Introduction

Inequalities and Divides in Digital Cultures

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If you live in a neighbourhood categorised as "low income," you are more likely to encounter online advertising for high-interest loans (Newman 2014; Miller 2015). If your name is considered popular among black people, individuals searching for you online may see arrest record advertising more frequently (Sweeney 2013). If an online advertising system classified you as woman, you are less likely to receive job advertisements for high-income positions (Datta, Tschantz, & Datta 2015: 102). We could considerably expand this list of technological biases and their detrimental, discriminatory effects. Some of the mentioned examples may have been partially tackled by now (Hauser 2016), but new ones are surfacing almost every day.

These examples from the online advertising sector illustrate a point that one might consider well established: digital media and platforms suffer from biases; they perpetuate societal inequalities and divides. Media and science/technology scholars, among others, have long stressed that technology is not neutral (see Ferguson 1974; Kranzberg 1986; Franklin & McNeil 1988; Wyatt et al. 2000) but is structurally similar to, or even embodies, forms of authority and power (e. g. Winner 1980). Yet, while the argument that "[t]echnology is neither good nor bad; nor is it neutral" (Kranzberg 1986: 545) may seem like common sense by now, its validity and significance had to be defended again and again – even in recent times.

Digital technologies have been, to some extent rightfully, lauded as means for tackling disparities in information access, skills acquisition, cultural or political engagement and economic participation. Besides, online platforms such as Twitter or YouTube support individuals and groups in calling attention to discrimination and societal issues. Yet, the opposite is true, too: digital technologies in turn assert and reinforce pre-existing inequalities and foster new ones. More importantly, these disparities may affect individuals and groups in harmful ways. Therefore, when speaking of "inequality/inequalities" in digital cultures, we suggest an understanding of the term that re-highlights a point made by Wyatt et al. (2000). In their edited volume *Technology and In/equality*, the authors argue that "[f]or there to be inequality, there have to be both difference and disadvantage" (2000: 5). Thus, the term does not only refer to imbalances in how users may access or use digital technologies and content. It also critically addresses that these differences disadvantage certain users, while privileging others.

Therefore, this issue of the *Digital Culture & Society* journal discusses the following: first, how do digital technologies and platforms perpetuate and (co-)

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produce inequalities and divides? And second, in what ways are these disparities disadvantageous, harmful and discriminatory for certain individuals and groups? As technologies do not simply (read: deterministically) bring about negative or positive effects, we are particularly interested in the socio-technical assemblages (see e.g. Kitchin 2017) emerging around digital inequalities. In consequence, this issue scrutinises the emergence of, for example, unequal access conditions, skills distribution and algorithmic biases. At the same time, it pays attention to users' agency. Thus, it also examines how individuals and users may resist and counter techno-social biases and inequalities. These points do not present an exhaustive list, e.g. neglecting questions of media representation to some extent (see Sloan & Mackay 2007; Hill & Shaw 2013). Yet, the issue introduction focuses on the following three themes, as we consider these as historically and contemporarily influential starting points to reflect on digital inequalities:

- Inequality of access
- Inequality and algorithms
- Inequality by design and discursive divides

Among others, Robinson et al. (2015) emphasise that emerging "digital inequalities" should not be conceptualised as detached, mere technological issues. Instead, digital inequalities are contingent on, embedded in and relevant to social, political and economic ensembles. They may be associated with factors such as diverging skills and media literacy, unequal access due to political restrictions or economic conditions. In this sense, one also needs understand them in relation to "[...] traditional axes of inequality such as race, class, and gender" (Robinson et al. 2015: 569).

With regard to digital technologies, "inequality/inequalities" tend to be entangled with the notion of the "digital divide" (Selwyn 2002; Van Dijk & Hacker 2003; Warschauer 2004; Ragnedda & Muschert 2013). As we will examine in the following section, initially, relevant debates focused especially on issues of unequal access as well as on their geopolitical, economic implications and causes.

Inequality of Access

Inequalities have often been addressed as geographically uneven distributions of information and communication technologies (ICTs). Initially, the discussion of the digital divide focused on accessibility and therefore circled around the question whether (and where) people *have or do not have* access to ICTs. This is a highly material perspective and puts an emphasis on general access to and possession of technologies, as well as usage opportunities (Van Dijk 1999). This was basically done according to a yes/no logic. With internet access spreading at least in Western countries, research moved away from this binary understanding of accessibility (Warschauer 2004; Hargittai 2008). As stated by Thomas and Wyatt, "[a]ccess is not the only problem" (2000: 21). While missing technological infrastructure is yet an issue on a global as well as on a local scale, e.g. in rural areas, inequalities were also seen as more than mere matters of (technical) accessibility. The question is not only whether someone has access to digital technologies but: "Who, with which characteristics, connects how, to what?" (Hilbert 2011: 727). Therefore, Ragnedda & Muschert (2013) still acknowledge research into unequal access in their description of the digital divide, but they also take into account additional factors such as demographic and socio-economic factors including income, education, age and gender, as well as infrastructure, products and services. The authors propose to link research results focussed on access to a wider understanding of the digital divide and also ask to apply classical approaches of the sociology of stratification in order to explore how existing social inequalities are replicated, as well as newly created in technology use.

With ICT use spreading, research moved from a focus on the distribution of access to investigating differences in the usage of technology in greater detail. Van Dijk and Hacker (2003) identified several what they called "usage gaps." A usage gap can arise not only because of a lack of (material) possession, but also because of missing experience and inadequate digital skills in dealing with technologies. Even when saturated with ICTs (the authors present the statistics using data from the United States and the Netherlands), there are gradual but significant differences among people with different demographics, especially age and gender is a significant factor, while education seems to play a minor role. In order to close these usage gaps, the authors conclude that producers and designers should focus on elderly people, women and ethnic minorities.

General usage gaps within populations can be studied using large datasets covering the distribution of use as well as the demographics of the users. In order to get a detailed view of individual differences in use within certain groups, research which connects infrastructural approaches with inquiries into the mundane routines and emerging media practices seems promising. These rather qualitatively oriented studies also bring forward insights into how people work around inequalities of access and how they deal with the absence of the necessary infrastructural means to connect. Ethnographic inquiries into the media use of people in African countries and Latin America show how mobile infrastructures emerge bottom-up which connect distant places through the constant movement of people, data and things. Without wanting to romanticise, it also has to be acknowledged that divides and inequalities in access lead to workarounds and the creative misuse of technology which can get stabilised and become an alternative infrastructure (e.g. Grätz 2013; Hobbis 2017; see also the article by Köhn in this issue).

In addition to the overall question of access to ICTs, there is also the issue of inequality of access to contents. Having the means to access a network, platform or service can mean different things in different locations, times or situations.

Access is not access to all areas for everyone. Classification of users significantly influences how they are addressed online, which includes what content they may or may not encounter. Geographic locating is insofar still an issue here, since the exact location of information retrieval can change the selection and curation of contents in a dynamic temporal frequency. For example, through geofencing, certain content can be blocked based on the current location of users depending on the legal situation regarding the licensing of certain contents. Since licensing entertainment programmes is largely organised as a negotiation between content providers and national distributors, geofencing and geoblocking is used to regulate access to certain contents. Not being able to watch your favourite show on Netflix while in vacation might be annoying, but certain search results do not show up in different parts of the world because they are not in line with a restorative national interest, and the impacts on the world view of the users are much more subtle and serious.

This points to the power of the technology itself. In highly industrialised countries, end-users are increasingly tangled up in vertically organised digital geographies, or simply "stacks" (Bratton 2015), spanned by physical infrastructures, platforms, smart cities, networks of devices and logging, transmitting and reacting objects (Dodge & Kitchin 2011). This leads us to a question that has become increasingly pressing given the contemporary, everyday significance of algorithms and machine learning: How are inequalities and divides (re-)produced not by inequality of access, or by the use of technology but by the protocols of digital media themselves? What happens to the dictum "to classify is human" (Bowker & Star 1999: 1) when processes of datafication are increasingly automated, and information is algorithmically selected, ranked and curated?

Inequality and Algorithms

When using digital devices and accessing platforms, individuals' behaviour online is nearly constantly documented and quantified. Such "big data" are used to classify and rank users: according to their alleged skills and abilities, consumer habits, job performance, credit history or behaviour in public. Statistical models are supposed to indicate individuals' probability to succeed in a job, shop for certain items, pay off a loan or commit a felony. Besides, obvious surveillance "Data[i]fication" (see e.g. Van Dijck 2014; Broadbent & Lobet-Maris 2015) transforms individuals into commodities. Users are reduced to "data fumes" (Thatcher 2014), and their (economic) value is determined by what is considered their digital footprint.

The unfolding "technological unconscious" (Thrift 2004) is relevant because classifications made by algorithms do not only influence how we perceive and see the world (see the following section). Instead, they also have a bearing on how we are seen and treated by others. These classification systems show a "material force" (Bowker & Star 1999: 3) affecting individuals' situation quite concretely. Yet, their (all too often problematic) underlying assumptions and procedures remain largely invisible.

This does, for example, apply to online advertising of various products and services, ranging from aforementioned loans to job advertising. But one should also consider other domains, such as software and artificial intelligence (AI), meant to guide company's recruitment. For instance, from 2014 until 2018, the tech and e-commerce corporation Amazon.com Inc. developed and employed a recruiting tool which turned out to discriminate against women. One of the reasons for this was that "[…] Amazon's computer models were trained to vet applicants by observing patterns in resumes submitted to the company over a 10-year period. Most came from men, a reflection of male dominance across the tech industry" (Dastin 2018). The case hints at the relatively well-known, but still largely unresolved issue that AI is likely to inherit the biases of those data and procedures used in respective machine learning processes.

The consequences of such discrimination are profound. They do not only affect individuals but have implications for whole industries. As for instance, Hicks (2017) emphasises, with regard to the history of computing in Great Britain, it is not only a misconception that the field has been from the outset dominated by men (see also Abbate 2012). More importantly, they show in their historical examination that "[…] just as efforts to construct a new technocratic class floundered, so too did British computing. In consolidating a male-identified ideal for computer work, the government also whittled down the available pool for computer jobs" (Hicks 2017: 15). Such gendered labour shifts thus have economic repercussions. They are moreover, as we highlighted above, rarely separable from factors such as class, nationality and race.

Paying attention to racialised discrimination, Safiya U. Noble recently coined the term "algorithmic oppression" (2018). The author examines how online search engines and their classification systems discriminate individuals based on racial stereotypes. While isolated incidents are often shrugged off as "glitches" of the system, they do amount to more structurally persistent forms of marginalisation and discrimination. In this sense, Noble's concept of algorithmic oppression appears particularly relevant, as it foregrounds algorithms' discriminatory effects. It complements previous, academic and activist work on algorithmic bias (see e.g. Bozdag 2013; Bucher 2017; Gillespie 2017), also called machine bias (Angwin et al. 2016).

A major point of discussion in this context is the question of – human and/or technological – responsibility and accountability. Many authors, among them Noble (2018), stress that machine bias is ultimately not simply a technological bias, as it is inherited from its creators, users and the data fed into the system. Others oppose that machine learning has reached a level of complexity where the programmer has only limited insights into how certain processes and conclusions are established (see e.g. Ziewitz 2016, on algorithms' "[…] alleged obscurity and inscrutability", and Ananny & Crawford 2018). The latter position opens question-able possibilities for hiding behind technologically black-boxed discrimination – while the black-boxing appears in fact largely human-made (see also Bucher 2018: 41ff.).

Though even if we were to (hypothetically) accept the argument for a moment, it seems especially surprising in which domains such allegedly opaque algorithms are meanwhile used.[1] In the United States, for example, automated risk assessment and produced scores are employed in the criminal justice systems: i. a. to estimate individuals' likeliness to commit another felony. Yet, as Angwin et al. (2016) show in a *Propublica* study, such risk assessment software, e. g. created by the company *Northpointe*, is flawed and leads to racial discrimination:

> In forecasting who would re-offend, the algorithm made mistakes with black and white defendants at roughly the same rate but in very different ways. The formula was particularly likely to falsely flag black defendants as future criminals, wrongly labeling them this way at almost twice the rate as white defendants. White defendants were mislabeled as low risk more often than black defendants. (Angwin et al. 2016)

By pointing out fundamental flaws in automated risk assessment, the authors call attention to the risks and dangers of "outsourcing" decision-making to algorithms more generally. In doing so, their study also illustrates that machine bias is not simply a phenomenon which users have come to accept. Instead, resistance and activist engagement have emerged around related issues and problematic cases.

Civic resistance against problematic uses of algorithms can be described as variation of "data activism" (Milan & van der Velden 2016; Schrock 2016). Such a continuation of earlier "media activism" (Carroll & Hackett 2006) refers to activist practices which discursively and practically oppose how algorithms and related technology are used in contemporary societies. They may expose their flaws by technically investigating the implications of algorithms. And they call attention to these flaws and their implications, with the help of online platforms and social media. This type of activism can refer to one-time interventions by individual users. For example, in a YouTube video, two employees of an American electronics store demonstrated that the motion tracking software of a Hewlett-Packard laptop was not able to interact with either of them. As the concerned staff member, Desi Cryer, puts it: "I think my blackness is interfering with the computer's ability to follow me" (Zamen & Cryer 2009). Activist engagement with algorithmic discrimination may be more continuous and institutionally embedded though too. In Germany, for example, the hacker collective Chaos Computer Club has

1 As also Ananny and Crawford suggest: "If a system is so complex that even those with total views into it are unable to describe its failures and successes, then accountability models might focus on the whether the system is sufficiently understood – or understandable – to allow its deployment in different environments, whether more development time is needed, or if the system should be built at all." (2018: 984–985)

established itself as important, civic association engaging with tech-political developments and shedding light on "[...] technical and societal issues, such as surveillance, privacy, freedom of information, hacktivism, data security [...]" (Chaos Computer Club n. d.).

These types of civic engagement emphasise a point made also by Bucher (2018). We may "[...] live algorithmic lives. Life, however, is not blindly controlled or determined by algorithms. Nor are we simply victims of an ever-expanding artificial intelligence" (Bucher 2018). At the same time, the author also considers that algorithms can have harmful effects. She specifically highlights the issue "[h]ow we are positioned and addressed as objects of algorithmic attention" (Bucher 2018: 155). This question also leads us to the third theme crucial for examining inequalities and divides in digital cultures. In the following section, we will focus on the content that users may or may not encounter on online platforms – partly due to algorithmic curation.

Inequality by Design and Discursive Divides

Internet and tech corporation use data mining and automated classification, among other things, to present users with content that corresponds to their commercial interests. One might want to refrain from calling this "user-relevant content," as it buys into the narrative that such targeted content is supposed to be in individuals' interest. It is only aimed at being of interest for the user to the extent that this fulfils corporate goals – such as a higher likeliness of users to engage with a post, click on an advertisement and/or buy products. In an effort to foster participation and consumption, most social media platforms have come to function according to the principle "What you saw is what you get." Of course, this is not the only criterion: users' geolocation (see also the previous section), indicated interests, demographic data and other factors are vital too.

Users are shown posts or advertising – e. g. on their Instagram feed or Facebook timeline – which are assumed to match interests deduced from previously accessed or shared content. Social platforms curate and offer content according to criteria considered likely to attract users' attention and facilitate interaction. Two terms have been especially influential in this regard: filter bubbles and echo chambers. Both closely relate to earlier theories of homophily (see e. g. McPherson et al. 2001). Several authors have cautioned against the emergence of "filter bubbles" (Sunstein 2006; Pariser 2011; Bozda 2013). The phenomenon is particularly notable on social media and, according to Pariser, "[...] invisibly transforms the world we experience by controlling what we see and don't see" (2011: 82).

The idea is closely related to the "echo chamber effect" (Sunstein 2001, 2018; see also Barberá et al. 2015), resulting i. a. from social media's content curation. It refers to social networks acting as closed systems in which existing beliefs are amplified or reinforced, while dissenting views are subdued. In this sense, social media echo chambers were discussed as potential causes of discursive divides between groups characterised by different opinions, interests or attitudes. Some authors have argued that a lack of exposure to diverse arguments may lead to intellectual isolation and polarised citizenry (Sunstein 2001). It has been controversially debated though to what extent such echo chambers are indeed evolving on social media, what role users themselves play in this and if this development is problematic.

In the first place, it has been questioned whether social media reduce encounters in which users experience disagreement, compared to face-to-face communication (Barnidge 2017; see also Bakshy[2] et al. 2015). Based on a study of 150 million tweets on political as well as nonpolitical issues, Barberá et al. "[...] observed considerable variation across time periods and topics in the extent to which conversations on Twitter were politically polarized. This suggests that some previous studies may have overestimated the degree of mass political polarization" (2015: 1539). Moreover, the original idea of (social media) echo chambers was criticised for its tech-deterministic tendency (Rieder 2012). Several studies (Bakshy et al. 2015; Yang et al. 2017) emphasised that the users' filtering and selection practices play a crucial role in selective content exposure. This issue is also stressed in studies concerning the anti-vaccination movement and an information-seeking behaviour that largely focuses on confirming pre-existing misconceptions (Zummo 2017). Moreover, others argued that being confronted with opposing opinions does certainly not warrant that one may change the own position – in fact, the opposite may be true (Yardi & boyd 2010).

Concepts such as social media filter bubbles and the echo chamber effect are hence relevant for inequalities and divides in digital cultures for multiple reasons. First, in terms of inequalities, they indicate that users of the same platform will by no means encounter the same content. Rather, content is tailored to their profiles, aimed at optimising their value for respective companies and their (advertising) customers. Thus second, in terms of divides, since users may be unlikely to ever encounter and engage with certain content, the risk of isolated spheres of information exchange and debate emerges.

Returning to Wyatt et al.'s argument "[f]or there to be inequality, there have to be both difference and disadvantage" (2000: 5), differences regarding the content users encounter clearly exist. Yet, the disadvantages remain to be explored. These involve, for example, that (vulnerable) individuals are increasingly exposed to advertising taking advantage of their situation. High-interest loans for individuals classified as low income are one possibility. But more recent developments, such as Amazon's patented voice analysis technology for detecting sickness or depression, also enable insights into users' physical and mental health – resulting in advertising for medication and health-related products (Brodkin 2018).

2 At the time of the article's publication, the author was employed at Facebook Inc.

Responding i. a. to these risks of datafication and algorithmic content curation, the idea of *data justice* has increasingly attracted attention (Dencik, Hintz, & Cable 2016; Taylor 2017). As Taylor argues, "[t]he various framings of data justice proposed since the advent of big data indicate that around the world, scholars and policymakers are attempting to reconcile principles of social justice with the reality of datafication" (2017: 12). According to the Taylor's own framework, data justice should consider three main pillars: (1) visibility, dealing with both privacy and representation; (2) engagement with technology, involving the "freedom to control the terms of one's engagement with data markets"; and (3) non-discrimination, i. e. possibilities for identifying and countering bias as well as the freedom of not being discriminated again based on those (2017: 9 ff.; see also the interview with Linnet Taylor in this issue).

Certainly, commercial interests are not the only factor to consider in this context. In 2017/2018, particularly data-driven, political campaigning was in the public spotlight: notably due to the Cambridge Analytica scandal (Cadwalladr & Graham-Harrison 2018). While product advertising may "only" persuade users into buying certain items or services, political advertising may affect their voting behaviour. It is contested though if social media analytics and political advertising, placed by companies such as Cambridge Analytica Ltd. (CAL) and its British parent firm SCL Elections Ltd., were indeed able to nudge users into voting for certain parties/candidates (Baldwin-Philippi 2017; Karpf 2017). Nevertheless, CAL's "dirty politics" (Milan & van der Velden 2016: 1) fed concerns and anxieties among voters and (some) politicians alike. Ultimately, these boiled down to the issue: "What if your political opinions are not actually yours?" (Wetherell 2018). On the one hand, a better understanding of differences in users' access to content and opinions is therefore urgently needed. On the other hand, insights into the actual effects of such differences are scarce – and such insights need to distance themselves from assumptions based on corporate claims or commercially driven studies.

We have already stressed that neither filter bubbles nor echo chambers are mere technological phenomena. Instead, corporate interests but also social dynamics and users' preferences play a decisive role. In addition, one should also take into account governmental interventions. Filter bubbles and echo chambers refer to socio-technical developments questioning to what extent users (do not) get to see content that would be in their personal and societal interests. In other cases, it is undeniable that the content shown to users is inherently biased. It is well-known that countries such as China, in collaboration with respective corporations, censor the content users may encounter when accessing Google from their territory (O'Rourke et al. 2007).

But also recent political developments in Europe should not be overlooked: for example, the Copyright Directive with its controversial Articles 11 and 13, also called "link tax" and "upload filter," was considered as a potential source of censorship. The directive, which has meanwhile been approved in slightly adjusted form, has been harshly criticised by tech pioneers and media scholars. In particular, Article 13 has been described as development that "[…] would mandate Internet platforms to embed an automated infrastructure for monitoring and censorship deep into their networks" (Cerf et al. 2018). Hilty and Moscon moreover argued that it "[…] entails serious risks of contrasts with the [European] Charter of Fundamental Rights as well as with copyright exceptions" (2017: 4). Such developments also indicate that not only corporate interests and users' practices, but also policy developments are crucial for understanding the accessibility and data-driven, automated curation of digital content.

Referring back to the three themes highlighted in this introduction, i. e. inequality of access, inequality and algorithms and inequality by design and discursive divides, the papers included in this issue scrutinise inequalities and divides in digital cultures from empirically informed perspectives. The articles under the section "Case Studies and Field Research" discuss pertinent issues based on qualitative approaches. Gary Kafer interrogates the logics of American terrorist watchlist screening. The author highlights how digital inequities result from specific computational parameters. The paper focuses on Secure Flight: an automated prescreening program by the U. S. Transportation Security Administration aimed at identifying low- and high-risk airline passengers through name-matching algorithms. Gabby Resch examines the conditions and current limits of data engagement, with particular regard to issues of data literacy and access. The article presents the results of a design study, involving interviews with blind and visually impaired persons. Emil Lundedal Hammar pursues a materialist approach to contemporary digital memory-making in video games. Drawing on semi-structured qualitative interviews with European, Asian, and North American developers of historical games, the author argues that materialist and cultural aspects of videogame development reinforce existing mnemonic hegemony. Magdalena Kania-Lundholm writes about the experiences of older non- and/or seldom ICT users and their potential exclusion. She empirically explores how the ideas and experiences of ICT non-usage are shared and negotiated. Steffen Köhn analyses critical media practices surrounding *El Paquete*. This one terabyte collection of data is circulated in Cuba, e. g. on USB sticks and hard drives. The author explores *El Paquete* as a case which shows how relationships between citizenry and the state are being re-negotiated. Natalie Dixon examines mobile communication from an affective perspective. The author draws on the case study of an informal migrant camp, established at Budapest's Keleti train station in 2015.

"Entering the Field" is an experimental section which presents initial and ongoing empirical work. Martin Dittus and Mark Graham present early findings from their study of Wikipedia's geolinguistic contours. Their article shows to what extent local languages are involved in the process of creating local representations. Klare Lanson reflects on a mobile art ethnography, aimed at understanding and questioning regional as well rural experiences of the digital. Based on creative practice-based methods, the author examines the regional/urban divide using the example of the working mother commuter as digital wayfarer. Moreover, this issue's "Entering the Field" section includes an article by Sally Wyatt and Flis Henwood. In 2000, the authors published an edited volume on *Technology and In/Equality: Questioning the Information Society*, together with Miller and Senker (Wyatt et al. 2000). In their paper for this issue, they look back at their work and reflect on developments since then. The final "In conversation with…" piece presents an email interview with Linnet Taylor. In this article, Taylor discusses her work on global data justice.

Last, we would like to thank the authors and reviewers for their fantastic work and collaboration. All papers will be made available as open access 12 months after the initial publication of this issue. You will find them on http://digicults.org/issues.

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