citizens' residence and gender but also political preferences such as party affiliation and support for social causes. The available data is analyzed using algorithms to identify relevant demographic groups, which are then strategically targeted with political content. A prominent example of political microtargeting was the Cambridge Analytica scandal; however, microtargeting is widely used also by nongovernmental organizations for mobilizing around various societal causes.

Self-determination
Self-determination can be understood as an individual and collective competence to recognize, use and shape scope for action. It is a basic prerequisite for the democratic organization of society and for a competition-based social market economy. Informational self-determination relates to the basic right of the individual to determine the disclosure and use of one's personal data [49]. Thus, this understanding of self-determination is closely related to datafication and privacy [50]. On a collective level, self-determination is a precondition and a requirement for democratic governance.

Surveillance capitalism
Surveillance capitalism refers to an economic system that is based on the commodification of personal data, enabling governments and companies to predict and influence the behavior of groups and individuals [22]. Surveillance capitalism embodies a logic of ever-increasing accumulation and processing of personal data that gives governmental and corporate actors the unprecedented power to profile and monitor people in service of commercial profit or social control. These developments pose profound risks to human dignity, self-determination, agency, and well-being.

References

[1] Weizenbaum, J. (1966). ELIZA - A computer program for the study of natural language communication between man and machine. *Communications of the ACM, 9(1), 36–45*. https://doi.org/10.1145/365153.365168

[2] Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson.

[3] Renz, A., Krishnaraja, S., & Gronau, E. (2020). Demystification of artificial intelligence in education – How much AI is really in educational technology? *International Journal of Learning Analytics and Artificial Intelligence for Education*, *2*2(1), 14–30. https://www.online-journals.org/index.php/i-jai/article/view/12675

[4] Spath, D., Ganschar, O., Gerlach, S., Hämmerle, M., Krause, T., & Schlund, S. (2013). *Produktionsarbeit der Zukunft – Industrie 4.0*. Fraunhofer Institute for Industrial Engineering. https://www2.iao.fraunhofer.de/images/iao-news/produktionsarbeit-der-zukunft.pdf

[5] Teichmann, M., Ullrich, A., Wenz, J., & Gronau, N. (2020). Herausforderungen und Handlungsempfehlungen betrieblicher Weiterbildungspraxis in Zeiten der Digitalisierung. HMD Praxis der Wirtschaftsinformatik, 57(3), 512–527.

[6] Popenici, S. A. D., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning, 12(*22), 1–13.

[7] Holstein, K., McLaren, B. M., & Aleven, V. (2019). Co-designing a real-time classroom orchestration tool to support teacher–ai complementarity. *Journal of Learning Analytics, 6(2), 27–52* https://doi.org/10.18608/jla.2019.62.3

[8] Frank, M. R., Autor, D., Bessen, J. E., Brynjolfsson, E., Cebrian, M., Deming, D. J., Feldman, M., Groh, M., Lobo, J., Moro, E., Wang, D., Youn, H., & Rahwan, I. (2019). Toward understanding the impact of artificial intelligence on labor. *Proceedings of the National Academy of Sciences of the United States of America, 116*(14), 6531–6539. https://doi.org/10.1073/pnas.1900949116

[9] Autor D. H. (2015). Why are there still so many jobs? The history and future of workplace automation. *Journal of Economic Perspectives, 29*(3), 3–30. https://doi.org/10.1257/jep.29.3.3

[10] Wilson, H., Daugherty, P., & Bianzino, N. (2017, March 23). *The jobs that artificial intelligence will create*. MIT Sloan Management Review. https://sloanreview.mit.edu/article/will-ai-create-as-many-jobs-as-it-eliminates/

[11] Siemieniuch C. E., Sinclair M. A., & Henshaw M. J. deC. (2015). Global drivers, sustainable manufacturing and systems ergonomics. *Applied Ergonomics, 51*, 104–119. https://doi.org/10.1016/j.apergo.2015.04.018

[12] Ad hoc Committee on Artificial Intelligence (2020). *Feasibility study on a legal framework on AI design, development and application based on CoE standards*. Council of Europe.

[13] Neff, G., McGrath, M., & Prakash, N. (2020). *Artificial intelligence in the workplace*. Oxford Internet Institute. https://www.oii.ox.ac.uk/wp-content/uploads/2020/08/AI-at-Work-2020-Accessible-version.pdf

[14] Kolbjørnsrud, V., Amico, R., & Thomas, R. J. (2016, November 2). How artificial intelligence will redefine management. *Harvard Business Review*. https://hbr.org/2016/11/how-artificial-intelligence-will-redefine-management

[15] Daugherty, P. R., Wilson, H. J., & Chowdhury, R. (2019). Using artificial intelligence to promote diversity. *MIT Sloan Management Review*, *60*(2).

[16] Hoshino, R., Slobodin, A., & Bernoudy, W. (2018). *An automated employee timetabling system for small businesses*. *Proceedings of the 32nd AAAI Conference on Artificial Intelligence* (pp. 7673–7679). AAAI Press.

[17] Halal, W., Kolber, J., Davies, O., & Global, T. (2016). Forecasts of AI and future jobs in 2030: Muddling through likely, with two alternative scenarios. *Journal of Futures Studies, 21*(2), 83–96.

[18] Noble, S. U. (2018). *Algorithms of oppression*. New York University Press.

[19] Benjamin, R. (2019). *Race after technology*. John Wiley & Sons.

[20] Gil de Zúñiga, H., Weeks, B., & Ardèvol-Abreu, A. (2017). Effects of the News-Finds-Me Perception in Communication: Social Media Use Implications for News Seeking and Learning About Politics. *Journal of Computer-Mediated Communication, 22*(3), 105–123. https://doi.org/10.1111/jcc4.12185

[21] Ben-Israel, I., Cerdio, J., Ema, A., Friedman, L., Ienca, M., Mantelero, A., Eviatar, M., Muller, C., Shiroyama, H., & Vayena, E. (2020). *Towards Regulation of AI Systems*. *Global perspectives on the development of a legal framework on AI systems based on the Council of Europe's standards on human rights, democracy and the rule of law*. Council of Europe.

[22] Zuboff, S. (2019). *The age of surveillance capitalism*. Profile Books.

[23] West, S. M. (2019). Data capitalism: Redefining the logics of surveillance and privacy. *Business & Society, 58*(1), 20–41. https://doi.org/10.1177%2F0007650317718185

[24] Crawford, K. (2021). *Atlas of AI*. Yale University Press.

[25] Andrejevic, M. (2014). The big data divide. *International Journal of Communication, 8*, 1673–1689.

[26] Lorenz, P. (2020). *AI governance through political fora and standards developing organizations: Mapping the actors relevant to AI governance*. Stiftung Neue Verantwortung. https://www.stiftung-nv.de/sites/default/files/ai_governance_through_political_fora_and_standards_developing_organizations.pdf

[27] Just, N., & Latzer, M. (2017). Governance by algorithms: Reality construction by algorithmic selection on the Internet. *Media, Culture and Society, 39*(2), 238–258. https://doi.org/10.1177/0163443716643157

[28] Klinger, U., & Svensson, J. (2018). The end of media logics? On algorithms and agency. *New Media and Society, 20*(12), 4653–4670. https://doi.org/10.1177/1461444818779750

[29] Kitchin, R. (2017). Thinking critically about and researching algorithms. Information, *Communication & Society, 20*(1), 14–29. https://doi.org/10.1080/1369118X.2016.1154087

[30] Newman, N., Fletcher, R., Schulz, A., Andı, S., & Nielsen, R. K. (2020). *Reuters institute digital news report 2020*. Reuters Institute. https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2020-06/DNR_2020_FINAL.pdf

[31] Alhabash, S., & Ma, M. (2017). A tale of four platforms: Motivations and uses of Facebook, Twitter, Instagram, and Snapchat among college students? *Social Media and Society, 3*(1). https://doi.org/10.1177/2056305117691544

[32] Bucher, T. (2018). *If...then: Algorithmic power and politics*. Oxford University Press.

[33] Gran, A. B., Booth, P., & Bucher, T. (2020). To be or not to be algorithm aware: A question of a new digital divide? *Information Communication and Society*. Advance online publication. https://doi.org/10.1080/1369118X.2020.1736124

[34] Harambam, J., Bountouridis, D., Makhortykh, M., & van Hoboken, J. (2019). Designing for the better by taking users into account: a qualitative evaluation of user control mechanisms in (news) recommender systems. *Proceedings of the 13th ACM Conference on Recommender Systems*

(pp. 69–77). Association for Computing Machinery. https://doi.org/10.1145/3298689.3347014

[35] Thorson, K. (2020). Attracting the news: Algorithms, platforms, and reframing incidental exposure. *Journalism, 21*(8), 1067–1082. https://doi.org/10.1177/1464884920915352

[36] Nemitz, P., & Pfeffer, M.. (2020). Prinzip Mensch. Macht, Freiheit und Demokratie im Zeitalter der künstlichen Intelligenz. Dietz, J H.

[37] Rostalski, F., & Thiel, T. (2021). Künstliche Intelligenz als Herausforderung für demokratische Partizipation. *Verantwortungsvoller Einsatz von KI? Mit menschlicher Kompetenz! Eine Schriftenreihe der Interdisziplinären Arbeitsgruppe Verantwortung: Maschinelles Lernen und Künstliche Intelligenz*. Berlin-Brandenburgische Akademie der Wissenschaften. https://www.bbaw.de/files-bbaw/user_upload/publikationen/BBAW_Verantwortung-KI-4_A5_Broschuere_2020_online-version.pdf

[38] Araujo, T., Helberger, N., Kruikemeier, S., & de Vreese, C. H. (2020). In AI we trust? Perceptions about automated decision-making by artificial intelligence. *AI and Society, 35*, 611–623. https://doi.org/10.1007/s00146-019-00931-w

[39] O'Neil, C. (2016). *Weapons of math destruction: How big data increases inequality and threatens democracy*. Allen Lane.

[40] Hargittai, E., Gruber, J., Djukaric, T., Fuchs, J., & Brombach, L. (2020). Black box measures? How to study people's algorithm skills. *Information, Communication & Society, 23*(5), 764–775. https://doi.org/10.1080/1369118X.2020.1713846

[41] Hargittai, E., & Micheli, M. (2019). Internet skills and why they matter. In M. Graham, & W. H. Dutton (Eds.), *Society and the internet: How networks of information and communication are changing our lives* (2nd ed., pp. 109–126). Oxford University Press.

[42] Zarouali, B., Boerman, S. C., & de Vreese, C. H. (2021). Is this recommended by an algorithm? The development and validation of the algorithmic media content awareness scale (AMCA-scale). *Telematics and Informatics, 62*(March), 101607. https://doi.org/10.1016/j.tele.2021.101607

[43] Zerilli, J., Knott, A., Maclaurin, J., & Gavaghan, C. (2019). Algorithmic decision-making and the control problem. *Minds and Machines, 29*(4), 555–578. https://doi.org/10.1007/s11023-019-09513-7

[44] Richardson, R. (Ed.). (2019). *Confronting black boxes. A shadow report of the New York City automated decision system task force*. AI Now Institute. https://ainowinstitute.org/ads-shadowreport-2019.pdf

[45] Mejias, U. A., & Couldry, N. (2019). Datafication. *Internet Policy Review, 8*(4). https://doi.org/10.14763/2019.4.1428

[46] van Dijck, J. (2014). Datafication, dataism and dataveillance: Big data between scientific paradigm and ideology. *Surveillance and Society, 12*(2), 197–208. https://doi.org/10.24908/ss.v12i2.4776

[47] Couldry, N. (2018). Tracing capitalism's turn to data: Or, contextualizing daily life's new data "context" — Commentary. *International Journal of Communication, 12*(0), 5.

[48] Papakyriakopoulos, O., Hegelich, S., Shahrezaye, M., & Serrano, J. C. M. (2018). Social media and microtargeting: Political data processing and the consequences for Germany. *Big Data and Society, 5*(2), 1–15. https://doi.org/10.1177/2053951718811844

[49] Fischer-Hübner, S., Hoofnagle, C., Krontiris, I., Rannenberg, K., & Waidner, M. (2011). Online privacy: Towards informational self-determination on the Internet. *Dagstuhl Manifestos, 1*(1), 1–20. https://doi.org/10.4230/DagMan.1.1.1

[50] Hildebrandt, M. (2015). *Smart technologies and the end(s) of law: Novel entanglements of law and technology*. Edward Elgar Publishing. https://doi.org/10.4337/9781849808774

About the Authors

Emilija Gagrčin, M.A. is a research associate at the Weizenbaum Institute for the Networked Society (research group: Digital Citizenship) and a doctoral student in the field of political communication at Freie Universität Berlin. In her research, she explores how digitalization and datafication are changing the way citizens perceive and exercise their role in democracy. Outside of academia, she is serving as a member of the Advisory Council on Youth of the Council of Europe, where she is entrusted with the topics of internet governance and artificial intelligence.

Nadja Schaetz, M.A., is a doctoral student at Universität Hamburg, where she does research on journalism under datafication, with a focus on communicative dimensions of inequality. She is particularly interested in the social and political implications of datafication and AI. Prior to her doctoral studies at Universität Hamburg, she worked as a research associate at the Weizenbaum Institute for the Networked Society and Freie Universität Berlin. She holds an M.A. degree in media and communication studies from Stockholm University, where she remains a collaborator doing research on information inequality in a global perspective.

Niklas Rakowski is a doctoral student at the Weizenbaum Institute for the Networked Society (research group: Digitalization and Democracy). Previously he studied law in Münster and Lisbon with a focus on IT and media law. His current field of research is fundamental human rights in the digital age. In his doctoral thesis, he examines the freedom of assembly in digital spheres. In 2019, he founded and initiated Talking Europe, a Pan-European discussion platform that used artificial intelligence to enable discussions between Europeans with opposing political views in their native languages.

Roland Toth, M.A., is a research associate at Freie Universität Berlin in the Department for Media Use Research at the Institute of Journalism and Communication Studies (IfPuK). His research focus lies on the conceptualization and measurement of mobile media use. He primarily teaches seminars on quantitative methodology using R programming language. Roland is also scientific officer at the Weizenbaum Institute for the Networked Society.

André Renz holds a Ph.D. in the field of economics and behavioral sciences from the University of Bayreuth. Using a trans- and interdisciplinary research approach, he combines methods in sociology, psychology, and economics to gain a deeper understanding of everyday phenomena and market changes. Since 2018, he has led the research group Data-Driven Business Model Innovation at the Weizenbaum Institute for the Networked Society in Berlin. Currently, his focus is on the topic of artificial intelligence in education, learning analytics, data-based EdTech solutions, and digital transformation and innovation in education and knowledge transfer.

Gergana Vladova holds a Ph.D. in business informatics from the University of Potsdam. She is leading the research group Education and Advanced Training in the Digital Society at the Weizenbaum Institute for the Networked Society as well as the research group Knowledge, Learning, Training at the University of Potsdam, Chair of Business Informatics. In the center of her research is the transformation of educational processes as a result of digitalization as well as the role of new technologies, especially AI.

Martin Emmer is professor of communication science at the Freie Universität Berlin, where he chairs the Department for Media Use Research at the Institute of Journalism and Communication Studies (IfPuK). He is the founding director and principal investigator (PI) at the Weizenbaum Institute for the Networked Society. Martin Emmer was managing director of the Institute of Journalism and Communication Studies at the Freie Universität Berlin from 2017–2019 and has been PI of the Einstein Center Digital Future since 2016. His research focuses on political communication, the use of digital media, and methods of empirical communication research.

Imprint

Published by

The Managing Board members of the
Weizenbaum-Institut e.V

Prof. Dr. Christoph Neuberger
Prof. Dr. Sascha Friesike
Prof. Dr. Martin Krzywdzinski
Dr. Karin-Irene Eiermann

Weizenbaum-Institut e.V
Hardenbergstraße 32
10623 Berlin

Tel: +49 30 700141-001
Mail: info@weizenbaum-institut.de
Web: www.weizenbaum-institut.de

The Weizenbaum Institute for the Networked Society – The German Internet Institute is a joint project funded by the Federal Ministry of Education and Research (BMBF). It conducts interdisciplinary and basic research on the changes in society caused by digitalisation and develops options for shaping politics, business and civil society.

In cooperation with

Goethe-Institut e.V.
Project “Generation A=Algorithm”

Dr. Jeannette Neustadt
Brigitte Döllgast

Goethe-Institut
Oskar-von-Miller Ring 18
80333 München

Tel: +49 89 159 21-0
Mail: info@goethe.de
Web: www.goethe.de

The Goethe-Institut is a worldwide active cultural institute of the Federal Republic of Germany. It promotes the study of the German language abroad and encourages international cultural exchange.

The work of the Weizenbaum Institute is funded by the Federal Ministry of Education and Research of Germany (BMBF) (grant no.: 16DII121, 16DII122, 16DII123, 16DII124, 16DII125, 16DII126, 16DII127, 16DII128 – “Deutsches Internet-Institut”).

This report was supported with special funds from the Federal Foreign Office for the German EU Council Presidency 2020.

DOI: https://doi.org/10.34669/wi/1

Authors: Emilija Gagrčin, Nadja Schaetz, Niklas Rakowski, Roland Toth, Dr. André Renz, Dr. Gergana Vladova, Prof. Dr. Martin Emmer

Contact: Emilija Gagrčin

Design: Marcia Mihotich

Image credits:
Cover, Mohammed Hassan
p.11 Caroline Attwood
p.18 Shingi Rice
p.24 Toby Osborn
p.30 Priscilla Du Preez
p.35 Shingi Rice
p.43 Glodi Miessi
unsplash.com