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Economy 4.0 – The Digitalization of Labour from a Gender Perspective

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A Plea to Reflect on the Entanglements of Gendered Work Patterns and Digital Technologies

Annette von Alemann, Julia Gruhlich, Ilona Horwath, Lena Weber

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Just like the First Industrial Revolution, digitalisation is found to be profoundly shaking up the world of work and it has therefore been called 'the Fourth Industrial Revolution', 'Economy 4.0', or 'Industry 4.0'. The rapidly increased implementation of smart technologies, automation, robotics, cyber-physical systems, and digital labour (cloud- and crowd work) in many occupational areas, including the service sector and industry, has sparked a variety of fundamental transformations in the organisation of professions, work, working conditions, and the structure of the labour market. In addition, the widespread use of mobile phones, computers, and data clouds has been challenging the traditional boundaries between private and professional life. Technological innovations have always been discussed as catalysts for social innovation.

However, digitalisation is not a one-way-street. It has to be regarded in the context of its multiple facets and consequences. On the one hand, it creates new possibilities – for example, to reconcile work and private life or to create less hierarchical industrial relations; on the other, it fosters new possible ways for employers to control employees and gives rise to less secure jobs, of which women are historically more often disadvantaged then men. And since technology is a human creation, historically grown social inequalities between genders, ethnicities, and classes are partly implied or transferred into algorithm decision-making, big data sources, and many other areas, and this has large-scale consequences (Eubanks 2018, Lischka, Klingel 2018).

It is striking that the current debate on digitalisation in the world of work and its

consequences is dominated by gender-blind perspectives, especially in economics, labour research, computer science, and technology research (Rosenblat, Stark 2016; Scholz 2017; Vallas, Kovalainen 2019). This makes all the more important the studies and theories that introduce a perspective that systematically integrates gender and feminist theory into science and technology studies and into economic and labour research. It is not enough to just include a gender perspective in this research area, and it is instead necessary to take into account feminist theory, since many studies on artificial intelligence (AI) claim to use 'gender' perspectives, but actually incorporate or even undermine professional knowledge from gender studies and feminist research. This is evident, for example, in the debates on the controversial 'Gay Faces Study', which examines the extent to which a person's sexual orientation can be determined solely from their face (see Wang, Kosinski 2017; Leuner 2018). Conversely, in Gender Studies and Feminist Technoscience, there is a long tradition of exploring the relationship between gender, work, and technology (Haraway 1991b; Wajcman 1994; Ernst, Horwath 2014), which unfortunately has not yet received attention in the ongoing debate about digital workplaces and the social construction of digital industrial relations, data sets, and algorithms.

With reference to technology, one of the pioneers of Science and Technology Studies (STS) is undoubtedly Donna Haraway (1991a), who, in the 1990s, started a discussion on the disruptive and transformative potential of the upcoming 'virtual world' or emerging 'cyberspace' for traditional gender orders and for the dualistic divisions between humans and animals, and things and creatures. Since then, gender researchers in STS have assumed (and hoped) that individuals would be able to reinvent themselves in the virtual world beyond conventional dualisms and gender identities, which might challenge gendered, stereotypical, and restrictive notions of human abilities and interests. This vision culminated in the image of the 'cyborg' (Haraway 1991a). Some researchers even believed that the new technologies opened new job opportunities, particularly for women, because they perceived that completely new professions were emerging that initially had no gender connotations (Wajcman 2004: 108–109). The figure of the cyborg also serves to deconstruct the human-technology-relationship within industrial relations (Halford et al. 2015). Indeed, women have become more and more powerful and more interested in technology, and they are entering the halls of engineering and computational science. Women are, even if only slightly, more involved in the construction of technology, in the smart industries, and in data science (O'Neil 2017). However, the tech industry remains merely white, male, middle class, and able-bodied (Rommeveit et al. 2017; Reinhardt 2015), and research about the digital divide indicates that globally women have less access to the world wide web, that they face cyber-bullying and -mobbing, and that their technical skills are disregarded (OECD 2018).

If we now ask not only about the connection between gender and technology, but also about the connection between work and gender, we inevitably come across two further lines of research: feminist organisation research, and labour and industrial relations research.

First, feminist organisation research shows that organisations do not function as gender-neutrally and rationally as is often assumed. Instead, feminist research has shown that gender becomes relevant in organisations, not only as a reminiscence of traditional stereotypes in the minds of individuals or in the form of identities, but in the structures of the organisation itself. The concept of the 'ideal worker' (Acker 1990, 2006) is based on a full-time worker who has no care obligations in private life and is available around the clock, which has the effect of excluding women in particular from careers (Acker 1990; Williams 2001; Hochschild, Machung 2012). Gender inequalities are effective on a cultural and symbolic as well as on a structural and an individual level (Acker 2006; Halford, Leonard 2001). Women are still disadvantaged in the labour market: they are disproportionally affected by precarious employment and the lack of social standards in employment, they earn less, they have fewer opportunities for advancement or further training, and as they are viewed socially as mothers *and* employees they suffer from the double burden of employment and care-work. Feminist organisational researchers are concerned with the interrelation of gender hierarchies in organisations: they study the processes of gendering work activities, the emergence of gendered work patterns, and the unequal placement of men and women in different professions, occupations and positions (Kalev, Deutsch 2018). From this perspective, an important research question is whether digitalisation can encourage organisations to change their work structures in order to facilitate the reconciliation of work and family life. Another research question is if and how organisations take women into account when building up an information technology infrastructure, in staff development, and in management/leadership.

Second, one stream of feminist labour research combines Marxist with feminist perspectives. It focuses on the relationship between work and gender and states that, in industrial societies, the divide between paid and unpaid work is interrelated with femininity and masculinity. One important feminist demand, among others, is that of equal pay for work of equal value. For this endeavour, feminist Marxist researchers investigate the necessary conditions for this in society and how to achieve them (McDowell 2014). Feminist labour research is interested in the integration of gender into supposedly gender-neutral production processes and, doing this, it sheds light on topics that were previously left invisible, such as a broad understanding of work, the issue of work-life balance and work-life-conflicts, and the important role played by unpaid-labour in society (Becker-Schmidt 2002; Federicci 2012). Feminist labour

researchers have highlighted the key roles that white women and women of colour have played in the history of computing (Nakamura 2014; Hicks 2017) and in pioneering forms of creative online work (Pham 2015; Duffy, Schwartz 2018). Most importantly, feminist labour scholars draw attention to the non-paid labour of undervalued private and 'emotional' work (Hochschild 2003) that is based on immaterial skills, such as caring, loving, educating, communicating, entertaining, and coordinating, which are essential for most services jobs. It is interesting to note that it is precisely these skills, de-qualified and devalued as 'female', that are becoming particularly important in society today, in service work, and in the course of digitalisation. It is therefore hardly surprising that in recent years there have been calls for a revival of feminist Marxist approaches (Jarrett 2016; see also Wagesforfacebook.com).

All these perspectives from interdisciplinary feminist and gender research give important insights into the relationship of work, gender, and/or intersectional inequalities. We suggest that they need to be applied more strongly to the changes caused by digital technologies.

In this special issue, we intend to study gender in/equality in the era of 'Economy 4.0' by concentrating on the interconnection of work, digital technologies, and gender relations in the emerging digital age. We ask if the technologically-induced change in work will lead to a general change in gender order and gender relations: Will existing inequalities, such as vertical and horizontal gender segregation, the unequal distribution of income, the lack of opportunities for women's career development, the low level of recognition given to 'women's work', and the traditional division of labour in the family, be diminished? Or will they persist and even intensify? Our aim is to shed light on the multiple connections between the emerging Economy 4.0 and gender at the intersection of other categories of social inequality, such as race and class. By raising this question, we are approaching a growing field of research that, so far, has barely explored gender issues and the position of women in the labour market. On the contrary, current discussions on the digital transformation of work tend to focus on male-dominated industries (such as the automotive sector), or they conceive new occupational perspectives as disembodied and supposedly gender-neutral.

As we work and write on this special issue, global events are unfolding thick and fast due to the spread of the COVID-19 pandemic. Digital work is gaining momentum in the private sector as working from home is starting to be accepted in areas where it was uncommon or even unthinkable before. In the underfunded public sector, especially in primary and secondary education, it is becoming apparent that there is grossly insufficient digital infrastructure and a lack of concepts on studying, learning, and teaching online. Additionally, teachers have had to learn as they go along and apply digital education concepts without help from society or their organisation. In this situation, digitalisation has been 'fast-tracked' and the changes in the world

of work, as well as the gender arrangements interwoven with them, are accelerating in many countries.

At the same time, the pandemic has clearly highlighted gender inequalities at work (Schröder et al. 2020). It is already becoming apparent that women in particular are negatively affected by the pandemic (Kohlrausch, Zucco 2020; Kreyenfeld et al. 2020). The majority of women work in professions where they are at a high risk of getting infected and infecting their families (the health sector, care, services, retail and banking, education). Furthermore, as schools and kindergartens were or are closed in many countries, the pressure to work from home has hit women particularly hard. Often, fathers do not feel equally responsible for housework and child-rearing (Boll, Schüller 2020; Bünning, Hipp, Munnes 2020; Möhring et al. 2020). Even before the lockdown, the findings about men and women working from home showed an unequal division of gainful and non-gainful work: when both partners in a heterosexual couple worked from home in full-time employment, it was mainly the women who shouldered a greater amount of the care work. The 'gender-care share' is and has always been unequally distributed (Boll, Schüller 2020; Samtleben, Müller, Lott 2020). On the other hand, fathers and men more often work in jobs that are not considered as feasible to perform at home, just as it is part of the masculine symbolic order to be present at the workplace. Very few employers consider(ed) the fact that there is no such thing as an ideal worker and have hardly scaled down their performance requirements during the crisis.

Owing to long-term political ignorance about the unequal positioning of women in society, women in particular have been affected by the double burden of bringing up children, schooling them, and working at the same time. The pandemic has exposed these inequalities even more. Suddenly, politicians are praising 'women's professions' as highly important for society. For example, in Germany, these professions have been labelled 'systemrelevant', which means they are 'essential to the social system'. The denomination includes nurses and supermarket cashiers, whose contributions to society have been rather dismissed in recent decades. It is obvious to everyone in society that many 'women's professions' formerly deemed to be of little value actually ensure the maintenance and survival of society. About three-quarters of the jobs in critical infrastructure are held by women. Many of those jobs, however, cannot be automated, performed from home, or in some other way digitally transformed.

Will the powerful homology between masculinity and (digital) technology persist or will the exclusion and systematic devaluation of femininity in the context of technology become questionable? The new technological possibilities might change work, but, if gender inequalities are to be reduced, what matters is how professional frameworks are designed and used. To now it has been unclear what direction the new attention

women's occupations have begun to receive will go in. Will it trigger a sustainable rethinking in politics? Will female-connoted professions finally be more up-valued because they are necessary for society?

The articles in this special issue present empirical evidence gathered prior to the COVID-19 pandemic and the recent wave of the digitalisation of work. Nevertheless, the authors identified fundamental patterns and dynamics that are also reflected in current developments and shape their course.

Bettina Kohlrausch and Lena Weber examine, from the perspective of feminist labour research, the question of whether digitalisation is helping to shift the boundary between devalued female activities and overvalued male activities, and whether gender segregation in the labour market and in organisations can be reduced by the new technological developments. They show that the digital transformation of work is based on gender inequalities that have grown historically and are not automatically resolved by digital technologies. On the contrary, their analysis shows that if complementary gender-equality policies are not implemented, the introduction of new technologies will exacerbate existing gender inequalities.

Katrin Golsch and Marco Seegers ask in their article to what extent men and women perceive technological changes in their workplace. Using data from the German panel--study SOEP, Golsch and Seegers' contribution fills a gap in the research, because in Germany, like in many other countries, a large part of the research on technological changes and their consequences is located in the field of industrial production. One shortcoming of this research is that many female-dominated occupations are per se excluded from consideration. One of the striking outcomes of Golsch and Seeger's research is that the kind of occupation – distinguishing between women's and men's occupations – has a profound impact on the perception of digitalisation. Gender segregation in the labour market is one reason why women are more likely to expect an increase in health risks and in work related demands than men.

Anja-Kristin Abendroth's contribution deals with the emergence of crowdwork as a new form of flexible work in which individuals solve problems or offer services or products for payment via online platforms. Abendroth investigates whether the gender pay gap also appears among crowdworkers and finds that female crowdworkers working on a marketplace platform earn a lower hourly wage than men. This gender pay gap can, at least in part, be explained by gender inequalities in the overall labour market. Her results also show that men get better pay especially when they have children, which can be explained by the fact that fathers are generally better positioned in the overall labour market and, thus, have easier access to better-paid work – not only because they have acquired the skills necessary to perform work on the platform, but also because overall labour market positioning is used as a quality signal on the platform or allows them to be picky about which crowdworking tasks to select.

Last but not least, in this special issue we take a look at the impact of COVID-19 on the development of digitalisation and work and gender. To gather first-hand international comments on this, we interviewed gender researchers and social and technical scientists from South Africa, Canada, the Czech Republic, Great Britain, Belgium, Finland, and Austria. We asked them about their personal impressions of the COVID-19 pandemic, their own work situation, and what changes they have seen in their area of research induced by the pandemic. We have bundled the exciting answers in the form of a collective interview in order to provide incentives for further thinking and research beyond national borders. At the end of this volume, we present some book and conference reviews in the field of gender, work, and digitalisation.

We wish you a stimulating reading experience and look forward to further exchanges in this important field of research.

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Gender Relations at the Digitalised Workplace: The Interrelation Between Digitalisation, Gender, and Work

Bettina Kohlrausch, Lena Weber

Abstract: Innovative leaps in digital technology alongside changing gender roles in society may open a window of opportunity to renegotiate gendered work patterns. The main question addressed in this article is the extent to which digitalisation holds the potential to reorganise gendered work relations, and if so why. First, we elaborate on the interrelation between work and gender in capitalist societies. Our main argument is that digitalisation is shifting the boundaries between paid and unpaid labour with far-reaching repercussions for women and men. Second, we will identify core digitalisation processes capable of overcoming or changing gendered work patterns. These include automation, the platform economy, and the interactive processes by which a value is assigned to work. We discuss these three processes and their implications for gender inequalities by means of examples based on current literature.

Keywords: gendered work pattern, digitalisation, digital capitalism

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Digitalisation is often considered a primary driver of future social, economic, and cultural changes, potentially even on par with the first Industrial Revolution (Staab 2016).[1] The process of digitalisation is mainly associated with new opportunities to interlink machines with machines or human beings via the internet and with algorithmic decision-making. The term 'digital capitalism' captures the accelerating changes that modern societies are currently facing (Brynjolfsson, McAfee 2014; Schiller 2000; Pasquale 2015; Staab 2016). Key characteristics of this 'new age' of capitalism are

[1] We thank the anonymous reviewers for their careful reading of our manuscript and many insightful comments and suggestions. We feel that this has resulted in a stronger manuscript.

the exponential increase in the performance of information and communication technology (processors, memory, etc.), the development of new technologies (such as smartphones, 3-D printing, or robotics), the collection and evaluation of large amounts of data, the further development and increased usability of artificial intelligence, and finally digital networking of people and things. New business strategies in the platform economy increasingly focus on the commercial exploitation of client and user data with far-reaching consequences for the reorganisation of production, reproduction, and work. Within this, behaviour data (GPS tracking data) can be profited from financially (by Google) and formerly unpaid work and open source technology can be commercialised, as a precondition for being digitalised.

Innovative leaps in technology, alongside changing gender roles in society, may open a window of opportunity to renegotiate gendered work patterns (Carstensen 2019; Wajcman 2004). We argue that the digital organisation and regulation of data are of formative significance for the organisation of production, work, gender relations, and society at large. Scholars in the field of digital capitalism highlight the enormous impact digital applications have on the separation of productive and reproductive labour (Huws 2014; Staab 2016), this dualism between productive and reproductive labour is strongly interwoven with the asymmetric gender order in Western society. Changes in this separation of work spheres are therefore closely interlinked with transformed gender relations.

The main question addressed in this article is the extent to which digitalisation holds the potential to reorganise gendered work relations and if so why. We provide a systematic analysis of the relationship between gender and the digitalisation of work by creating a conceptual heuristic. Our analysis focuses on how gender assignments and the patterns of the gender division of labour are shaped, negotiated, or affected by digitalisation. First, based on the feminist critique of capitalism, we will elaborate on the interrelation between work and gender in capitalist societies. Second, we will identify the core digitalisation processes capable of overcoming or changing gendered work patterns. These include automation (2.1), the platform economy and gender-exclusive power mechanisms (2.2), and the processes of doing gender in digital work settings and technologies (2.3). We will discuss these three mechanisms by means of examples based on current literature. In our conclusion, we will evaluate emerging trends and findings from a feminist perspective. Our main argument is that digitalisation shifts the boundaries between paid and unpaid labour, which are connected with gendered division of work, and this will reinforce unequal gendered work pattern.

Feminist critics of capitalistic work organisation: historical and structural preconditions for digitalisation

One important strand of feminist theory has always pointed to the interrelationship between capitalism and patriarchy. The development of a reproductive sphere has been a critical requirement to increase (male) productivity on the shop floor, in the productive sphere, and thus implement a more efficient mode of capitalist production. Critical feminist analyses of capitalism argue that male control over women's labour power, thus the hierarchical relationship between genders, relies on gendered work organisation and the division of labour between reproduction and production (Hartmann 1979; Becker-Schmidt 2002; Eisenstein 1979).

In our theoretical framework, we refer to the German feminist theorist Regina Becker-Schmidt (2002; 2003; 2007), who describes the gendered division of labour in capitalism. Regina Becker-Schmidt's approach is insightful as it explains that the division between reproductive and productive labour and paid and unpaid labour, which is essential for the capitalist mode of production, is linked to the hierarchical relationship between genders. The simultaneous separation and interdependence of the two 'spheres of labour' is a highly conflicting arrangement, one that is deeply ingrained in the capitalist gender order: 'Although they are separated from one another, they are bound together; although they are bound by reciprocity, they are separated by antagonism' (Becker-Schmidt 2002:36). Some analyses of digital capitalism suggest that this central dualism between productive and reproductive work is eroding and/or is being reconfigured by the digital economy and work. Becker-Schmidt (2002, 2003, 2007) shows that the division between productive/public and reproductive/private work in the realm of the transformation from a feudalistic society to industrialised capitalism is accompanied by a close association between reproductive and unpaid work on the one hand and femininity on the other. Skills and abilities that seem to be necessary in this sphere, such as emotionality, sensitivity, and empathy are deemed to be typical female. Paid and productive work is highly associated with masculinity and attributes such as being powerful, assertive, strong, and rational are deemed to be typical male. Gender-specific attributions were and to some extent still are regarded as given by nature, even if this has been proven not to be true.

Existing feminist theoretical analyses of digital labour often focus primarily on the incorporation of immaterial labour into the market (Gregg, Andrijasevic 2019; Huws 2019; Jarrett 2014, 2016). However, this is a theoretical shortcoming since the digitalisation of work affects gender inequalities on several levels and in multiple fields. The potential of Becker-Schmidt's approach is her focus on the contradictory pattern of women's socialisation within the productive and reproductive sphere.

The focal point of her argument is that devalued and unpaid work is attributed and linked to women and femininity in modern capitalism (Becker-Schmidt 2002, 2003). Based on Becker-Schmidt's perspective, this conflicting socialisation of women into the spheres of paid and unpaid work is indicated by three main characteristics, which will guide us in our further examination of the literature about the potential gender-unequal outcome of digital labour. Therefore, we will briefly present here the central arguments of these three main characteristics.

The gendered division of productive/paid and reproductive/unpaid labour

Salary defines the dividing line between productive or paid and reproductive or unpaid labour. Reproductive labour has long been provided primarily by women (wives), who have been excluded from the labour force in Western society. This unequal gender order is and was related to and became integrated into the German welfare state system, where men have been considered the 'male breadwinner' in the family (Esping-Andersen 1990; Pfau-Effinger 2005).[2] These arrangements are reinforced by patterns of collective bargaining. Collective bargaining has had a strong gender bias as the male segments of the labour market are covered to a much greater extent by collective agreements than the female ones.

Becker-Schmidt (2002) states that the demands resulting from reproductive work, on the one hand, and productive work, on the other, structurally contradict each other. Care work, with its orientation towards the needs and intentions of others, is structured in a profoundly different manner than the sphere of employment, where profit, competition, and efficiency reign as the guiding principles. Therefore, reconciling employment with private life is more conflicted for women than it is for men (Jurczyk 1998). While private and working life add up in a positive way for hegemonic masculinity and men, femininity and women are confronted more strongly with the question of whether and in which phases they should give preference to either one or the other (Becker-Schmidt 2002: 41–42).

Horizontal gender segregation of the labour market

Gender segregation on the labour market is highly interrelated with the processes of 'doing gender' (West, Zimmerman 1987). Gender research has shown that each task, activity, or type of employment and work field has its own underlying gender belief system, which gives credibility to the employees and makes 'doing gender while doing work' part of their work task. 'Gender-typed work has different meanings for

[2] We have analysed the changes from a German point of view, since welfare-state institutions are shaped and influenced by nation states. However, the effects of digitalisation are spreading on a global labour market. Therefore, we point out the implications at the given points.

women and men, however, because of differences in the cultural valuation of behavior considered appropriate to each gender' (Leidner 1991: 154). The strong connection between femininity and reproductive work, such as childbearing and care for elderly people, draws a line between the spheres of paid and unpaid work, but it also has implications for gendered labour market segregation and the devaluation of women's work within the productive sphere. 'Horizontal segregation refers to segregation across the manual-non-manual divide, specifically women's underrepresentation in manual occupation (e.g. manufacturing, craft) and their overrepresentation in non-manufacturing occupations (e.g. semi-professional, clerical, sales, service)'[3] (Charles 2003: 269). Thus, 'women's labour' is often low paid and entails no or precarious social protection and less bargaining power (Campbell, Vosko, MacDonald 2009). Even though women work in comparable or the same positions as men, they can be unfairly compensated, which is referred to as the 'gender pay gap' (Scheele 2007).

Vertical gendered segregation of the labour market

'Vertical segregation refers to hierarchical inequality, specifically men's domination of the highest-status occupations within the manual and non-manual sectors of the economy' (Charles 2003: 269). Vertical labour market segregation is entangled with the horizontal gender segregation of work in capitalist societies. The socialisation of women within the sphere of reproduction weakens their position within the realm of productive work. The way women are primarily ascribed with responsibility for unpaid care work in private life establishes a culture of 'male primacy', since paid work is more valued in capitalism than unpaid work. The formal and operational organisation of work, in the form of full-time working hours or the organisation of careers according to the principle of seniority, are often incompatible with reproductive work. Moreover, the classical understanding of a workplace is that of a formal organisation, which is characterised by clearly defined objectives, means-end rationality, job descriptions, rules of membership, hierarchies, decision-making channels, and labour division. As feminist scholars have shown, this seemingly 'gender-neutral' definition of formal organisations is androcentric (i.e. Acker 1990). The organisation of labour within the workplace reflects the gender division of labour in society in many ways. Female employees are underrepresented in leading and top positions, whereas they are mostly found in assistant jobs and jobs with low qualifications in work organisations (Keane, Russell, Smyth 2017). Gender research has shown that the formal barriers

[3] The distinction between manual and non-manual occupations was introduced by the International Labour Organization (ILO) and their International Standard Classification of Occupation (ISCO). Female-dominated 'care' work services are classified into non-manual occupations (health care, social, cultural and physical services, teaching), whereas domestic work (cleaning, preparation of food, and helping) is manual. Therefore, the gendered classification of the occupations is crosswise to the ISCO.

women have faced are dissolving or have been removed in most organisations, with many organisations declaring their commitment to gender equality and diversity (on academia see Riegraf, Weber 2017), while informal processes and gender belief systems persist. This in turn structures gender relationships inside and outside the labour market by spreading the general belief that 'men's traits are more valuable' and women are generally less technically competent (Charles 2003: 270).

In recent decades, feminist analysis of capitalism has referred to changes in gendered work arrangements, such as the blurring of boundaries between the productive and reproductive spheres and between paid and unpaid labour as a result of the neoliberal shift in society (Fraser 2009), the increase in the number of women in the paid workforce, the greater acceptance of gender equality in at least some societies, and the globalisation of labour markets. Economic rationality is one important precondition for the distribution and adoption of digital labour. We argue in this article that digitalisation will reinforce certain gender inequalities and push forward a gendered re-negotiation and organisation of work. First, typical women's work is less likely to be affected by automation, whereas typical men's work may be devalued and deregulated. This can be understood to mean that the opportunities and risks of the male and female labour force are becoming more aligned. Second, the platform economy creates new work forms, which seem to extend the disadvantages that women already face in offline employment. Third, typical gendered ascriptions and stereotypes will become inscribed in the construction of seemingly 'objective' or 'neutral' digital technics, which reinforces unequal gender work arrangements as they become invisible in a new way.

Gendered division of productive and reproductive labour in digital capitalism

The digital transformation of production and the labour market is accelerating and reinforcing the processes that blur the boundaries between paid and unpaid work (Huws 2014; Staab 2016). Contemporary capitalist business models tend to build upon digital technologies, which are likely to restructure capitalist patterns of production and, as a result, the gender relations underpinning them (see above). The leading question in our analysis is whether technological changes will dilute or exacerbate the existing mechanisms of gender inequalities. We identify three processes of digitalisation as the driving forces that are changing the relationship between the productive and reproductive spheres.

First, digitalisation accelerates the automation and optimisation of value chains. This reorganisation of production might imply a revaluation of tasks, and competences,

as tasks that were formerly central to the organisation of industrial production could be automated. This could lead to a revaluation of manual and non-manual tasks, especially non-automatable female-dominated personal services and domestic work, which could become more highly valued (Dengler, Matthes 2018; Piasna, Drahokoupil 2017).

Second, digitalisation enables and facilitates the establishment of new data-based business models known as online platforms or a platform economy (Bergvall-Kåreborn, Howcroft 2014; Codagnone, Karatzogianni, Matthews 2019; Graham, Hjorth, Lehdonvirta 2017; Pesole et al. 2018; Poutanen, Kovalainen, Rouvinen 2020). The existence of the platform economy is accompanied by a decline in standard employment relationships and an increase in the formalisation of work, which has highly gendered implications. Third, the implementation of algorithms, artificial intelligence, cyber-physical systems, and digital applications restructure interaction processes at work at a micro level, which may have the potential to destroy, reproduce, shift, or negotiate 'doing gender' (West, Zimmerman 1987).

Automation: restructuring the gendered segregation of the labour market

Automation by algorithms, cyber-physical systems, and machine learning is one of the driving forces behind the restructuring of the labour market because it facilitates the substitution of tasks or even whole occupations and their replacement with robotic assistant systems and algorithms. Neither automation nor substitution are new developments, but both have been accelerated by digitalisation. However, '[w]hereas the technologies that drove automation in the past required clear instructions in controlled environments to substitute for human endeavour, new technologies are now increasingly able to act and problem-solve independently, inferring the appropriate solution or actions on the basis of external inputs, and "learning" as they do so' (Lawrence, Roberts, King 2017: 6). We argue that automation has led to a revaluation of 'male' and 'female' work, reinforcing mutual transitions between paid and unpaid work (Huws 2014: 170).

Bonin et al. (2015) conclude that about 12% of jobs are likely to become substituted in Germany and 9% in the United States. Scholars agree that lower-skilled tasks are more likely to be substituted. Whether women or men are more likely to be threatened by automation depends on the gender-specific structure of qualification and segmentation within the respective labour market. For Germany, Dengler and Matthes (2016) found a higher risk of substitution in the case of men at all levels of qualification. In low-skilled jobs, the potential of substitution in the case of men (54%) is significantly higher than it is in the case of women (37%). For men, the potential decreases as the level of requirements for a job increases. The opposite is true for women: the potential in low-skilled jobs is lower than that in skilled jobs

and only decreases in management positions to about the same extent as it does for men. The main explanation for this is the horizontal segregation of men and women in the labour market: women make up most of the employees in social and cultural services, which are more resistant to automation (e.g., in the care sector, certain tasks can be substituted but probably not whole occupations, since caring itself can best be provided by human beings), whereas men make up the majority in technical jobs, where there is greater substitution potential in lower-level jobs. Empirical evidence on how the gendered occupation structure is already affected remains inconclusive. After comparing job growth and destruction between 2011 and 2015, Piasna and Drahokoupil (2017: 319), who studied the European labour market, conclude that no developments until now 'signal a major break with the traditional division between "female" and "male" jobs' due to digitalisation. However, if the authors take the task content into account (repetitive vs. complex tasks) and not the occupation field, they see that women 'exhibit a faster growth in share of non-routine, analytic and interpersonal tasks' (Piasna, Drahokoupil 2017:320). So far, we have seen the relatively small development of women moving into the better-off sectors of the labour market, but a redistribution of the labour market may be coming – at least for some women, those from a higher socio-economic background.

Kurz et al. (2019) argue that the amount of substitution depends on bargaining power. For Germany, they show that powerful unions have already negotiated instruments for an active labour market policy aimed at safeguarding the jobs of primarily male workers in the car industry. In contrast, there is no comparable lobby for the female-dominated banking sector, which is highly affected by automation. Women are less often enrolled and employed in technical studies and professions (European Commission 2019). Yet technical skills may become the gateway to prestigious positions in the digital age, the ones in which people participate in decisions about who owns data and who is allowed to put a value on data. If women remain less involved in technical knowledge production and have less power over digital tools, the processes of horizontal and vertical segregation are very likely to intensify.

However, both women and men will increasingly face the challenge of managing transitions across occupations. A key prerequisite for accomplishing this challenge is access to continuing education. Recent OECD data (2019) on this topic revealed that, independent of socio-demographic factors and the characteristics of an employment contract, women have fewer opportunities to participate in continuing education than men, even though their willingness to participate is much higher. Moreover, in absolute numbers, the participation of women in continuing education is even lower since they work more often in part-time jobs and on temporary employment contracts, which hampers access to continuing education. Here, existing disadvantages on the labour market are likely to be reinforced.

Currently, it is still open to debate whether automation will lead to a redistribution of the gendered labour market. There are hints that women's and men's social positions on the labour market are aligned; women's work is less likely to be affected by substitution, whereas men's work is becoming devalued and deregulated by automation. Further, it is not clear if female-dominated care and domestic work, which is more resilient to automation, will based on this be upgraded in society or devalued, because it is not linked to digital skills.

Platform economy, digital workplaces, and gender inequalities

In this article, we seek to shed light on the interrelation between digital business models and gendered work patterns. Keywords include the platform economy, the sharing economy, digital labour, crowdworking, and virtual teams or self-managed teamwork (Kovalainen, Vallas, Poutanen 2020: 1). The emergence of the platform economy had far-reaching consequences for the organisation of work and maybe even for the 'very conception of what it means to have a "job"' (Kovalainen, Vallas, Poutanen 2020: 1), even though it is only a job provider for a select few in society at present (Huws et al. 2017). In an international comparison, Huws et al. (2017) estimated the number of gig workers as between two percent (Sweden) and nine percent (Italy). However, platform work is a fundamental change because it 'decouples' work from institutional structures, which has extensive ramifications even for non-gig work (Kovalainen, Vallas, Poutanen 2020: 2). 'Platform firms almost always define themselves purely *as* intermediaries rather than employers, thus defining their workers as independent contractors or self-employed.' (Kovalainen, Vallas, Poutanen 2020: 5) The definitions of platform providers are manifold. From micro-tasking platforms and creative competitions to simply intermediate work and workers (Kovalainen, Vallas, Poutanen 2020).

The platform economy provides jobs across the globe 24/7. It can open access to gainful employment for marginalised groups, such as low-skilled or untrained women (Wood et al. 2019). For them, or for women who perceive their main responsibility to be unpaid care work, this could be a step back into the labour market. It offers them flexibility and task variety. There have been discussions as to whether this would improve the reconciliation of private and professional life, especially for working mothers (Jürgens 2019; Wischermann, Kirschenbauer 2015). At this point, the debate reveals a gender bias, since the problems of reconciling private and professional life are primarily considered to be the responsibility of women (Carstensen 2019). Besides that, we know from other flexible work models that they give rise to individualised or private conflicts over time and resources, which tend to work to the disadvantage of women, especially mothers (Hochschild, Machung 2012; Voß, Weiß 2009).

However, the flip side is that platform work is often low paid and involves social isolation and overwork (Wood et al. 2019), which women already tend to experience in offline workplaces (Campbell, Vosko, MacDonald 2009; Rubery 2011). Initial studies on platform workers suggest that only highly skilled workers with special qualifications (predominantly males) benefit from platform work (Huws et al. 2017). Jürgens (2019) stresses that the use of digital technologies to the benefit of employees is a demanding process and depends on the resources that individual employees have at their disposal. However, due to part-time employment and lower skilled jobs, women have less bargaining power (Abendroth, Reimann 2018). Until now, this has meant that bargaining and negotiation problems have been transferred to the private sphere to be solved, making it even harder to make collective or solidary decisions.

For the informal labour market of care and domestic work, where women are highly represented, the platform economy is one way to receive more formalised work in social services (Ticona, Mateescu 2018; Weber 2020). Platforms such as *care.com*, *helpling.de*, *carelinx.com*, and *UrbanSitter.com* are already widespread. So far, however, the opposite seems to be true in that existing distinctions between powerless care workers and powerful platform companies and clients are reproduced (Ticona, Mateescu 2018). Nevertheless, the potential is there to create a political framework for more formalisation and better working conditions in this already very precarious labour segment.

One feature the new business models have in common is that they break with standard employment relations and ideals, as demonstrated by the example of Uber, a digital platform that matches clients with private or in some way self-employed drivers (Rosenblat, Stark 2016; Scholz 2017). The role of employees with specific rights and duties is diluted in these data-based work models. This has consequences not only for Uber drivers but also for the entire industry. For instance, data-based business models incorporate informal evaluation processes (Turco 2016). The rating and evaluation of the products or services used become part of the business model, and new techniques are developed for performance control (Gerber 2019). Digital systems of reputation and reward create new forms of precarity (e.g. a dependency on client satisfaction). Moreover, platform work reinforces the fragmentation of jobs, which appears to affect women more than men (Piasna, Drahokoupil 2017: 322). More women than men tend to have multiple short-term and part-time jobs in addition to the solo self-employment.

Another strand of research points to the gender (racial etc.) discriminatory effects of the algorithm decision-making on which platform business models are based (Kullmann 2018; Dastin 2018; O'Neil 2017). Humans decide what is fed into the algorithm and the data model that the algorithm will use to solve a matching

problem – for example, between a driver and someone who needs a car. Algorithms create gender biases through the gendered datasets that they are fed. In the case of machine-learning, the algorithms can detect a gendered usage pattern and create a gender bias if they learn, for instance, that women tend to prefer female drivers. This short example shows that a digital business model can easily incorporate or build upon gendered structures that have emerged in the analogue world and are likely to perpetuate them, since algorithms are often perceived as neutral or objective. In this regard, gender inequalities might even be obscured.

In sum, the platform economy seems to be a workplace where many already existing disadvantages for female employees are transposed into the digital world, largely because there is little institutional employment representation and bargaining power in female-dominated work areas.

Doing gender in a digital work setting

The theoretical perspective of doing gender while doing work is based on two assumptions that may be disrupted by digital work settings. The first assumption is that doing gender is part of the social interaction between humans. Cultural and social-service jobs are performed in social interactions, but any other occupation can involve social interactions as well as part of professional everyday life. When digital assistant systems, algorithmic decision-making, technologies, and artificial intelligence are employed, these social interactions may be replaced by data communication or may change in fundamental ways. For example, humans now must interact with machines, robots, or technical systems instead of other humans. The institutional setting of the interaction could be 'released' from doing gender because the machine or the robot does not perceive the 'doing gender' behaviour. However, the construction of artificial intelligence (O'Neil 2017) and techniques and robots (Weber, Bath 2007) include assumptions about gender. One illustrative example is provided by voice assistants, like 'Siri' and 'Alexa'. Not only do they have a female name, they are constructed as subordinate, friendly, and polite females because most people are familiar with interactive arrangements like these from 'feminised' service jobs, which makes it easier for them to adapt to new digital technologies (West, Kraut, Chew 2019: 91 ff.). Seemingly, gender-neutral techniques do not treat people fairly and equally (Dastin 2018; O'Neil 2017; Uhlmann, Silberzahn 2014; Silberzahn, Uhlmann, Zhu 2014).

The second assumption is that doing gender is a type of social interaction in a shared physical space, where mutual perception of alter and ego occurs. Obviously, this definition of an interaction must be expanded, as many social interactions now take place via social media platforms and digitally transferred. Again, given that mutual perception is mediated, stereotypes about gender could be overcome, but

the existing evidences from literature rather suggest the reinforcement of gender stereotyping.[4]

Digital business models create new work areas and forms of work. These, in turn, become part of the process of doing gender; some of these areas and forms of work are attributed to masculinity, others to femininity. Insight can be obtained from how they became valued and commercialised. In this respect, there is a growing debate on the interface between gender and media studies about how digital immaterial labour is linked with gender stereotypes or how women's unpaid immaterial cultural labour is going to be exploited by the digital creative industry. On the one hand, the immaterial labour of blogging, posting, and liking (unpaid work) has a strong link to femininity. These digital platforms can accumulate capital through women's unpaid labour (Arcy 2016:366). Blogging and liking on online platforms are the new 'female-typed' forms of emotional labour of the digital age (Cirucci 2018; Jarrett 2014; Ouellette, Wilson 2011).

Duffy and Pruchniewska (2017) found in their study that female self-employed entrepreneurs feel compelled to develop online profiles that are oriented towards classical concepts of femininity in order to become successful. The authors concluded that the elimination of direct interactions through digital platform work creates uncertainties, which must be compensated for by means of gender overidentification in order to establish credibility, trust, and reliability with customers. Although the hegemonic masculine image of an entrepreneur has several cracks in it and there has been a clear rise in female-typed entrepreneurship (Adkins, Dever 2015; Duffy 2016; Hunter 2016), Duffy and Pruchniewska (2018: 848) detect the persistence of the 'old' offline gender inequalities, which they call the 'digital double bind'. Women must walk the fine line between masculine-assigned business success and the cultural scripts of female self-presentation. Moreover, this finding is also true for start-up culture, where only around fifteen percent are women in Europe (Kollmann et al. 2016).

Although digital work areas have the potential to release social interaction from processes of 'doing gender' or even break up taken-for-granted assumptions about gender-typed skills and capabilities, evidence shows that the hierarchical attribution of gender-typed skills and capabilities in most workplaces is more likely to be reproduced. Studies show that there is a tendency for 'traditional' gender norms to be reinscribed in digital work and digital workers tend to overidentify with gender stereotypes to decrease insecurity in online communication.

[4] This was already the subject of a virulent discussion at the interface between gender and media studies when the Internet emerged, when the question was whether people would now try to develop gender-neutral avatars or profiles or choose to switch their gender.

Conclusion

The starting point of our argument was the question of how much the changes that labour markets are undergoing in digital capitalism will restructure gender relations. We showed that the feminist analysis of Western capitalism by Becker-Schmidt (2002) is a useful tool for better understanding the fundaments of the entanglement between work and the gender order in capitalism. We showed that the distinction between reproductive and productive work and the subordination of work typically ascribed to be women's work are the basic mechanisms behind the (re)production of gender inequalities. While the division between productive and reproductive work is at the core of the capitalist order, we argue that the reorganisation of work in digital capitalism is aimed at this very core of capitalist work organisation. The guideline for our examination of digital work has been to look at how far the reorganisation of work affects gender relations. We have shown that digitalisation creates or accelerates automation, new business models, and work areas that are capable of dissolving, changing, or reproducing in new forms the separation between productive and reproductive work and consequently also the associated gender dualism and gender inequalities. We examined these processes for the consequences they may hold for the division of paid and unpaid labour and the horizontal and vertical gendered segregation of labour markets.

Concerning automation, we showed that it could lead to the redistribution of gendered vertical and horizontal labour market segregation and for two reasons: First, automation could lead to a reduction in working hours, and that could increase the scope for the redistribution of paid and unpaid work between the genders. Second, men's work is more likely to be affected by substitution than women's work. Women's work (education, childcare, elderly care, health care, domestic care) is more difficult to rationalise or can only be automated to a limited extent. Typical 'female' work could thus gain in relevance, while typical industrial 'male' work, would lose importance, which would change the vertical patterns of gendered labour market segregation. However, women are disadvantaged when it comes to participating in the technical infrastructure of digital capitalism.

New business models and platform work still account for a small proportion of employment. However, this new way of organising work is also contributing to changes in other areas of work not yet organised through platforms. It is becoming apparent that, on the one hand, established standards of social security are being dismantled and, on the other hand, areas of work are being formalised that were previously either not commodified or were informal, and this primarily concerns women's work. We expect a levelling out of employee standards, which will tend to bottom out at a low level and will put women at a greater disadvantage than men.

This is because men's work tends to be better organised in collective agreements than women's work. Vertical labour market segregation would thus be intensified. Moreover, algorithms are the new powerful technology behind these new business models and women rarely participate in the development of algorithms. Furthermore, business models based on co-consumption tend to blur the division of paid and unpaid work, but this is more likely to give rise to new and additional mechanisms for exploiting unpaid work than to overcome existing divisions between productive and unproductive work.

Doing gender processes and human–machine interactions may change digitally mediated work relationships and processes. This could have the potential to overcome the antagonism between female and male work content and tasks and the horizontal and vertical segregation of the labour market. However, as argued above, the initial empirical evidence suggests that the opposite is true. The elimination of direct face-to-face interactions that create trust means that individuals, and especially women, tend to overidentify with their gender to establish credibility and trust, thereby reinforcing rather than dismantling or eradicating traditional gender stereotypes.

We have shown that digital capitalism will change the pattern of women's labour market participation and restructure the relationship between productive and reproductive work and labour market segregation. However, we also showed that while this has the potential to create more gender equality in the labour market, there is also the risk that the old modes of discrimination will persist in a new digital form. At the end of the day, the power women have to actively shape the new labour market will determine the outcome of this process.

We therefore identify three main requirements for a more gender-egalitarian digitalisation process. First, women and low-skilled worker must obtain more bargaining power. This concerns the question of whether individuals can manage to create new tools of collectivisation under the conditions of digital labour. Issues relating to labour regulation or the substitution of tasks are therefore not just decided by what is possible in general but are also the result of social negotiation. Thus, more female access to bargaining power will be decisive. Second, there is a huge need for more gender-equal access to information and data construction. Whether work is mainly governed by algorithms and artificial intelligence depends on the extent of the 'information asymmetries that can limit the abilities of the workers to make informed choices' (Kovalainen, Vallas, Poutanen 2020:6). Access to information will thus become a powerful resource. The third requirement is the (re)-qualification of those whose existing qualifications are the jobs and work activities being substituted. This is the central tool for safeguarding employment careers in the digital age.

Our analysis is limited to the trends that we have been able to identify and the special debates that we selected to exemplify our arguments. Until now, most tendencies

have been difficult to predict because the impacts or changes remain on a normative, regulative, and institutional level that is still shifting, meaning that many developments will only become apparent in the years or decades to come.

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Perceptions of Technological Change at Work through a Gender Lens

Katrin Golsch, Marco Seegers

Abstract: In Germany, like in many other countries, much of the research on technological changes and their consequences has been devoted to investigating the field of industrial production. A shortcoming of this research is that many female-dominated occupations are excluded per se from consideration. However, whether and to what extent men's and women's perceptions of technological changes in their workplace differ is an important subject of debate. This article addresses the following questions: To what extent are men and women experiencing changes in the technologies of their workplace? Are women less likely to experience such changes? Do men and women anticipate to differing degrees a threat to their future job security and the skills demanded of them? And do they expect technological changes in their workplace to impact their health or work performance demands? The analysis, based on data from the Socio-Economic Panel Study (SOEP, 2015–2017), compares men and women across gender-typical and gender-atypical occupations and identifies conditions that increase or decrease perceived risks of technological change at work. The results indicate that technological change is perceived as most threatening in female-dominated occupations, and especially by women.
Keywords: technological change, risk perception, gender

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The technological transformation is changing the world of work and also has far-reaching consequences in other areas of life (e.g. Hirschi 2018). The increasing use of computers and mobile devices is just one aspect of this process. The combination of automation and information technology is another aspect. Work processes are changing across all sectors and industries, but the extent and pace of change vary and this is often associated with high levels of individual uncertainty. It is thus important to study not just the pace and extent of technological change, but individuals'

perceptions of risk as well. Both men and women may face particular challenges for work life, likely resulting in concerns about getting fired (Shoss 2017) and about not being able to keep up with the required technological skills or meet work performance demands (Hammermann, Stettes 2016), and may be concerned about health risks as well (Schulz-Dadaczynski, Junghanns, Lohmann-Haislah 2019). Germany is no exception to this fast-moving phenomenon and its multifaceted impacts on individual lives. Compared with other OECD member countries, previous research revealed that the majority of Germans see the consequences of technological change in general more as opportunities than as risks (OECD 2019).

With the focus on technological change at work, research has so far often ignored possible gender differences (Hauer 2016; Piasna, Drahokoupil 2017). Little is known about the extent to which women and men are affected in different ways by these processes, how they react to them, and what role is played by the occupational context they work in (e.g. Kutzner, Schnier 2017; Voss 2017). The last point could be particularly significant, given the persistence of occupational gender segregation in Germany (Busch-Heizmann 2015). This is already an important dimension of social inequality, because women's jobs are more often characterised by worse employment conditions, such as lower wages and limited career opportunities. Taking this inequality into account, it is important to gain deeper insight into the extent to which gender inequalities emerge or persist due to technological change (Ahlers et al. 2017). To date, the focus on technological innovations in the field of industrial production (Hirsch-Kreinsen, Ittermann, Niehaus 2018) and thus on male-dominated occupational fields in particular has been a key factor in the creation of the above-mentioned blind spot in this research field (Hauer 2016). The consequences of technological change in female-dominated sectors (e.g. in education, health, and nursing) are much less well-researched (Ahlers et al. 2018).

The goal of this study is to enhance understanding about the individual risk perception of technological change at work by systematically comparing men and women across gender-typical and gender-atypical occupations. An in-depth examination of men's and women's risk perceptions of technological change in the workplace is very significant because subjective concerns can have important consequences – for example, for an individual's health, work performance, turnover, and his or her willingness to participate in further training (e.g. Shoss 2017). In order to comprehensively investigate the consequences of technological change, a common understanding is needed that brings together subjective-individual perspectives and objective consequences.

The article is structured as follows. The next section presents the theoretical reasons for why it is important to study the risk perception of new technologies and why risk perception may be expected to differ by gender. To this end, theoretical approaches

on gender inequality in the work context will be linked to the broader literature on technological change at work. One research question driving the empirical part is: To what extent do men and women experience changes in the technologies of their workplace? Are women less likely to experience such changes? The next task is to study the subjective risk perceptions relating to this experience: To what extent do men and women anticipate changing skill demands, and do they expect to lose their job in the near future? Do men and women expect to differing degrees that technological changes in their workplace will impact their work performance demands or health? The three most recent waves of the SOEP (2015-2017) serve as a database for this analysis, as described in the method section. The results section presents the findings of our study, and the last section summarises the findings and suggests areas for future research.

Theoretical considerations

Technological change at work: risks and opportunities

The focus of the present article is not on risks with regard to technological change at work in general but on subjective risk perceptions. However, a question that needs to be answered beforehand is from a theoretical point of view: What risks and opportunities may arise from technological change for both genders?

First and foremost, technological change promotes the permanent restructuring of the labour market and thus also of occupational profiles and jobs. This requires a permanently high willingness to adapt from employees (Hasselmann, Schauerte, Schröder 2017). Taking a task-based approach, it is assumed that technological change will influence work tasks (Autor, Levy, Murnane 2003). On the one hand, human tasks can be substituted by the adoption of technical applications, which can lead to the automation of tasks. On the other hand, new tasks, work requirements, and conditions can be created that may have positive and negative effects on employees. Both are likely to change the occupational structure within industries and across sectors (Kruppe et al. 2019). From a micro-employee perspective, technological change is therefore defined as the introduction of new (digital) tools and technologies in the work context, which have a significant impact on the individuals who work with them.

The risk of substitution varies depending on a job's requirements (Arntz, Gregory, Zierahn 2016) and is expected to be lower for tasks that require a high degree of creativity, spontaneity, cooperation, or interaction (Hardy, Keister, Lewandowski 2016). While the average risk of substitution is high in the manufacturing sector and in construction, transportation, and retail, the average risk of being displaced

seems lower in social and cultural service professions and in medical and non-medical health professions (Kruppe et al. 2019). However, a high risk of substitution is not only observed in male-dominated occupations (e.g. in precision mechanics and toolmaking, metalworking, and the production of foodstuffs) but also in some female-dominated sectors (e.g. doctors' receptionists and assistants, retail sales occupations, housekeeping, consumer advice, and cleaning). Nevertheless, based on their task profiles, women-dominated occupations are less at risk of substitution than men-dominated occupations in all OECD member countries (except Japan) (Krieger-Boden, Sorgner 2018). Risks and opportunities associated with technological change also depend on task profiles, which differ between male- and female-dominated occupations (Seegers 2020). Compared to male-dominated occupations, female-dominated occupations that are directly affected by technological substitution are often characterised by a higher share of interactive tasks and a lower share of autonomy and variety. A related issue is the extent to which the risks of technological change depend on skills. It is assumed that human skills must be adapted to the changing work requirements that result from the implementation of new technology. The attractiveness of advanced training is thus increasing for men and women in the wake of technology-induced changes in tasks (Berger, Frey 2016).

With regard to gender differences, prior studies paint a mixed picture. With few exceptions (e.g. ICT specialist skills), there is virtually no evidence of significant gender differences in skills that are required by jobs due to technological change, and women seem to profit from the creation of highly skilled jobs (OECD 2017). At the same time, other trends do point in the direction of women's greater vulnerability due to their position in the labour market, since women still hold a more restricted range of jobs and hierarchical positions than men, and technological change contributes to this segregation (Piasna, Drahokoupil 2017).

As a result of changing work tasks, work requirements also change (both the physical and psychological demands). The most direct negative effect is that the workload and the number of tasks to be performed simultaneously have often significantly increased, resulting in higher levels of work pressure (DGB Index Gute Arbeit 2016, 2017). But there are also positive effects as there is a more flexible framework for employees' decision-making (BMAS 2016). The opportunity to work outside of their normal workplace has increased for many women, especially among highly qualified women and female executives (Lott 2014). Flexible working-time arrangements are on the rise, too, and this facilitates the compatibility of work and family in some cases, especially among full-time employees. However, it also blurs boundaries between work and family life, with the potential to exacerbate stress-based work-family conflicts (Rump, Eilers 2017). Various tasks are also becoming less physically demanding, but

in many cases the increased work demands outweigh these gains on the physical side, and there is also often more psychological stress (BMAS 2016).

In an overall view of the results described so far, we know that technological change is a multifaceted process that is significantly changing work processes, and women's occupations are not exempt from this. This often creates an uncertain workplace setting, including various risks to which men and women may be exposed. In particular, this refers to the risk of getting fired and of not being able to keep up with the technological skills required for the job or meet work performance demands, as well as health-related risks. In the following analysis, the important point is that these risks are likely to be perceived differently across work settings and gender. This should not obscure the fact that technological change may also have facilitative effects. The individual's chances of profiting greatly – or at all – from technological change will depend on a set of personal, structural, and occupational characteristics.

Subjective risk perception of technological change at work

The discussion now turns to subjective risk perception. Our approach builds on ideas taken from Wachinger et al. (2013: 1049), who define risk perception as a 'process of collecting, selecting and interpreting signals about uncertain impacts of events, activities or technologies'. Various (perceived) risk characteristics can form the basis for this process (Slovic 2000; Slovic, Fischhoff, Lichtenstein 2000). What is special in the context of technological change is that the extent and pace of this change and its associated hazards are unknown and for many are not controllable. Risk perception of technological changes refers to men's and women's judgements about the likelihood of getting fired and not being able to keep up with the technological skills required for a job or meet work performance demands, as well as health risks. Theoretically, these risk perceptions are not only the result of men's and women's cognitive judgements, but also stem from their feelings, particularly if access to detailed information about risks is lacking (Loewenstein et al. 2001). In addition, according to the ideas of Slovic (2000) and Kahnemann, Slovic, Tversky (1982), individuals working in sectors and occupations that have already been exposed to technological change may evaluate the changes at their own workplace as particularly risky.

To date, too few empirical studies focus on the employees themselves and their perception of the risks attached to technological change in the work context. One finding from previous research on Germany is that few employees worry about losing their jobs due to technological change, especially if they are highly skilled employees, while many men and women report increased training needs (BMAS 2016). Evaluating the perceived workload, just under a half of employees say that their workload has increased as a consequence of technological change (especially due to the need to

multi-task and be constantly available) (DGB Index Gute Arbeit 2016). The strain this involves and the associated fatigue and psychological problems increase with the educational level of employees (BMAS 2016).

The question, however, is whether technological change and its consequences for jobs are subjectively experienced and interpreted differently. According to Wachinger et al. (2013: 1049), risk perceptions 'may differ depending on the type of risk, the risk context, the personality of the individual, and the social context'. As described above, technological change can have an impact on men's and women's perception of four different types of risks: risk of losing one's job (Shoss 2017), concerns about skill requirements or work performance demands (Hammermann, Stettes 2016), as well as health-related risks (Schulz-Dadaczynski, Junghanns, Lohmann-Haislah 2019). Gender differences in risk perception may be due to a number of objective factors that characterise the risk context (such as differences in the form of job qualification requirements, work-related tasks, or working arrangements) and to subjective factors (such as risk preference and other personality traits, self-perception). From labour market research we already know that the importance of individual characteristics (e.g. gender, age, education) for inequalities among employees varies within and across occupations in diverse sectors (Autor, Handel 2013). As will be shown later, not only company structures and practices but also discrimination and stereotyping processes form the background for reflections on the unequal distribution of opportunities for individual groups of employees within a company. However, previous digitalisation research has not highlighted the consequences of these stereotyping and discrimination processes for the everyday work of women and men (Oliveira 2017).

To what extent these factors actually play a role in men's and women's risk perceptions, must in the light of the current state of research be seen as a question that still remains to be answered. Although relevant, there is scant theoretical and empirical knowledge about the extent to which men and women perceive technological change at work differently. In some studies on Germany, gender differences have been found, as women more often feel they are at the mercy of technology. Women have less say and decision-making power than men in the adoption and use of digital technology in companies (DGB Index Gute Arbeit 2017). Full-time female employees report higher levels of workload intensification, while men are more likely to report changes in work demands (DGB Index Gute Arbeit 2016, 2017). These studies do not systematically compare men and women across gender-typical and gender-atypical occupations, however. The following discussion outlines why we can expect gender differences in the perceived risks of technological change in the workplace. Our particular interest lies in bringing greater focus to the role of gender segregation in the labour market.

The role of occupational gender segregation

Even though there have been considerable advances with regard to women's education and the share of women who are employed, occupational gender segregation is a stable characteristic of the labour market, in Germany and elsewhere (Charles, Grusky 2004). The proportion of women in highly qualified positions remains low in comparison to men (vertical segregation), while at the same time women are often employed in typically female occupations with poorer career prospects (horizontal segregation). Moreover, men often receive higher rewards (in the form of job security, salaries, and training) from their employment than women, independent of the sex composition of their occupation. Compared to other (European) countries, Germany stands out due to its above-average and persistent horizontal gender segregation (Hausmann, Kleinert 2014). Therefore, it is interesting to analyse whether technological change can break up these rigid structures.

One question for ongoing debate is the extent to which new technologies are adopted at varying rates in female- and male-dominated sectors, and whether this is likely to cause changes in women's and men's occupational structure (Voss 2017). Put positively, technological change can open up new opportunities for women and men in the labour market and thus contribute to greater gender equality. Yet these points are currently not at the heart of the discourse (Kutzner, Schnier 2017). More attention is paid to certain adverse effects that may result if opportunities for women in the labour market increase only in the sectors that depend on cheaper, more flexible, and often temporary workers (Piasna, Drahokoupil 2017). An important but less well recognised aspect is the role of training and upskilling in breaking down gender barriers, at least if women and men are given equal access to advanced training (Weusthoff 2017). The study by Seegers (2020) provides a first hint that male and female employees in female-dominated occupations threatened by substitution participate in continuing training almost twice as often as in male-dominated occupations.

Turning to possible theoretical explanations for gender differences in men's and women's perceptions of risks in the work context, understanding the mechanisms behind occupational gender segregation seems relevant because these lead to a particular risk context. The gender-segregating structure of the labour market is explained in the literature through various approaches. Many employed women face a double workload, because they are still responsible for much of the unpaid domestic and care work in the private sphere in addition to paid work (Lachance-Grzela, Bouchard 2010). This is the background to the supply-side explanations for why women select typically female occupations to facilitate strategies for combining work and family. Others argue that women follow gender-typical paths because they prefer to work with same-sex colleagues. Yet women's occupational choices should not

only be seen in the light of their work preferences. From a different angle, structural hurdles and processes of gender discrimination play an important role (Heilman, Caleo 2018). In the sociological and socio-psychological literature, discrimination is attributed to gender-specific categorisation and stereotyping processes (Heilman 2012). One of these stereotypes is the 'gender status belief', which is based on implicit assumptions about men's greater competence and skills. Ridgeway (2001) outlines how the gender status belief produces gender-specific performance expectations by creating a network of constraining expectations and interpersonal interactions. This influences, among other things, the amount of attention paid to men and women, their assertiveness and self-assessment, and the abilities attributed to them. This stereotyping behaviour channels men into the more preferred positions, whereas women are pushed into the more disadvantaged ones (Thébaud 2015). Another concept is self-stereotyping, which describes the way in which individuals integrate stereotypical characterisations of the groups they identify with into their self-concept (Lorenzi-Cioldi 1991). Based on this it is possible for (self-)stereotyping processes to be reproduced.

These general considerations can be sharpened if seen in the context of technological change at work. To this end, the focus now shifts to gender differences in technology-related self-perceptions and the question of how these are related to the work environment (Wynn, Correll 2017).

The role of self-perception

Technology is still understood as an expression of male-dominated culture, in Germany and elsewhere (Kutzner, Schnier 2017). This is evidence in the small proportion of women in the EU with an ICT-related degree or in an ICT-related job (Tarín Quirós et al. 2018). In such a context, the chances are high that women will be faced with stereotypes and the threat of being stereotyped. As a stereotyped group women who are employed in what is typically men's work thus often try not to behave stereotypically so as not to confirm the expectations that they are less capable, less professional, and not available 24/7, which can lead to a poorer performance (e.g. women make a special effort to avoid stereotypes by using technical devices) (Steele 1997). Owing to gender-specific socialisation and self-stereotyping, women tend to rate themselves as less technically competent than men do (Koch, Müller, Sieverding 2008). If women experience a stereotype threat, this may be an additional trigger for them to rate their skills on a lower level. Hence, one might expect that women who experience the implementation of new technologies at work will be more likely to judge their own competence and performance against higher standards than men and will be less sure that they will meet the requirements (Correll 2004). This is likely to give rise to a perceived lack of fit, and this self-feedback might lower

women's aspirations for occupational outcomes (Correll 2001), thus confirming gender stereotypes, whether consciously or not.

Against this backdrop, one can assume that women's technology-related self-perception of their skills is likely to play a major role in male-dominated occupations. Here men are at an advantage: not only do they have higher levels of (self-)attributed competence, they are also more likely than women to have better career prospects and higher rewards (Mihalčová, Pružinský, Gontkovičová 2015). But in female-dominated occupations, too, which are often already characterised by higher degrees of emotional stress, technological transformations may heighten women's concerns if they have a poor self-assessment of their technological skills. As indicated above, the stressors associated with the work-family interface are also negative reinforcing factors for many women. Following these lines of thought, women may be expected to rely on their self-perception when they make judgements about risks and may thus be more aware of certain risks, i.e. the risk of losing one's job, concerns about skill requirements or work performance demands, as well as health-related risks.

Focusing on men, the picture is less clear-cut. Men will often bring with them an initially higher self-assessment of their technological competence (Initiative D21 2018), and a stereotype threat is less likely to arise. Yet this does not mean that men are not likely to anticipate the threats that could result from technological change at work. This is because stereotypes also shape men's way of dealing with work demands, as can be seen, for example, in expectations about full-time availability in conformity with the 'ideal worker' norm, expectations that are connected with constructions of masculinity (Connell 2015). Because masculinity norms are accompanied by high performance demands, men are more likely to anticipate changes in the performance demands that may result from technological change at work. The effort required to meet new performance demands or the feeling of being inadequately prepared to meet these demands act as an additional source of stress. Hence, men may see more risks connected to the psychological aspects of health, whereas risks related to the physical aspects of health will often decrease because of technological change.

Over and above what has already been said, one could also expect only negligible or no gender differences with regard to risk perceptions. One rationale behind this is that technological innovations change everyday lives, and this familiarises both men and women with technology, where some stereotypes will be dismantled. Another rationale is a key finding from job satisfaction research. Despite persistent gender inequalities in the labour market, there is gender gap in job satisfaction in European countries, with women reporting greater job satisfaction than men (Perugini, Vladisavljević 2019).

The impact of perceived stereotyped judgements and behaviours

For the reasons given above, technological change is likely to result in a more uncertain and threatening work environment, and if these technologies are connoted as masculine, it can be argued that this is likely to increase the chances of gender stereotypes being activated. Stereotypes contain ascriptions of favourable and unfavourable characteristics and have descriptive and prescriptive components (Fiske 1998; Heilman 2001). In the present context, particular attention is paid to gender stereotypes and status beliefs (Ridgeway 1997), and how these interfere with competence expectations, ascribed competencies, and productivity (Foschi 2000). In their theoretical framework of ambivalent sexism, Glick and Fiske (1997) present two types of stereotyped sexism. They distinguish between hostile and benevolent sexism. The former reflects negative attitudes towards one sex based on stereotyping. The latter represents initially positive ascriptions to a gender, which in turn reproduce or reinforce gender stereotypes. Prior literature suggests that women in typically male occupations are often faced with hostile sexism in the form of a harsher observation and evaluation of their productivity by male gatekeepers, and may often feel isolated and excluded. This has been shown to have an impact not only on a range of job outcomes (e.g. on-the-job performance) but also on subjective health and well-being (King, Hebl, George, Matusik 2010). Even if women manage to show high competency and productivity levels, and thus exceed expectations, they may still experience poorer treatment and worse conditions than men (Heilman 2012).

On the basis of this research, it can be argued that technological change will foster discriminatory treatment of women, particularly in typically male work settings. One may therefore assume that women are more likely to perceive technological changes as threatening, particularly with regard to skill requirements and performance demands. Women employed in occupations that are dominated by men are then likely to face a double burden. Being underrepresented and exposed to processes such as (but not limited to) stereotyping and discrimination related to gender and technology, it can be assumed that they evaluate technological change at work as the most threatening.

However, it must be remembered in this discussion that some occupations do not require high-level technological skills, so implicit stereotypes about gender and technology should be less relevant there. It is therefore important to control not only for occupational gender segregation, but also occupational status and the digital intensity of the sector.

In all this, it is also necessary to closely examine other characteristics of workers. One reason for this is that stereotypes and status beliefs are also found in views on other people's migration history (Rosette, Ponce de Leon, Koval, Harrison 2018) or age (Toomey, Rudolph 2017). In the context of this study, older workers can be stereotyped if employers hold the view that older workers tend to be slower to adopt

new technologies and devices at work (Börsch-Supan 2013). Less straightforward, but clearly as important, are the ambivalent stereotypes that exist about people with migration backgrounds in reference to their country of origin (Bradley-Geist, Schmidtke 2018). In the following, age and migration background are therefore used as control variables, since both can influence subjective perceptions of technological change. This study does not, however, interrogate the intersections of gender, migration history, and age and the different privileges and disadvantages attached to these multiple identities (Choo, Ferree 2010).

Open research questions in the analysis of risk perceptions

As described above, technological change is assumed to have an impact on men's and women's perception of four different types of risks. Since theoretical predictions are ambiguous, the remainder of the article provides a descriptive analysis, comparing men and women across gender-typical and gender-atypical occupations and controlling for various personal, occupational, and structural characteristics in the analysis. The main questions are: To what extent are men and women experiencing changes in the technologies of their workplace? Do men and women anticipate to differing degrees a threat to their future job security and the skills required of them? And do they expect technological changes in their workplace to impact their health or work performance demands?

Data, variables and analytical strategy

Data

This analysis uses data from three waves of the Socio-Economic Panel (SOEP.v34), covering the survey years 2015-2017 (Goebel, Grabka, Liebig, Kroh, Richter, Schröder, Schupp 2019). Running since 1984, the SOEP is a multi-dimensional database that contains household- and individual-level data. Using several modes of data collection (with face-to-face interviewing as the default), every year nearly 15,000 households and about 30,000 persons in Germany participate in the SOEP survey. The data cover the past, present, and future situations of respondents (e. g. work situation) using self-reported 'objective and subjective' variables. Items that measure subjectively experienced change in the workplace have only been surveyed in these last waves of the panel. The sample used in the analysis thus includes employed men and women aged 18 to 65 who have participated in at least two panel waves. Self-employed people, trainees, and military personnel are not included. The chosen sample contains 2,740 women and 2,459 men (about 59% of the sample members were interviewed twice).

Variables

The dependent variable of interest is the subjective experience change in the workplace, and not any objective measure of change. Two survey questions are of interest here. Each respondent was asked: 'Sometimes there are changes in the tools and technologies of the workplace – for example, when new technologies, devices, or working or production processes are introduced. What about you? Have there been any changes of this kind in your job in the last year?' (dichotomous dependent variable: 1 = yes; 0 = no).

If this condition was met, respondents then estimated the potential risks associated with this over the next two years. A distinction was then made between the risk of losing their job and health risks. Moreover, respondents were asked to state whether they expect their demands for qualifications and work performance to increase or decrease. For this purpose, questions with ordinal response categories are used (ordinal dependent variables: risk/demands will decline, will remain the same, will increase). While the question about technological changes is retrospective (referring to the previous year, i.e. 2015 or 2016), the associated risks are measured prospectively (referring to the subsequent two years). One advantage is that the survey question does not focus solely on automation processes, which are more prevalent in male-dominated occupations. A further advantage is that the collection of prospective data will capture chronic risk events that people have to cope with, and not just a snapshot. A disadvantage of the question used in the SOEP is that it covers a range of aspects, some of which do not necessarily capture the effects of technological change.

The following analyses compare men's and women's risk perceptions across gender-typical and atypical occupations. However, information on occupational gender segregation is not included in the SOEP. Year-specific values have therefore been taken from a special evaluation of the Federal Statistical Office using the German Microcensus (Statistisches Bundesamt 2018) and merged with the SOEP applying the 3-digit job classification of the German Federal Employment Agency (Bundesagentur für Arbeit 2011). Three dummy variables are used to categorise the share of women in a given occupation, one for typically male jobs (where the percentage of women in these jobs is from 0 to 30), one for typically female jobs (where the percentage of women is from 70 to 100), and one for integrated jobs (where the percentage of women between 30 and 70) (Busch-Heizmann 2015).

While the goal of the analysis is to show how gender and the share of women in an occupation interact as determinants of perceived changes in the technologies of the workplace, we acknowledge that further variables need to be introduced into the multivariate analysis as controls. To measure the digital intensity of the sector in which women and men are employed (OECD 2019), the analysis differentiates between low intensity of digital transformation (e.g. real estate), medium intensity (e.g.

human health activities), and high intensity (e.g. IT and other information services). The control variables also include age, migration background, willingness to take risks (on a 10-point scale, ranging between 0 = not at all willing and 10 = very willing to take risks, which has been converted so that it ranges between 0 and 1), educational level, occupational status and duties, employment experience, firm size, and sample region. All time-varying variables are measured at two different points in time, 2015 and 2016, and thus refer to the retrospectively measured point in time when a change occurred (or did not occur) in the workplace. Table 1 shows the descriptive values of all variables by gender.

Table 1: Statistics of dependent and independent variables for women and men

		Women N=4362				Men N=3899			
		Mean	Std. Dev	Min.	Max.	Mean	Std. Dev	Min.	Max.
Dependent variables	Change in technologies (1=yes)	0.21	-	0	1	0.25	-	0	1
	Health risk will								
	increase	0.15	-	0	1	0.13	-	0	1
	remain the same	0.77	-	0	1	0.77	-	0	1
	decline	0.08	-	0	1	0.13	-	0	1
	Risk of losing job will								
	increase	0.06	-	0	1	0.05	-	0	1
	remain the same	0.85	-	0	1	0.82	-	0	1
	decline	0.09	-	0	1	0.14	-	0	1
	Demands for qualifications will								
	increase	0.50	-	0	1	0.52	-	0	1
	remain the same	0.49	-	0	1	0.47	-	0	1
	Decline	0.01	-	0	1	0.01	-	0	1
	Demands for work perf. will								
	increase	0.56	-	0	1	0.52	-	0	1
	remain the same	0.42	-	0	1	0.47	-	0	1
	decline	0.02	-	0	1	0.01	-	0	1
Independent variables	Share of women in occupation								
	Male-dominated	0.08	-	0	1	0.55	-	0	1
	Mixed	0.38	-	0	1	0.34	-	0	1
	Female-dominated	0.54	-	0	1	0.11	-	0	1
	Digital-intensity of sector								
	High	0.06	-	0	1	0.19	-	0	1
	Medium	0.79	-	0	1	0.64	-	0	1
	Low	0.15	-	0	1	0.16	-	0	1
	Firm size								
	19 or fewer employees	0.23	-	0	1	0.16	-	0	1

Independent variables	20 to 199 employees	0.26	-	0	1	0.26	-	0	1
	200 to 1999 employees	0.22	-	0	1	0.24	-	0	1
	2000 employees or more	0.29	-	0	1	0.34	-	0	1
	Educational level								
	High	0.39	-	0	1	0.37	-	0	1
	Medium	0.45	-	0	1	0.36	-	0	1
	Low	0.17	-	0	1	0.27	-	0	1
	Occupational status								
	Worker	0.11	-	0	1	0.30	-	0	1
	Civil servant	0.11	-	0	1	0.12	-	0	1
	Employee	0.78	-	0	1	0.58	-	0	1
	Occupational duties								
	Assistant	0.10	-	0	1	0.04	-	0	1
	Professional	0.55	-	0	1	0.51	-	0	1
	Specialist	0.14	-	0	1	0.19	-	0	1
	Expert	0.20	-	0	1	0.26	-	0	1
	Employment exp. in years	14.37	10.20	1	48	15.94	10.50	1	49
	Overtime per week in hours	1.69	2.56	0	23	2.55	3.56	0	23
	Willingness to take risks (0=not at all, 1=very willing)	0.45	0.21	0	1	0,53	0.21	0	1
	Age	47.53	9.14	20	64	46.96	9.39	20	64
	Migration background								
	No	0.91	-	0	1	0.90	-	0	1
	Direct	0.04	-	0	1	0.05	-	0	1
	Indirect	0.05	-	0	1	0.05	-	0	1
	Region								
	Eastern Germany	0.24	-	0	1	0.22	-	0	1
	Western Germany	0.76	-	0	1	0.78	-	0	1

Note: Statistical table of means, standard deviations (for continuous variables only), minimum and maximum of all variables used in the analysis (unweighted). All categorical variables are represented by a set of dummy variables (coded as 1 or 0), with one variable for each category.
Source: SOEP v.34.

Analytical strategy

The analysis employs descriptive statistics as well as regressions (Mitchell 2012). For descriptive purposes only, we report unweighted and weighted results (using cross-sectional SOEP-weights that take into account unequal selection probabilities at any stage of sampling as well as unequal response probabilities across waves). To examine the probability of experiencing a change in the tools and technologies of the workplace as the dependent variable, a binary logistic regression is used. Logit and ordinal logistic regressions are carried out in order to identify the determinants of subjective risk perceptions relating to this change. The descriptive results presented

in Table 1 clearly show that regression models for ordinal outcomes should be used in the multivariate analysis of the threat of job loss and threats to health. As for the other two dimensions, only logit models for binary outcomes (demands will increase vs. will remain the same) are suitable, because there are negligible numbers of respondents who expect these demands to decrease.

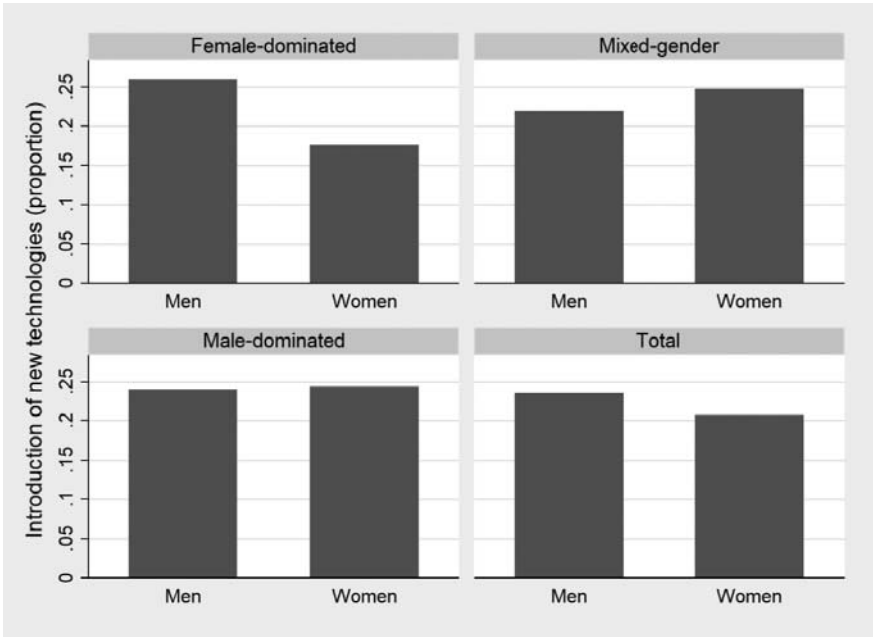
Since this results in pooled regression models, and it is therefore necessary to take into account the possible correlation of person-specific information, robust standard errors are estimated (Huber 1967; White 1980). The analysis is cross-sectional and cannot disentangle the underlying causal mechanisms. Moreover, it is possible that there are still some unobserved factors that could affect both the experience of changes in the workplace and the related expected outcomes such as health risks.

Results

Self-reported experience of change in the tools and technologies of the workplace

As the first step, we examine the self-reported experience of change in the tools and technologies of the workplace. Men are significantly more likely to mention technological changes at work than women (Figure 1). Comparing men and women across gender-typical and gender-atypical occupations, a striking difference is found: 18% (weighted: 17%) of women and 26% (weighted: 28%) of men in female-dominated occupations report changes of this kind in their job. The large difference between these two proportions is significant ($p = 0.000$), suggesting that women in female-dominated occupations are particularly unlikely to experience such changes. Gender differences are also observed within mixed-gender occupations, where 25% (weighted: 26%) of women and 22% (weighted: 23%) of men report the introduction of new technologies. This difference between proportions is smaller but still statistically significant ($p = 0.029$). There is no significant difference between men and women in male-dominated occupations (both 24%).

Figure 1: Self-reported experience of changes in the tools and technologies of the workplace by gender and the share of women in the given occupation



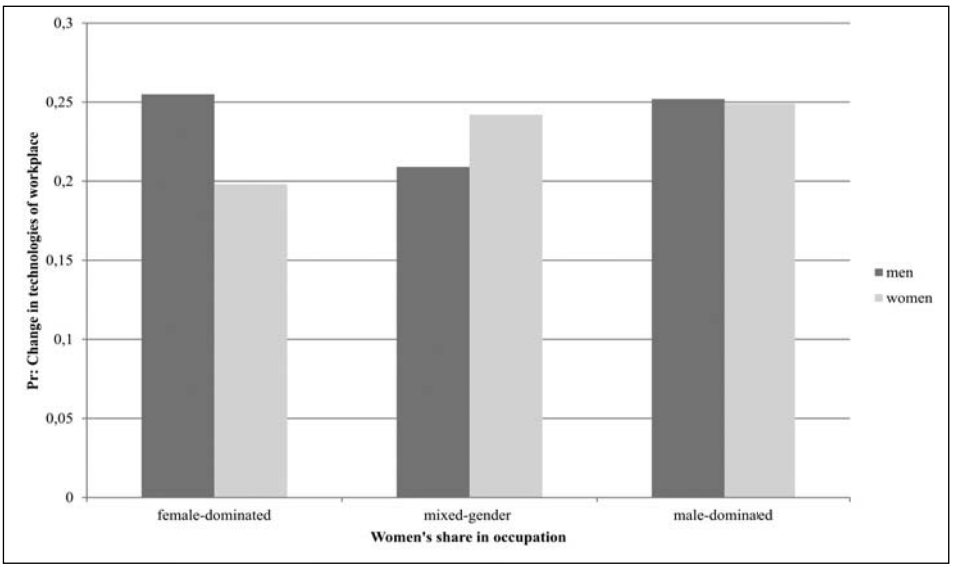
Source: SOEP v.34, unweighted.

It is important to examine whether these gender differences change when company-specific and occupational characteristics and structural and personal characteristics are taken into account. A logistic regression model is used to focus on the respondents' gender, the share of women in the given occupation, and the interaction between these two categorical variables (all other variables are included as control variables). Overall, the results of this analysis show that the log odds[1] of experiencing technological innovations are lower for women in female-dominated occupations. By contrast, the log odds are higher for women in mixed-gender occupations. For

[1] The logistic regression model quantifies the effect of a variable as a log-odds ratio. Log odds are the logarithmic chance of experiencing a change in technologies at the workplace (estimates available upon request). The estimation results can be displayed in different metrics. The log odds can be exponentiated to give an odds ratio and can also be converted into predicted probabilities. The greater the log odds, the greater the odds (of a change occurring), and the probability increases as the odds increase. To understand the results more easily, one can compare the predicted probabilities for men and women. The predicted probability depends on the level at which the variables in the model are held. For illustrative purposes, one may therefore calculate the average predicted probabilities for men and women across occupations.

a more vivid illustration of these results, Figure 2 presents the predictive margins[2] of the probability of experiencing technological innovations in relation to the share of women in the given occupation and to gender, averaging across all other values of the covariates in the dataset.

Figure 2: Probability of self-reported change in the tools and technologies of the workplace (predictive margins) by the share of women in the given occupation and gender



Note: Results from logistic with robust standard errors, controlling for all independent variables listed in Table 1. Source: SOEP v.34, unweighted.

To determine whether the main effects of interest are statistically significant, a three-step framework is used: an omnibus interaction test, a partial interaction test, and a test for interaction contrasts. This analysis reveals that the overall interaction of segregation and gender is significant ($p = 0.006$). When testing the simple effect of gender separately for female-dominated, mixed-gender, and male-dominated occupations, the analysis shows that the gender difference is significant for both female-dominated ($p = 0.016$) and mixed-gender occupations ($p = 0.046$). As already seen in the descriptive analysis, the gender difference is not significant

[2] The predictive margins are the predicted probabilities that a change occurs for men and women across gender-typical and gender-atypical occupations (keeping everything else constant). It is important to note that this pattern of interaction could vary as a function of the covariates.

for male-dominated occupations (p = 0.937). Gender differences are also found across occupations. The interaction between mixed-gender and female-dominated occupations is significant (p = 0.002). However, this does not hold true for the partial interaction between male-dominated and mixed-gender occupations (p = 0.237). The described interactions are significant regardless of whether or not other occupational characteristics (e.g. digital intensity) or personal characteristics (e.g. education or occupational duties) are held constant.

How changes in tools and technologies are expected to affect work

Figure 3 reveals the extent to which men and women who have experienced technological change at their workplace expect that this will influence their work over the next two years. With regard to health risks and the risk of job loss, some expect an increase, others expect a decrease in risks. A large proportion expect demands for qualifications and work performance to increase, while practically no one expects that a decrease in these demands will occur. Compared to demands for qualifications or work performance, perceived threats to health or job security are small: many men and women do not expect any deterioration or improvement in this regard.

Expected changes at the workplace are more strongly associated with a declining risk of job loss, particularly for men in typically male occupations. Men (3.79%, weighted: 3.84%) and women (3.39%, weighted: 3.60%) in gender-typical occupations often judge the risk of losing one's job as low. The perceived risk of job loss is highest for men (6.42%, weighted: 5.36%) and women (10.23%, weighted: 24.47%) in gender--atypical occupations, with a clear gender difference.

Men more often expect health risks to decrease, while women more often expect an increase in health risks. Both men (16.07%, weighted: 20.41%) and women (19.32%, weighted: 23.64%) in gender-atypical occupations often expect their health risks to increase, again revealing gender differences. This is also the case for men and women in gender-typical occupations, with women being more pessimistic about their health risks (15.09% vs 8.58%, weighted: 15.44% vs 10.59%).

When it comes to demands for workplace performance, gender differences are found in male- and female-dominated occupations, with women more often perceiving increasing demands than men. Women in gender-typical occupations are the most likely to expect an increase in demands for qualifications (55.34 %, weighted: 56.44%). In male-dominated occupations, men more often expect an increase in demands for qualifications than women (51.87 % vs 37.08 %, weighted: 49.33 vs 36.17%).

Figure 3: Perceptions of benefits and threats by the share of women in the given occupation and gender

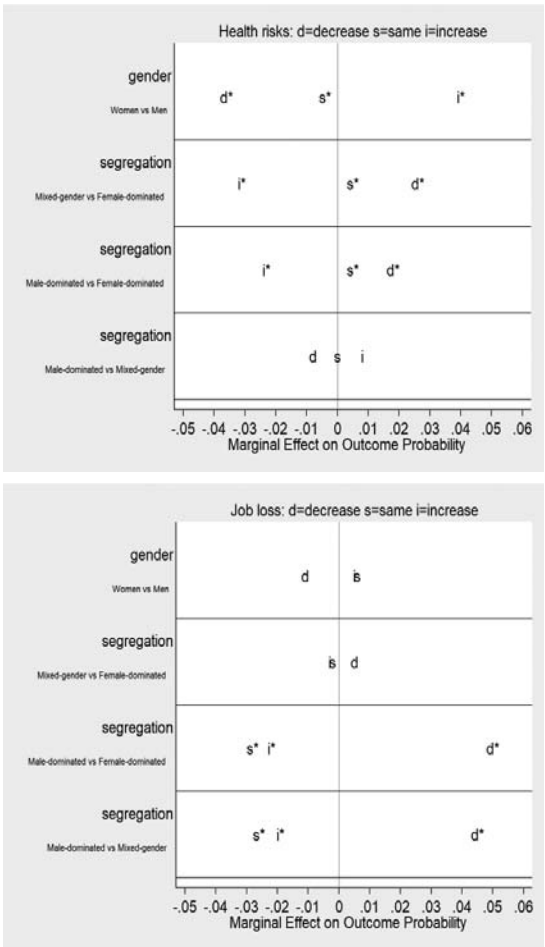
Note: This figure expresses only two proportions for each of the four variables of interest: benefit perceptions (left side of the y-axis) and risk perceptions (right side of the y-axis). Taking into account the third response category ('remain the same') and converting negative numbers into positive numbers, the results sum up to 100%. Source: SOEP v.34, unweighted.

The remainder of this section reviews selected results from the multivariate models. In this analysis, interactions between gender and the share of women in the given occupation do not have to be taken into account (after formal tests of interaction). The model specification is thus simpler but still controls for all other variables shown in Table 1.

As shown in the left panel of Figure 4, significant gender differences are found for the perception of health risks, as women have a higher probability of risk perception in this area, while the probability of perceiving the benefits of technological change is lower for them. Looking at occupational gender segregation, there are no significant differences when comparing male-dominated and mixed-gender occupations. However, the analysis reveals that on average the probability of perceiving an increase in health risks is higher in female-dominated occupations than male-dominated and mixed-gender occupations. Turning to the perceived risk of losing one's job (right panel of Figure 4), the effects of gender are insignificant. Significant differences are found, however, when the effect of the share of women in the given occupation is

considered. Those employed in male-dominated occupations are more likely to expect a decrease in the risk of job loss.

Figure 4: Perceptions of health risks and the risk of job loss by the share of women in the given occupation and gender (predictive margins)

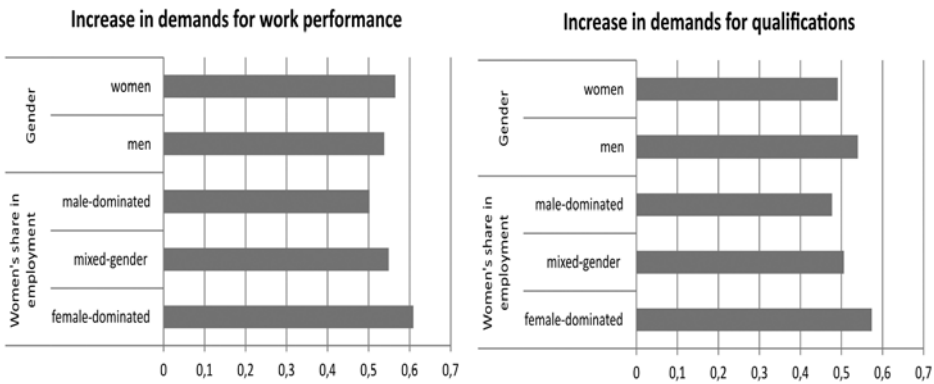


Note: Results from the ordinal logistic regression with robust standard errors, controlling for all independent variables listed in Table 1. * $p < 0.05$. Source: SOEP v.34, unweighted.

With regard to a perceived increase in demands for qualifications ($p = 0.102$) and work performance ($p = 0.342$), the effect of gender is not significant (Figure 5). Compared to respondents in female-dominated occupations, those employed in mixed-gender

(p = 0.042) or male-dominated occupations (p = 0.015) are significantly less likely to perceive an increase in demands for qualifications. The same holds true for demands for work performance. At the end of this presentation of the results, it should not go unnoticed that the results for women in male-dominated occupations who have experienced technological change are based on a small number of observations.

Figure 5: Perceptions of increased demands for qualifications and work performance by the share of women in the given occupation and gender (predictive margins)



Note: Results from the logistic regression with robust standard errors, controlling for all independent variables listed in Table 1. Source: SOEP v.34, unweighted.

Summary and discussion

Despite fast-growing research on technological change at work and in general, we know surprisingly little about subjective risk perceptions and possible gender differences. Returning to the initial question about the extent to which men and women are experiencing changes in the technologies of their workplace, this study shows that men and women in female-dominated and mixed-gender occupations are experiencing technological change to varying degrees, even after taking into account other personal, structural, and occupational characteristics. In female-dominated occupations, women are less likely than men to experience changes, but in mixed gender occupations they seem slightly more likely to do so than men. It is important to note that within male-dominated occupations, no gender differences are revealed.

With respect to risk perception, many individuals anticipate no change in demands and risks, and some expect their situation to improve due to technological change, at least with respect to health risks and the risk of job loss. The biggest challenges are seen in demands for qualifications and work performance. This evidence is

in line with theoretical assumptions about the (perceived) risks of technological change at work, which were presented above. From an employee perspective, the risks of technological change appear to be primarily due to a process of change, acceleration, and compression of work, increasing perceived skill demands and work performance demands.

Technological change is perceived as most threatening in female-dominated occupations, particularly for women. Women more often expect a deterioration in health, but when it comes to the risk of job loss or of increased demands for qualifications and work performance, women do not seem any more worried about the future than men. This may be partly explained by the lower substitution probability of female-dominated occupations. Technological change is accelerating the social transformation into a digital society, with new consequences for the health of employees. In general, the physical burden is decreasing with the support of technical devices, while mental stress is increasing because of the need for simultaneous and faster task completion. In the tertiary sector especially, where mainly women are employed (e.g. the medical and non-medical health sector, public administration, and the retail sector), work pressure seems to increase with the use of technology. Combined with a lower assessment of their own technical skills and the fact that they may face stereotypes and stereotype threats, women's health concerns appear to be well-founded. On top of this, there are generally low-paid jobs with poor working conditions (for example, in care, childcare, and cleaning) that are mainly performed by women. The share of women in an occupation does, however, make a difference. In male-dominated occupations, individuals are more likely to expect a decrease in health risks and in the risk of job loss, irrespective of gender. They are also less likely to expect an increasing demand for qualifications and work performance. Individuals in male-dominated occupations may be more used to technological change, which could reproduce gender status beliefs and reinforce gender-specific self-expectations. Moreover, their jobs are often becoming less physically demanding, and technological change often reduces the exposure to dangerous tasks. Working with technology and changes in tools and technologies are more of a new experience for those working in female-dominated occupations, and this may amplify risk perception, for both men and women. In light of these findings, future research should more closely explore the extent to which men's and women's risk perceptions vary across occupations, hierarchical positions, and sectors. Moreover, to what extent the division of domestic labour, which continues to be carried out mainly by women, plays a role has not been explicitly examined in the empirical models. In connection with the still-predominant male breadwinner model, especially in male-dominated occupations, this seems to have an influence and should be investigated in future analyses.

The results so far give no support to the claim that gender stereotypes and self-characterisations, though only implicitly measured, increase women's risk perception to a greater extent than men's. Yet this result is based only on a small number of cases, since few women work in atypical occupations and have experienced a change in the workplace. The risk perceptions that were examined also need to be further refined in future analyses, as health risks may, for example, be due to psychological and physiological factors. Another limitation is that – although many characteristics have already been controlled for – the data used cannot show whether individuals have repeatedly experienced technological changes in the past. It should also be mentioned that some individuals who changed jobs between two panel waves and those who lost their job may have been particularly exposed to technological change but are not part of the estimation sample.

Apart from these critical considerations, this study elucidates why further research on technological change in female-dominated occupations may be particularly fruitful. This article focuses on the perceptions of technological change in Germany at the micro-/employee level. The relationship between worries and subjective risk perceptions requires further investigation, as Sjöberg (1998) has already pointed out. Furthermore, light needs to be shed on the consequences of stereotyping and discrimination processes for the everyday work of women and men. As a next step, future studies should also address gender-specific risk perceptions in other countries to identify similarities and differences between countries. All in all, there is to date too little theoretical and empirical knowledge about the extent to which men and women evaluate technological change at work differently.

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The Gender Pay Gap in the Platform Economy: Comparing the Importance of Market and Organisational Dynamics on Two German Crowdworking Platforms

Anja-Kristin Abendroth

Abstract: The rise of the platform economy has brought about crowdwork as a new form of flexible work where individuals solve specific problems or provide specific services or products in exchange for payment via online platforms. Survey data for crowdworkers in Germany collected by the 'Digital Future' collaborative research unit are used to compare gender inequalities in hourly pay among crowdworkers sampled from a marketplace platform and a micro-task platform. The results reveal that fathers earn higher hourly pay than mothers and childless women and men, but only on the marketplace platform. These differences can partly be explained by fathers being better positioned in the overall labour market and fathers' investment patterns in crowdwork, with longer seniority on the platform and quick task performance, which results in higher hourly pay. Investments in crowdwork and overall labour market positioning are only of modest importance on the micro-task platform. This points to different organisational settings and inequality regimes on the two platforms under study.
Keywords: platform labour, platform economy, crowdwork, algorithmic control, gender inequalities, gender pay gap, flexibility

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In times of increased female labour market participation, coordinating a partnership, employment, and family tasks becomes more complex. As a consequence, the demand for employment that can be adapted more flexibly to fit personal needs and different life plans has increased.

In the platform economy, paid work organised via online platforms, often labelled

crowdwork,[1] is a new form of flexible work (Leimeister et al. 2016; Pongratz, Borman 2017; Vallas, Schorr 2020). It offers a large variety of work tasks that do not require a person to be at a specific location (Pongratz, Borman 2017; Wood et al. 2019). The work tasks can instead be done completely digitally using internet-ready devices, such as computers and smartphones, which enable locational work flexibility. Crowdwork has thus also been described as a new form of working from home (Adams, Berg 2017). Moreover, it is the worker who chooses the work tasks and decides when to use the platform to search for and complete tasks. This work situation offers a high level of work autonomy (Wood et al. 2019; Schorr et al. 2020).

Whether crowdwork as a new form of flexible work also translates into smaller gender pay inequalities, however, remains unclear. Crowdwork has the potential to accommodate the increased interest in flexibility among employees, especially women, who still face a more pronounced double burden of work and family responsibilities (e.g., Dechant, Blossfeld 2015; England 2010; Treas, Drobnic 2010). Moreover, in contrast to the flexible workplace arrangements available in conventional establishments, such as telework or flexi-time, in crowdwork the dynamics of gift exchange, where employees work longer hours in return for the 'gift of flexibility', are less likely to come into play (Chung, Van der Lippe 2018). Similarly, flexibility stigmas, where women in particular are perceived to be less productive when they work at home and experience pay penalties for using flexible work arrangements, are also less likely to occur (Lott, Chung 2016; Lott, Abendroth 2020). Nevertheless, the first evidence on work organised through the Amazon Mechanical Turk online platform reveals a gender wage gap of between 10% and 20% (Adam 2020; Adam, Berg 2017; Litman et al. 2020). The ILO (2018) report further indicates an average pay gap of between 18% and 38%, depending on the platform. For the online platform Uber, which mediates taxi rides, Cook et al. (2018) also show a gender pay gap that they explain by men's accumulated experience and the locations in which they drive. However, this form of platform work, often labelled gigwork, involves little locational flexibility and is not the focus of this research.

This study aims to compare gender inequalities in hourly pay on two German crowdworking platforms that mediate work tasks that can be performed anywhere and remotely. Based on a description of such platforms as a hybrid between an organisation and a market (Kirchner 2019), this study investigates whether the market and organisational dynamics that are highlighted as central explanations for the gender pay gap in established forms of paid work also operate on the two German crowdworking platforms and contribute to a gender pay gap among crowdworkers.

[1] Alternative terminologies are online labour (Pongratz, Borman 2017), remote gig work (Wood et al. 2019) and platform mediated remote contracting (Kenney, Zysman 2019).

First, I ask whether women earn a lower rate of hourly pay from crowdwork and to what extent this difference can be explained by gender inequalities in the overall labour market. With respect to market dynamics, I discuss whether gendered status beliefs, where men are in general perceived to be more competent and productive in the labour market, also lead to a lower demand for female work on crowdworking platforms, which, in line with the devaluation hypothesis of female work, results in lower hourly pay for female crowdworkers (e.g. England 1992; Ridgeway 2001).

Second, I ask whether there are gender-specific time investment patterns among German crowdworkers that can be attributed to the gendered division of labour and whether mothers' investment patterns result in lower hourly pay. With organisational dynamics, I refer to the predominance of the ideal worker norm in work organisations where a high time investment and presence at the regular work site, which align with traditional male life courses, are tied to higher hourly pay (Acker 1990; Williams et al. 2012, 2013; Kelly et al. 2010). Adam (2020), Adam and Berg (2017), and Litman et al. (2020) provided the first evidence that women's greater family responsibilities and related fragmented work patterns explain a large part of the gender pay gap on the Amazon Mechanical Turk crowdworking platform.

Third, based on the typology by Leimeister et al. (2006), this study further compares gender inequalities in hourly pay between two types of platforms that vary in terms of the skill and complexity of the work tasks (Bergvall-Kåreborn, Howcroft 2014; Leimeister et al. 2016): one is a micro-task platform offering work with unstructured data for blogs, shops, and websites, and the other is a marketplace platform with extensive text production and translation. Previous research mainly researched the gender pay gap for a single platform. Conclusions on the importance of the organisational setting for gender pay inequalities among crowdworkers, however, require systematic comparisons between different platforms.

The data used here are from a unique German Crowdworker Survey fielded within the 'Digital Future' collaborative research programme funded by the Ministry of Culture and Science of the state of North Rhine-Westphalia (Germany). Germany is an especially interesting case, as crowdwork is still mainly an additional source of earnings in the country, and women are, on average, more likely to want to increase their working hours in their current employment but often do not have the ability to do so (Dechant, Blossfeld 2015; Leimeister et al. 2016; Stier, Lewin-Epstein 2003; Treas, Drobnic 2010). Estimates of the percentage of crowdworkers within the active labour force thus far vary between 3% and 14% for Germany as a whole (Bonin, Rinne 2017; Huws, Joyce 2016; Pesole et al. 2018; Serfling 2018).

Crowdwork: a hybrid form of work

Crowdwork has been defined as a 'new form of paid work' in which individuals solve 'specific problems or provide specific services or products in exchange for payment' via online platforms (Eurofound 2015: 2ff). Crowdwork can here be initiated by the requester (crowdsourcer) or the crowdworker (Howcroft, Bergvall-Kåreborn 2019). The limited time horizon of the exchange between crowdworkers and crowdsourcers suggests that the exchange is merely an economic exchange mediated by the platform. Existing research that focuses on the mediating role of the platform, however, shows that this is not the case. The platform is a third actor that establishes the rules and conditions for the exchange, which it defines in its terms and conditions of business (Bergvall--Kåreborn, Howcroft 2014; Kirchner 2019). The platform's rules must be accepted when crowdworkers and crowdsources register on the platform (Bergvall-Kåreborn, Howcroft 2014). Moreover, the platform adopts elements of an employment relationship that are normally covered by regular work organisations, such as taking control of and monitoring work performance (Schorr et al. 2020; Vallas, Schorr 2020). Kirchner (2019) concludes that the rise of the platform economy involves a new hybrid form of work that resembles something between a market and an organisation.

Existing research on established forms of paid work has provided extensive evidence of a gender pay gap and its persistence over time, where women continue to earn, on average, lower hourly pay than men (e.g. England 2010; Misra, Murray-Close 2014). Market and organisational dynamics have here been addressed as major explanations that can also contribute to gender pay gaps among crowdworkers.

With respect to market dynamics, I refer to explanations that highlight a lower demand for female work, especially for high status positions and well-paid work tasks, owing to gender status beliefs. Gender status beliefs here refer to ascribed gendered competence and productivity, where men are in general perceived to be more competent and productive in the labour market, which in turn results in a general devaluation of female work in the labour market (England 1992; Ridgeway, Correll 2004; Risman 2004). Theories on gender as a status characteristic explain that, in hiring and promotion, people tend to categorise others according to gender and that assumed gendered skills and status perceptions consciously or unconsciously shape judgements and behaviour in hiring and promotion decisions, resulting in lower hourly pay for women irrespective of their human capital and investments (Ridgeway, Correll 2004; Risman 2004). Theories of statistical discrimination in the labour market (e.g., Phelps 1972) have further been used to argue that women are perceived to be generally less productive in the labour market due to the gendered division of labour, with women more likely to interrupt work and work part-time due to parenthood. Research on the self-employed suggests that these forms of discrimination can come

from creditors or consumers (Budig 2006a, b; Lechmann, Schnabel 2012). Existing research has supported this argument in experimental designs and has attributed net gender pay gaps in survey research to discrimination (for a review, see Misra, Murray-Close 2014).

With *organisational dynamics,* I refer to Ackers' theory on gendered organisations (1990), which points out that structures and processes in organisations are based on traditional male life courses. Existing literature here refers to the 'ideal worker norm', which describes a worker who works long hours, is highly accessible for work, and is physically present at the regular work site (Williams et al. 2012, 2013; Kelly et al. 2010). This norm of an ideal worker aligns with traditional male life courses and clearly deviates from common female life courses that involve more career interruptions, part-time work, and less availability for work because of the gendered division of labour, where women are still mainly responsible for work in the household (Williams et al. 2012, 2013; Kelly et al. 2010). In work organisations dominated by the notion of the ideal worker, workers' heavy time investment and presence at the regular work site are taken as signals of high productivity and therefore lead to better opportunities to earn higher hourly pay. Existing studies have supported this argument by showing the pay and career penalties attached to part-time work and to career interruptions to have children (e.g. Misra, Murray-Close 2014) and the high pay premiums for overtime work (e.g. Cha, Weeden 2014). Moreover, existing research points to a flexibility stigma, where employees express concerns about the possible limitation of their career opportunities if they use flexible workplace arrangements (Konrad, Yang 2012) when the supervisor in general expects a physical presence (Lott, Abendroth 2020), and/or where using a flexible work time or location results in pay penalties, especially for women (Lott, Chung 2016).

In this following section, I discuss whether the described market and organisational dynamics are similar or different on crowdworking platforms and how they can result in a gender gap in hourly pay among crowdworkers.

Market dynamics on crowdworking platforms and gender inequalities in hourly pay

On crowdworking platforms, workers have to register on the platform to perform a crowdworking task. The formal hiring processes and personnel selection criteria that are common in established forms of paid work often do not exist (Vallas, Schorr 2020). In addition, tasks are often distributed through a time-based competition that follows the principle of 'first come, first served' (Giard et al. 2019; Howcroft, Bergvall-Kåreborn 2019). Adam (2020) and Litman et al. (2020) further suggest that information on the gender of the crowdworker is not visible on the Amazon Mechanical Turk crowdworking platform, which gives gendered status beliefs less

room to determine men's and women's hourly pay. Adam (2020) thus concludes for Amazon Mechanical Turk that direct gender discrimination on crowdworking platforms does not contribute to a gender pay gap in the hourly pay of crowdworkers. Galperin (2019) instead argues that if gender is an available piece of information on the platform, stereotypes can be especially salient, because the exchange is rather short and the information on the job applicant limited. In line with this argument, Galperin (2019) reveals classic patterns of gender segregation in which women are less likely to be hired for male-stereotyped tasks (e.g., software development) and more likely to be hired for female-stereotyped tasks (e.g., writing and translation). However, given that the two platforms studied in this research involve extensive text production and translation (marketplace platform) and work with unstructured data for blogs, shops, and websites (micro-task platform), gender segregation into ascribed male- and female-stereotyped tasks is less likely to occur.

Nevertheless, status differences between male and female crowdworkers can be established in other ways. Existing research here refers to the importance of (marketplace) bargaining power being part of the overall positioning in the labour market (Durward et al. 2016; Schorr et al. 2020; Vallas, Schorr 2020; Wood et al. 2019). In a qualitative study based on two marketplace platforms, Durward et al. (2016) show that the quality signals of crowdworkers, such as advertising, references, evaluations, and the promoting of one's education and skills, matter for the task distribution. More specifically, these quality signals help crowdworkers to achieve critical bargaining power so that they can select the best job offers or even set their own prices, as job offers are often posted to a selected group of crowdworkers (Durward et al. 2016). If quality signals such as references and documented skills are not available, critical bargaining power can be gained by collecting many positive evaluations of the jobs already performed by crowdsourcers and/or the platform (Durward et al. 2016). In the same vein, Schorr et al. (2020), Vallas and Schorr (2020), and Wood et al. (2019) highlight that crowdworkers who are less dependent on the platform can refuse low-paying tasks and can position themselves more advantageously in the online labour market (Vallas, Schorr 2020). Given that women are disadvantaged in the overall labour market, they may have less bargaining power on crowdworking platforms. Women, especially those with children, have difficulty re-entering the labour market, work in jobs that receive lower pay on average, or earn lower pay when they are self-employed (e.g. Budig 2006a, b; England 2010; Lechmann, Schnabel 2012; Misra, Murray-Close 2014). As a consequence, differences in overall labour market positioning and associated bargaining power between men and women can contribute to gender inequalities in hourly pay from crowdwork. Differences in bargaining power can, for example, become visible in different opportunities to use quality signals to obtain a work task (Durward et al. 2016) or to be picky about selecting tasks (Schorr et al.

2020; Vallas, Schorr 2020; Wood et al. 2019). The study by Litman et al. (2020) on Amazon Mechanical Turk reveals that women are indeed more likely to select tasks that have lower advertised hourly pay than men.

The importance of (marketplace) bargaining power for hourly pay from crowdwork is, however, likely influenced by the organisational design of the platform. The platform structures which information can be used by crowdsourcers to distribute work tasks to a specific group of crowdworkers, who then compete for the task according to the principle of 'first come, first served'. Moreover, the platform structures what information crowdworkers can provide as quality signals – for example, in short profile descriptions. Algorithmic task distribution then uses information on the demand for specific groups of workers and their evaluations to filter tasks to workers with higher bargaining power (Bergvall-Kåreborn, Howcroft 2014; ILO 2018; Schorr et al. 2020; Vallas, Schorr 2020). This also suggests that people with less bargaining power have less of an opportunity to pick higher-paid tasks because they are filtered away from them. A system of algorithmic task distribution that relies on data that mirror differences in bargaining power between men and women then reinforces a lower demand for female crowdworkers. In line with this, existing research suggests that when algorithms are in play, they are likely to reproduce existing inequality structures in the labour market because the inequality structures are inherent in the data used by algorithms (Barzilay, Ben-David 2015; Folkerts et al. 2019). This pattern leads to the following hypothesis:

> H1: Women earn lower hourly pay from crowdwork than men, which can partly be explained by differences in their employment status and positioning in the overall labour market (indicated by their employment, self-employment, and pay in addition to crowdwork).

Organisational dynamics on crowdworking platforms and gender inequalities in hourly pay

The performance of work tasks on crowdworking platforms clearly deviates from the expectation that a worker be physically present in the workplace, which is part of the ideal worker norm in established forms of work organisations. Work tasks can often be performed irrespective of location, and workers can choose when work tasks are performed (e.g. Adam, Berg 2017; Schorr et al. 2020; Wood et al. 2019). In addition, work on crowdworking platforms is currently seldom performed as full-time work, and crowdworking tasks tend to be short-term (Huws, Joyce 2016; Leimeister et al. 2016; Serfling 2018). However, it is still likely that crowdworking platforms establish a norm in which the ideal worker is one who is highly available for crowdwork on

the platform so that crowdsourcers can get their tasks performed quickly (Gomez-Herrera et al. 2017). Existing research indicates that platforms tend to use reputation systems in the form of points, levels, or trophies for the number of performed work tasks or tenure on the platform, which can result in the algorithm granted these crowdworkers easier access to work tasks (Gomez-Herrera et al. 2017). Long tenure and heavy time investment on the platform, even when it is not a person's full-time job, can be signals of high availability on the crowdworking platform. The argument is that crowdworkers who invest themselves heavily in the platform with a relatively large number of crowdworking hours, tasks, and long tenure on the platform have easier access to better-paid work tasks, not only because they are more familiar with the processes involved and have gained skills for the crowdworking tasks on the platform (Litman et al. 2020), but also because platform algorithms reward crowdworkers' accessibility for the task and/or pay distribution. Interestingly, when we compare this to established forms of paid work, women and men in Germany currently seem to be more equally accessible for work on platforms, despite the gendered division of labour, because crowdwork is mainly an additional source of earnings and women are more likely to work part time and to be looking to increase their working hours (Huws, Joyce 2016; Pesole et al. 2018; Serfling 2018; Stier, Lewin-Epstein 2003). Men are better positioned in the labour market and thus may be prevented from participating more in crowdworking (Budig, Hodges 2010; England 2010).

Existing research on crowdworking platforms, however, indicates an additional characteristic of the ideal worker norm that exists on platforms and follows traditional male life courses. Adam and Berg (2017) showed that for crowdwork organised via Amazon Mechanical Turk there are pay penalties for more fragmented work patterns, the kind of patterns that motherhood tends to require, where longer task completion leads to lower pay. In line with this finding, Serfling (2018) suggests that the work-family situation matters for which tasks are chosen on the platform. Serfling (2018) shows that in Germany, women are more likely to do short-notice work tasks and tasks that take a rather short time. This finding suggests that mothers earn less hourly pay on crowdworking platforms because they have more fragmented work patterns and are thus able to do fewer tasks per hour. This indicates that the speed of task performance is considered in the algorithmic task distribution or in the evaluations by crowdsourcers. Based on this finding, the following hypothesis is formulated:

> H2: Mothers earn lower hourly pay from crowdwork than fathers and childless men and women, which can partly be explained by their slower task performance (fewer tasks per hour) on crowdworking platforms.

Differences between platform types

A growing research field has established that work organisations vary in their inequality regimes depending on their history, composition, policies, or cultures (for a review, see Tomaskovic-Devey, Avent-Holt 2019). Given that crowdworking platforms are described as a hybrid between the market and the organisation, it is expected that gender pay gaps on crowdworking platforms differ as well. Leimeister et al. (2016) identified different types of crowdworking platforms based on the tasks performed and observed differences in the prevailing working conditions (Leimeister et al., 2016). This research compared a marketplace and a micro-task platform, which partly displayed the type of segregation commonly observed between professional and non-professional workers in self-employment (Budig 2006a, b) and typologies that distinguish between low and high levels of skill and complexity in the platform's work tasks (Vallas, Schorr 2020). According to Leimeister et al.'s description (2016) of the micro-task platform, the tasks seldom require specific qualifications, are rather short in duration, and involve relatively low pay. Marketplace platforms are instead characterised by more complex tasks that have specific requirements for crowdworkers and can involve higher pay.

On the one hand, I suggest that algorithmic task distribution, which above I argued reinforces a lower demand for female work on the platform, differs between the micro-task and marketplace platforms under study. Economic literature has highlighted that algorithmic task distribution is used to reduce the transaction costs on a platform (for a review of the economic literature, see Vallas, Schorr 2020). These transaction costs are especially involved in the distribution of skilled tasks as they are difficult to control. As a consequence, it can be expected that the marketplace platform is more likely to rely on an extensive algorithmic task distribution that reinforces a gender pay gap on this platform. By contrast, for the micro-task platform, it can be expected that the 'first come, first served' principle of task distribution predominates and leaves less room for the devaluation of female work based on algorithmic task distribution.

On the other hand, I expect that more fragmented work patterns, where mothers are slower in their task performance, matter more for task distribution, evaluation, and pay on the marketplace platform. On the marketplace platform tasks are more complex and information on the time required for a task is more likely to be used in evaluations by the platform and/or the crowdsourcer. Fragmented work patterns due to motherhood are assumed to be less important for micro-tasks, which are rather short. This argumentation leads to the following hypothesis:

H3: Gender inequalities in hourly pay are more pronounced on the marketplace platform than on the micro-task platform.

Data and Methods

Data collection

The source of the data used here is the German Crowdworker Survey, which is fielded within the 'Digital Future' collaborative research programme funded by the Ministry of Culture and Science of the German state of North Rhine-Westphalia. (http://dx.doi.org/10.4119/unibi/2936990; method report: Giard et al. 2019). In the first step, 58 German-speaking crowdworking platforms were identified and relevant data were collected (e.g. the number of registered users, types of typical tasks, commercial register details, and existing studies on the platform). In the second step, platforms were chosen based on the following selection criteria: head office in Germany, number of active crowdworkers in Germany, and level of activity (extent of tasks and how current they were and social media contributions and how current they were). This procedure resulted in the selection of 17 platforms. Of those, the most established platform for each platform type was selected. The four chosen platforms were contacted with individual cover letters introducing the intended content and goals of the survey and information on data security and payment for respondents. The questionnaire was programmed using an online survey tool (Unipark), and the request for participation in the survey was offered as a regular task on the platform or was sent to crowdworkers via e-mail from November to December 2018. The survey period was between 3.5 hours (for the micro-task platform) and 12 days (for the marketplace platform, with a request via e-mail). The goal was to collect 200 completed questionnaires for each platform. The average time that respondents needed to complete the questionnaire was 25 minutes, with a range of 5 to 140 minutes. Moreover, it was possible to interrupt the online survey and continue after a break; this option was used by 3% to 6% of respondents. This goal was achieved, as 606 completed questionnaires were collected. Of these, 9 were excluded from the data set because the respondents gave an incorrect answer to a control question included in the questionnaire. For this research article, the analyses were based on a sample of crowdworkers on two platform types, a marketplace platform and a micro-task platform, that clearly differed in the complexity of tasks provided in ways that resemble common differences between professional and non-professional tasks in self-employment, but which also clearly vary in other respects, as described below.

Marketplace platform

Tasks on the marketplace platform involve extensive text production and translations for blogs, shops, or websites, which often require specific skills. Overall, only 20% of the respondents reported that tasks on the platform require no previous work experience or skills. A large share of crowdworkers on the platform reported that

skills other than formal qualifications and occupational experience are important (reported by 55%), but only a small share reported that these skills are the only requirement (26%). In addition, 31% reported that a formal educational degree is required (only 4% reported that a degree is the only requirement), and 34% reported that experience in their occupation is required (only 3% reported that this experience is the only requirement) for the tasks they perform on the platform. According to 94% of the crowdworkers in the sample, the platform and/or the crowdsourcer evaluates work performance. Task distribution involves a time-based competition for work tasks with fixed pay following the principle of 'first come, first served'. However, tasks are mainly distributed to just a select group of crowdworkers registered on the platform based on selection criteria that can be applied by the crowdsourcer. Communication between crowdworker and crowdsourcer is sometimes part of the exchange, and crowdsourcers can even select a specific crowdworker – for example, the one who performed the last task that the crowdsourcer posted on the platform. Most of the crowdworkers on the marketplace platform have a high level of education (58.3% have a university degree), are self-employed in addition to doing crowdwork, and have relatively long seniority on the platform (around half of them have been there for more than 5 years). More than half of them are female and only 30% of the respondents are 35 years old or younger (see also the methods report in Giard et al. 2019). Altogether 176 respondents provided valid information on all the measurements for the marketplace platform. Table A in the Appendix presents the descriptive statistics on the present sample of crowdworkers on the marketplace platform.

Micro-task platform

Tasks offered on the micro-task platform typically involve working with unstructured data such as texts, pictures, or videos – for example, tagging pictures or categorising data. The tasks are rather short and place few skill requirements on crowdworkers. Overall, 58% of the respondents reported that no previous work experience or skills are required for the tasks on the platform. Relevant skills other than formal qualifications and occupational experience were reported to be important by 16% of crowdworkers on the micro-task platform (7% reported that these skills are the only requirement). In addition, 16% reported that a formal educational degree is required, and 15% reported that experience in their occupation is required for the tasks they perform on the platform. The task distribution on the platform involves a time-based competition for work tasks with fixed pay assigned according to the principle of 'first come, first served'. Descriptive information further shows that the average hourly pay is lower on the micro-task than the marketplace platform (see Tables A and B in the Appendix). Evaluations seem to be less frequent than

on the marketplace platform. On the micro-task platform, 76% of respondents reported that evaluation by the platform and/or crowdsourcers is common. Another difference between the platforms is that crowdworkers on the micro-task platform are less qualified. In addition, the share of men and women on the platform is more equal. Moreover, more than half of them are 36 years old or younger, and only a few of them are self-employed and have a long tenure on the platform, in contrast to the crowdworkers on the marketplace platform (see also the methods reported in Giard et al. 2019). In total 178 respondents provided valid information on all the measurements for the micro-task platform. Table B in the Appendix provides descriptive statistics on the present sample of crowdworkers on the marketplace platform.

Measurement

Log hourly pay: Hourly pay is calculated by dividing the reported average monthly pay for crowdworking by the average number of hours spent monthly on such work. A log transformation of hourly pay is used because the distribution of pay deviates from a normal distribution.

Gender and parenthood: Gender and parenthood status were part of the survey and were used as a categorical variable in the analysis to distinguish between mothers, childless women, fathers, and childless men. Table A in the Appendix displays the descriptive statistics on log hourly pay for mothers, fathers, and childless men and women for the marketplace and micro-task platforms.

Investment in the crowdworking platform: The average total monthly crowdworking hours displays the overall time investments in crowdwork (CW hours). The share of crowdworking hours on the described marketplace or micro-task platform (share of CW hours on the platform) and the number of months registered on the platform are used to indicate the amount of time invested in the marketplace and micro-task platforms. To measure fragmented work patterns and slower task performance, the number of crowdworking hours per month was divided by the number of work tasks done per month on the platform to give the average number of tasks performed per crowdworking hour.

Labour market involvement and income in addition to work on the platform: Employment status was used as a categorical variable (0 = Not regularly employed; 1 = Employed; 2 = Only self-employed). Those who were not regularly employed were involved in childcare, were retired, or did irregular or minor work. Working hours in other employment measured the average monthly working hours in any other major employment the respondent performs besides crowdwork. To measure gross monthly pay, the total gross monthly pay reported was subtracted from the total monthly pay received from crowdwork. Gross monthly pay was top coded by 20,000 Euro per

month (relevant for two respondents) and then log-transformed as the distribution of pay deviated from a normal distribution.

Skills requirements and age: Information was used on whether the respondents perform tasks with specific knowledge as a requirement. Respondents were asked whether they take work tasks that require as a prerequisite (a) their educational or vocational qualification, (b) the whole of their work experience, (c) other specific knowledge they have acquired, or (d) no specific knowledge. Answers were provided on a five-point scale for these four items combined to assess whether the respondents mostly do qualified work tasks. The answer categories for (d) were reversed so that high values indicated requirements for specific knowledge. The highest level of education, educational field, occupational field, and length of time working in their occupational were only included in sensitivity analyses. Adding these indicators, however, did not change the results. This finding is in line with existing research on the self-employed (Budig 2006a, b; Lechmann, Schnabel 2012) and a prevailing finding that crowdworkers in Germany are, in general, highly qualified (Leimeister et al. 2016) and that qualifications are balanced between male and female crowdworkers (Litman et al. 2020). An additional sensitivity test further showed that age matters for hourly pay on the platform. Here, those who were older earned lower hourly pay on both platforms. Therefore, age was included as a control variable in the models.

Method

To investigate the gender pay gap for the marketplace and micro-task platforms and the processes involved, I perform ordinary least squares linear regressions separately for the marketplace platform (Table 1) and the micro-task platform (Table 2). Model 1 shows the overall differences between mothers, fathers, and childless men and women in hourly pay for the marketplace platform and for the micro-task platform, including age and skill indicators as additional control variables. Model 2 investigates the importance of the overall labour market positioning for hourly pay and gender differences in hourly pay on each platform to test hypothesis H1. Model 3 investigates the importance of investment in crowdworking and the importance of this investment, i.e. the amount of tasks performed, for gender inequality in hourly pay on the platform in order to test hypothesis H2. Model 4 includes both the indicators of overall labour market involvement and crowdworking investment. The comparisons between the models for the marketplace and micro-task platforms serve to test hypothesis H3.

Results of the multivariate analysis: the gender gap in hourly pay among crowdworkers

Table 1 and 2 display the results of the regression analysis on hourly pay on the marketplace and micro-task platforms. The results are discussed for each platform separately.

Marketplace platform

For the marketplace platform, Model 1 in Table 1 reveals that mothers on average earn 35% less, childless women 40% less, and childless men 34% less compared to fathers. Additional analysis shows that differences in hourly pay between mothers and childless men and childless women are not significant. The results further show that older crowdworkers earn lower hourly pay and that those who have accumulated skills for task performance in various ways earn higher hourly pay from crowdwork.

Table 1: The gender pay gap among crowdworkers on the marketplace platform

	Marketplace platform			
	M1	M2	M3	M4
Gender and Parenthood (Ref. cat. Fathers)				
Mothers	-0.346*	-0.291	-0.289*	-0.266
	(0.147)	(0.152)	(0.144)	(0.145)
Childless women	-0.401*	-0.346*	-0.327*	-0.307*
	(0.157)	(0.161)	(0.153)	(0.155)
Childless men	-0.337*	-0.309	-0.262	-0.263
	(0.168)	(0.169)	(0.164)	(0.163)
Other labour market involvement and income				
Work status (Ref. cat. Not employed)				
Employed		0.065		0.214
		(0.196)		(0.194)
Self-employed		0.323*		0.476***
		(0.130)		(0.140)
Log gross pay next to CW		0.044*		0.031
		(0.021)		(0.021)
Working hours in major employment next to CW		-0.004		-0.006
		(0.004)		(0.004)
CW investment				
Total CW hours			-0.006	-0.010*

			(0.004)	(0.005)
Share of CW hours on platform			0.347	0.424*
			(0.209)	(0.201)
CW tasks per hour			0.082*	0.102**
			(0.039)	(0.037)
Months on platform			0.004*	0.002
			(0.002)	(0.002)
Age	-0.019***	-0.018***	-0.018***	-0.015**
	(0.005)	(0.005)	(0.005)	(0.005)
Performance of tasks where accumulated skills are required	0.042**	0.036*	0.042**	0.039**
	(0.015)	(0.014)	(0.015)	(0.014)
Constant	2.701***	2.375***	2.159***	1.802***
	(0.298)	(0.312)	(0.352)	(0.363)
Adj. R2	0.102	0.167	0.163	0.239

Source: Crowdworker Survey Data 'Digital Future'.

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Standard errors in parentheses.

Model 2 adds information on employment status and positioning in the overall labour market. The results show that those who are self-employed in addition to their crowdwork earn higher hourly pay than those who are not employed or only employed in minor or irregular employment. This finding suggests that those who are self-employed possess and/or are perceived to possess the most suitable skills for the performance of well-paid tasks on the platform and receive better access to well-paid crowdworking tasks. The same applies to better positioning in the overall labour market indicated by higher hourly pay earned through crowdwork. The change in the coefficients for the gender/parenthood combination from Model 1 to Model 2 shows that considering gender differences in labour market positioning explains part of the hourly pay differences between fathers and mothers (5%) and between fathers and childless women (5%) and men (3%). The descriptive statistics in the Appendix also confirm that the share of crowdworkers who are not employed is smallest for fathers and that fathers also earn the highest gross pay through crowdwork. This finding indicates a pay advantage for them even though fathers are also less likely to be self-employed and more likely to be older. Overall, these results provide some evidence for hypothesis H1, which argued that women earn lower hourly pay from crowdwork than men, which can partly be explained by differences in their employment status and positioning in the overall labour market (indicated by their employment, self-employment, working hours, and pay from crowdwork).

In Model 3, crowdworking investment is included instead of overall labour market positioning. The results show that some forms of crowdworking investment lead to higher hourly pay on the platform but not all. The platform seems to reward tenure (months on platform) and quick task performance (tasks per hour). Comparing the gender pay gap between Model 1 and Model 3 shows that differences in crowdworking investment explain hourly pay differences between fathers and mothers (5.7%) and childless women (7.4%) and men (7.5%). The pay differences between mothers and fathers and between fathers and childless men are no longer significant when differences in crowdworking investment are considered. This finding can be attributed to differences in seniority on the platform, where fathers report the longest seniority and slightly quicker task performance. However, slower task performance seems not only to be related to parenthood. Childless men and women also report slower task performance. This finding provides only some evidence for hypothesis H2, which argued that mothers earn lower hourly pay from crowdwork than fathers and childless men and women, which can partly be explained by their slower work performance, as indicated by the performance of fewer tasks per hour on crowdworking platforms.

In Model 4, both information on overall labour market positioning and investment in crowdworking are included. Together the overall labour market positioning and investment in crowdwork explain 8% of the hourly pay differences between fathers and mothers, 9.4% of the difference between fathers and childless women, and 7.4% of that between fathers and childless men. Moreover, the pay differences between mothers and fathers and fathers and childless men are no longer significant. Model 4 further shows that overall labour market positioning and crowdworking investment are interrelated as significance and effect size changes. More specifically, pay in addition to crowdwork and months on the platform are no longer significantly related to hourly pay. Instead, total crowdworking hours now reveal that heavy time investment means less pay and not more. The overall adjusted R2 is 0.239, which indicates that the indicators of overall labour market positioning and crowdworking investments are important predictors of hourly pay for crowdworkers who perform marketplace tasks. Nevertheless, a large part of the differences in hourly pay remains unexplained.

Micro-task platform

Table 2: The gender pay gap among crowdworkers on the micro-task platform

	Micro-task platform			
	M1	M2	M3	M4
Gender and Parenthood (Ref. cat. Fathers)				
Mothers	-0.040	-0.064	-0.084	-0.076
	(0.214)	(0.212)	(0.214)	(0.212)
Childless women	-0.242	-0.309	-0.234	-0.249
	(0.213)	(0.211)	(0.215)	(0.212)
Childless men	-0.139	-0.218	-0.176	-0.214
	(0.207)	(0.207)	(0.207)	(0.206)
Other labour market involvement and income				
Work status (Ref. cat. Not employed)				
Employed		0.387		0.418
		(0.226)		(0.230)
Self-employed		0.757***		0.746**
		(0.211)		(0.228)
Log gross pay next to CW		-0.000		-0.000
		(0.005)		(0.005)
Working hours in major employment next to CW		-0.050		-0.052
		(0.032)		(0.031)
CW investments				
Total CW hours			-0.005	-0.016
			(0.010)	(0.010)
Share of CW hours on platform			-0.265	-0.268
			(0.234)	(0.230)
CW tasks per hour			0.029*	0.021
			(0.012)	(0.012)
Months on platform			0.004	0.004
			(0.002)	(0.002)
Age	-0.005	-0.010	-0.010	-0.012*
	(0.005)	(0.005)	(0.006)	(0.006)
Performance of tasks where accumulated skills are required	-0.002	-0.009	0.001	-0.004
	(0.016)	(0.016)	(0.016)	(0.016)
Constant	1.657***	1.871***	1.831***	2.026***
	(0.326)	(0.330)	(0.370)	(0.377)
Adj. R2	0.000	0.044	0.029	0.073

Source: Crowdworker Survey Data 'Digital Future'.

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Standard errors in parentheses.

In contrast to the marketplace platform, Model 1 in Table 2 for the micro-task platform reveals no significant differences in hourly pay between fathers, mothers, and childless men and women. Also, age and accumulated skills for the performance of crowdwork do not seem to matter for hourly pay on the micro-task platform in this model (but see Model 4 with a significant effect of age).

Labour market positioning in Model 2 and crowdworking investments in Model 3 are only of modest importance for hourly pay as indicated by the very small adjusted R2. Those who are self-employed earn higher hourly pay (Model 2) as do those who do more tasks per hour (Model 3). Model 4, where overall labour market positioning and crowdworking investment are combined in the analysis, shows that both are highly interrelated. Self-employed crowdworkers earn higher hourly pay in part because they manage to perform tasks especially quickly. As mothers are especially likely not to be employed but they also do more tasks per hour, this situation does not seem to be to their advantage. Overall, the results for the micro-task platform do not support hypothesis H1 or hypothesis H2. Rather, the results confirm hypothesis H3, which argued that gender inequalities in hourly pay are more pronounced on the marketplace platform than the micro-task platform.

Conclusion and discussion

In the platform economy, crowdwork is a new form of flexible work organised via online platforms that has also been called a new form of working from home (Adams 2020). In accordance with the description of crowdworking platforms as a hybrid between a market and an organisation (Kirchner 2019), this study investigated whether the market and organisational dynamics that are highlighted as central explanations for the persistence of the gender pay gap in established forms of work also result in a gender pay gap in hourly pay among crowdworkers sampled from a marketplace and a micro-task platform.

I conclude that only female crowdworkers from the marketplace platform earn lower hourly pay from crowdwork and that this gender pay gap can indeed partly be explained by gender inequalities in the overall labour market. However, women only earn less than fathers and not less than childless men. The results show that fathers are better positioned in the overall labour market, and therefore, have better opportunities to earn higher hourly pay from crowdwork. They are rarely unemployed or in minor or irregular employment and earn the highest pay outside crowdwork. This finding is in line with existing research that has found that differences in the (marketplace) bargaining power of crowdworkers relate to their overall positioning in the labour market and dependence on income from the platform (Durward et al. 2016; Schorr et al. 2020, Vallas and Schorr 2020; Wood et al. 2019). The argument is that those

who are better positioned in the overall labour market have easier access to better-paid work tasks not only because they have gained the skills to perform marketplace work tasks on the platform, but also because overall labour market positioning can be used as a quality signal on the platform (Durward et al. 2016) or allows a crowdworker to be picky about which crowdworking tasks to select (Schorr et al. 2020, Vallas and Schorr 2020; Wood et al. 2019). Algorithmic task distribution that relies on data that mirror differences in bargaining power between men and women then further enforces a lower demand for female crowdworkers as well-paid tasks are filtered away from them (Bergvall-Kåreborn, Howcroft 2014; ILO 2018; Schorr et al. 2020, Vallas and Schorr 2020). If gender pay inequalities among crowdworkers were only driven by the differences in bargaining power that stem from their overall positioning in the labour market we would expect to see similar gender pay gaps on the two platforms studied. For the micro-task platform, however, the results show that overall labour market positioning is only of modest importance for hourly pay and results in no significant pay advantage for fathers. One possible explanation is that marketplace platforms that offer tasks that require high levels of skill and complexity are more likely to rely on algorithmic task distribution to reduce transaction costs, as these tasks are more difficult to monitor and control. Overall, this provides some evidence that there is a lower demand for female work on crowdworking platforms, which is consistent with the devaluation hypothesis of female work that has been used to explain gender pay inequalities in established forms of work (Ridgeway 2001; Ridgeway, Correll 2004). Moreover, it supports the argument that work organised via platforms is a hybrid between a market and an organisation (Kirchner 2019) and that organisational settings vary between platforms and that contributes to different inequality regimes.

The results further suggest that that on these platforms the ideal worker norm clearly deviates from the norm that is established in traditional forms of work (Acker 1990; Williams et al. 2012, 2013; Kelly et al. 2010). Workers do not need to be at a specific work site, and the number of hours they work does not seem to lead to higher hourly pay. Interestingly, heavy time investment in crowdwork results in even lower pay on both platforms, which is a disadvantage for hourly pay on the marketplace platform for mothers and childless women and men. One possible explanation is that those who invest more time in crowdwork have not yet reached the critical bargaining power reported by Durward et al. (2016).

Nevertheless, it can be concluded that other gender-specific time investment patterns among German crowdworkers that can be attributed to the gendered division of labour contribute to a gender pay gap at least on the marketplace platform. Long tenure on the platform and quick task performance result in higher hourly pay, which is to the benefit of fathers on the marketplace platform. This finding is in line with the findings of Adam (2020), Adam and Berg (2017), and Litman et

al. (2020) on the Amazon Mechanical Turk platform, which showed that the more fragmented work patterns of mothers resulted in slower task performance and drove the gender pay gap on the platform. As childless women perform fewer tasks per hour than mothers, and childless men perform even fewer tasks per hour than childless women, this finding further suggests that as well as an individual's family situation there are other factors, such as familiarity with the tasks and accumulated skills, that affect the amount of time required to perform a task. Indeed, the descriptive statistics show that mothers tend to have accumulated better skills for performing crowdworking tasks and have more experience in crowdworking than childless men and women. Interestingly, on the micro-task platform, women with children do more tasks per hour than men. The tasks are probably shorter, so the fragmented work patterns of mothers do not affect task performance speed. In addition, rapid task performance is only of modest importance for hourly pay from micro-tasks and does not benefit mothers' pay, pointing again to different processes for task and pay distribution between the platforms. The results further suggest that motherhood is not taken as a signal of lower work productivity on the platform as there is no pay disadvantage compared to childless women and men. However, an overall pay disadvantage for women remains after differences in overall labour market positioning and crowdworking investment are taken into consideration.

This research has limitations. First, the conclusions drawn are not based on a representative sample of crowdworkers in Germany or on these two platforms. Therefore, the conclusions only apply for this specific sample of crowdworkers. Drawing representative samples based on crowdworkers on which there is no registered data is still a challenge for current research. In addition, the sample size is relatively small, which restricts the number of items possible to include in one model and only makes it possible to depict relatively large associations. A larger sample, especially one with more crowdworking platforms, would allow researchers to systematically test the importance that different setups of crowdworking platforms have for generating gender pay inequalities among crowdworkers. More information on the quality signals and distribution processes used by the platform and on the evaluation criteria used by crowdsourcers and the platform would further allow for more nuanced conclusions on the mechanisms that can contribute to or hamper inequalities in hourly pay among crowdworkers. Finally, this study investigated only two mechanisms for the persistence of the gender pay gap among crowdworkers with a focus on the importance of overall labour market positioning and crowdworking investments.

Nevertheless, this study provides the first insights into the importance of organisational settings for gender pay gaps among crowdworkers. It shows that marketplace platforms and micro-tasks are characterised by different regimes of organisational inequality, as has already been suggested in the case of traditional

work organisations (Tomaskovic-Devey, Avent-Holt 2019). Not only do men and women who perform marketplace tasks and micro-tasks differ in their overall labour market positioning and crowdworking investment, but overall labour market positioning and crowdworking investment are also of varying importance when it comes to determining the hourly pay of crowdworkers on the two platforms. Overall, these results point to the need to systematically study different crowdworking platforms and the organisational settings involved that contribute to or diminish gender pay inequalities among crowdworkers.

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Appendix

Table A: Descriptive statistics for men and women on the marketplace platform

	Mothers (N=57)		Childless women (N=50)		Fathers (N=31)		Childless men (N=38)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Log hourly pay	2.05	.68	2.08	.67	2.34	.80	2.21	.63
(Hourly pay in Euros)	8.52	5.84	8.87	7.52	12.33	8.78	10.11	7.72
Overall labour market positioning								
Work status:								
Not employed	25%		30%		10%		21%	
Employed	12%		10%		42%		13%	
Self employed	63%		60%		48%		66%	
Contracted monthly working hours in major employment next to CW *(for those with other major employment)*	29.59	12.29	31.20	12.76	39.79	7.60	34.65	13.90
Log gross pay aside from CW *(for those with other employment)*	6.39	1.02	6.36	1.58	7.66	7.55	6.92	.984
(Gross pay aside from CW for those with other employment)	953.40	961.41	1085.01	989.26	3598.4	5076.72	1620.42	1786.38
Investment on the CW platform								
Average CW hours per month	21.91	13.19	18.12	11.07	17.23	13.39	16.80	11.46
Share of CW hours per month on the marketplace platform	.81	.26	.87	.21	.86	.26	.87	.19
Months on the marketplace platform	64.07	32.48	49.74	31.21	66.32	28.98	49.05	29.05
Average CW tasks per hour	.95	1.97	.93	.76	1.02	.98	.83	.58
Performance of tasks where accumulated skills are required	13.54	3.91	12.34	3.54	13.45	3.24	13.49	2.79
Age	47.02	10.27	39.90	11.62	49.97	9.17	38.47	12.19

Source: Crowdworker Survey Data 'Digital Future'.

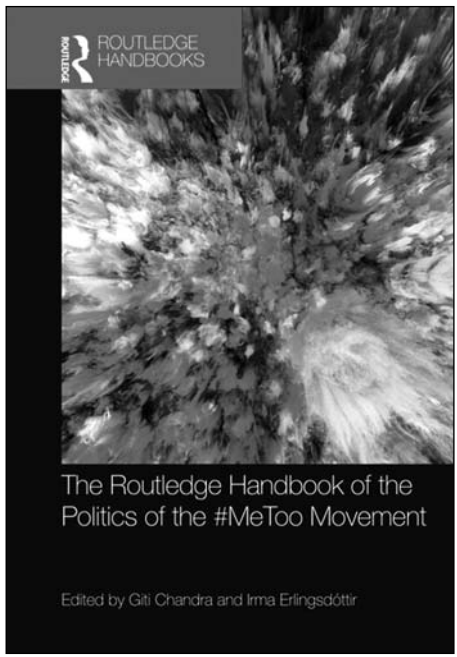
Table B: Descriptive statistics of men and women on the on micro-task platform

	Mothers (N=40)		Childless women (N=51)		Fathers (N=19)		Childless men (N=68)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Log hourly pay	1.37	.80	1.21	.82	1.40	0.85	1.32	0.68
(Hourly pay in Euro)	4.93	8.32	5.92	22.31	5.40	9.26	4.17	7.78
Overall labour market positioning								
Work status:								
Not employed	42.5%		29.41%		21.05%		36.76%	
Employed	37.5%		54.90%		68.42%		39.71%	
Self employed	20%		15.69%		10.53%		23.53%	
Contracted monthly working hours in major employment next to CW *(for those with other major employment)*	33.50	12.39	29.91	10.31	36.87	6.66	33.23	15.86
Log gross pay aside from CW *(for those with other employment)*	7.09	.99	7.15	.99	7.58	1.01	7.33	.90
(Gross pay aside from CW for those with other employment)	1630.96	1005.97	1871.64	1474.71	2621.57	1559.30	2054.76	1299.75
Investment on the CW platform								
Average CW hours per month	6.45	5.86	8.45	9.49	6.32	5.19	6.03	6.37
Share of CW hours per month on the micro-task platform	.84	.31	.82	.26	.69	.36	.82	.27
Months on the micro-task platform	29.73	31.61	20.53	23.40	23.53	24.48	22.10	26.37
Average CW tasks per hour	5.15	5.17	3.93	3.99	3.54	3.28	4.55	5.32
Performance of tasks where accumulated skills are required	10.00	4.07	8.49	3.79	9.21	3.39	9.18	3.11
Age	42.73	10.48	34.67	12.25	44.58	11.86	33.46	10.18

Source: Crowdworker Survey Data 'Digital Future'.

The Routledge Handbook of the Politics of the #MeToo Movement

Giti Chandra, Irma Erlingsdóttir (eds.)



Since the MeToo hashtag went viral in 2017, the movement has burgeoned across social media, moving beyond Twitter and into living rooms and courtrooms. It has spread unevenly across the globe, with some countries and societies more impacted than others, and interacted with existing feminist movements, struggles, and resistances.

This interdisciplinary handbook identifies thematic and theoretical areas that require attention and interrogation, inviting the reader to make connections between the ways in which the #MeToo movement has panned out in different parts of the world, seeing it in the context of the many feminist and gendered struggles already in place, as well as the solidarities with similar movements across countries and cultures.

With contributions from gender experts spanning a wide range of disciplines including political science, history, sociology, law, literature, and philosophy, this ground-breaking book will have contemporary relevance for scholars, feminists, gender researchers, and policy-makers across the globe.

Routledge 2020.

GENDER A VÝZKUM
GENDER AND RESEARCH

International Perspectives about COVID-19, Digital Labour and Gender Work Pattern: A Collective Interview

Annette von Alemann, Julia Gruhlich, Ilona Horwath, Lena Weber

Alemann, Annette von, Gruhlich, Julia, Horwath, Ilona, Weber, Lena. 2020. International Perspectives about COVID-19, Digital Labour and Gender Work Pattern: A Collective Interview. *Gender a výzkum / Gender and Research* 21 (2): 86–102, http://dx.doi.org/10.13060/gav.2020.014.

In this special issue, we want to capture different country perspectives on the connection between the digitalisation of work and gender relations. As a result of the COVID-19 pandemic, the world has suddenly found itself in an exceptional situation that had not been foreseen in our editorial project but proved to be relevant for gendered work patterns and digitalisation. Digital systems and devices have seemed to offer the best solutions to the situation of the pandemic and the subsequent lockdowns all over the world. It has become apparent, however, that not everyone has equal access to the internet and technical knowledge of computing, and that women and men have been affected in very different ways by the COVID-19 crisis in their (digital or not) work environments. To find out more about the situation all over the world, we asked some gender researchers and social and technical scientists from South Africa, Canada, the Czech Republic, Great Britain, Belgium, Finland, and Austria a few questions via e-mail about their personal impressions from the COVID-19 pandemic and their own working situation. What we present here is the innovative format of an 'artificial collective interview': the responses have been shortened and compiled, but not reformulated. However, the questions have been modified to give the impression of a face-to-face group interview, though the interaction actually took the form of one-to-one email communication. The answers were collected during the summer period in August-September 2020. The interviewees were chosen because their work focused on

gender and digitalisation even before the COVID-19 crisis and/or because they did research, published, or blogged about the events during the pandemic, or because they have been perceived as experts in areas that have changed rapidly.

The interviewees are:

Deevia Bhana, DSI/NRF South African Research Chair (SARChI): Gender and Childhood Sexuality, School of Education, University of KwaZulu-Natal, South Africa.

Mark Gatto, Graduate Research Associate (Supporting Equality, Diversity & Inclusion projects) at the Faculty of Business and Law, Northumbria University, Newcastle. Together with Amal Abdellatif he wrote an auto-ethnography about their academic work situation during the pandemic. His research explores the influence of masculinity on working parents' discourses and decisions at work and at home.

Jeff Hearn, Senior Professor in Gender Studies, Örebro University, Sweden; Professor of Sociology, University of Huddersfield, UK; Professor Emeritus, Hanken School of Economics, Finland; Professor Extraordinarius, University of South Africa. He is working on several relevant issues, including age and ageism in organisations and digital work and violation.

Nicole Horáková Hirschlerová, Assistant Professor in the Department of Sociology, University of Ostrava, Czech Republic.

Gabriele Kotsis, President of the Association for Computing Machinery (ACM), Full Professor in Computer Science and Head of the Department of Telecommunication and the division of Cooperative Information Systems Kepler University Linz, Austria.

Chia Longman, Associate Professor in Gender Studies, Director of the Centre for Research on Culture and Gender and the Inter University Master Programme in Gender and Diversity, Ghent University, Belgium. She opened a discussion on Facebook about the 'home office' mode of work and virtual teaching.

Tamara Shefer, Professor and Chairperson, Women's and Gender Studies Department Faculty of Arts, University of the Western Cape, Cape Town, South Africa. Currently she is involved in a student project on the gendered impact of COVID-19.

Anne Wagner, PhD, School of Social Work, Faculty of Education and Professional Studies, Nipissing University, Canada. Her research focuses on feminist researchers in neoliberal universities. She teaches in the Faculty of Education and Professional Studies, which is why she was interviewed about the teaching situation.

Editors: How did you experience the COVID-19 pandemic in your country and how has the situation affected your work?

Nicole Horáková: The COVID-19 pandemic came upon us somehow as a surprise, and even though we heard the news from China, nobody really expected that we were going to have distance teaching. The Czech Republic started to shut down public life by closing schools, restaurants, theatres, cinemas, sport clubs, etc., in the middle of March, very soon followed by the closure of the borders with neighbouring countries. That was the toughest experience for me during the general restrictions because I felt terribly locked in. It must have been like this during communism, was one of my first thoughts.

As I teach at three different universities (one full-time, at the other two as an external member) I could observe how differently they coped with the challenges COVID 19 presented (and still present) for the organisation in general as well as for the teachers and students in particular. The university where I am teaching full-time was standardly prepared for online teaching, which means they offer Moodle and Microsoft Teams to support distance teaching and learning. One school was very poorly equipped and switching to online teaching was a great challenge for them: they had no communication platform that met the requirements of online teaching. This fact was very time-consuming for me as a teacher because I had to build my own infrastructure to communicate with the students and to provide them with study materials.

When I teach a seminar, we discuss the compulsory reading face-to-face and I can somehow check who is prepared or not. But in online-teaching through Moodle I felt the need to check all the texts and tasks the students sent to me and give everybody an individual feedback. So, my work flow was much heavier than during an ordinary semester. And this impression was also shared by the students. They told me that they had to work much more than usual. I personally do not think so, but during the pandemic they were forced to fulfil all the tasks and readings they would have had to do also during an ordinary semester, but thanks to the online lesson they were more under control.

Gabriele Kotsis: Shifting to virtual teaching and working from home caused an unexpected increase in workload. It is noticeable that online teaching requires different didactic methods and tools and having your office at home means that you tend to say yes to even more meetings and tasks because you have the feeling of so much time, no delay because of travel ;-)

Nicole Horáková: One last word about my students because the possibilities available for them also had great impact on my work. To be honest, I was really surprised how poorly equipped some of them are for studying online: Some of them do not own a computer or notebook ready for online meetings, the camera and/

or the microphone does not work, and those students living in smaller villages do not have a stable internet connection. For them, this way of studying was very challenging.

Editors: The COVID-19 crisis has revealed even more that the gap between rich and poor and the digitally integrated and disintegrated. Deevia and Tamara, what was it like in South Africa?

Tamara Shefer: The pandemic and the lock-down in particular had a powerful impact on my work. First, I need to contextualise my university a little bit and how the responses to the pandemic affected things in South Africa and my university in particular. The university I am located at, where I have worked for 26 years, is what is known as a historically Black university, reserved in apartheid racist segregation policies and practices for 'Coloured' communities. While the postapartheid democracy since 1994 has attempted to desegregate and transform higher education, many of these now known as HDIs (historically disadvantaged universities) remain disadvantaged by historical inequalities and how they play out in the present. My university, for example, while now including diverse students, not only those designated historically as Coloured, still includes a majority of very poor students who have had disadvantaged educational and social backgrounds and many who come from rural areas. While the universities have attempted to challenge historical inequalities and facilitate epistemological access for students, many of our students are still challenged by material and discursive inequalities that are played out in experiences of in/exclusion and un/belonging in our universities.

So, when the pandemic hit South Africa, and a highly restricted lockdown was instituted, our university was closed and many of our students were sent home, often to rural areas, often with very little internet access, and even those in urban contexts were working with connectivity and data challenges. The university did begin providing data and devices, but this took quite some time, and for those of us involved as lecturers and heads of departments, as in my own case, a lot of time and energy was centred around this administrative practical component – simply trying to ensure that our students could participate in online forums for their courses.

Deevia Bhana: The global spread of the disease and news of its devastating effects, which began with concerns in Italy and then spread across the globe, did produce anxiety, and like others I was anticipating catastrophe for South Africa – which at first glance appeared depressive in light of living conditions, health inequalities, and poverty. So, emotionally, this fear was great, but as the months have passed the fear has proved to be misguided, and thankfully South Africa has been spared the experiences that we have seen in other developed contexts.

My students, who are all Master's level and PhD researchers, have been dramatically affected, and delays in graduation are expected. New measures were put in place to circumvent face-to-face contact, although this has also proved to be ineffective at times as the target population lack access to digitalisation, and their research activities are therefore compromised. Also, the use of cell phones, Zoom, WhatsApp, while useful under the circumstances, miss important elements of face-to-face contact and research that are critical for qualitative research. I chaired a Webinar that raised these issues with respect to support for children and young people no longer in school. I was also tasked with raising the issue of sexuality and young people, and how parents can support healthy sexual development when young people are not permitted to see each other under lockdown.

Editors: This leads directly to our next question. How did you become familiar with digital work tools?

Deevia Bhana: Since March 2020 I have had to find myself in Teams, Zoom, and learn how to navigate it. I am astounded at how much I now can do virtually. I had no idea how possible this was. I think gender plays an important role in how I perceived online digital media, and age and generation gaps in relation to social media. I continue to have handicaps not only with digital work tools but with my laptop, and simple things like how to have a different word view are complicated for me.

Nicole Horáková: Maybe I have the advantage that I am very much a technophile and interested in computer-based teaching. Even before the pandemic, I always offered online-based materials and exercises to my students. I like trying out new methods of teaching and possibilities for communicating with students and for meeting their needs. Against this background, the COVID pandemic offered me a great opportunity to try something new and use different channels. Before the pandemic it was not really necessary and there was no time for me to intensively explore the possibilities that the new technologies offer, but now I was forced to do this. This was for me, somehow, a positive outcome.

Mark Gatto: I was already familiar with social networking platforms like MS Teams and a range of other video conferencing tools prior to full-time online working, so the move online was fairly comfortable for me from a skills perspective. I have followed a blended approach to technology to limit my screen time where possible, so I take hand-written notes that I later scan to online folders. I also prioritised social discourse and I engaged in frequent online chat forums using enterprise social network platforms and video calls.

Chia Longman: As a university professor, the switch to working at home was not a huge impediment to work, but having to do this while caring for and home-

schooling children was a nightmare, as these tasks cannot be combined. During the complete lockdown, for me personally, with a 5- and 12-year-old at home, this led to incredible amounts of stress due to continuous interruptions while at the computer, etc. I was able to carry out the minimum tasks required for teaching and administration, but hardly any research or writing, which require uninterrupted blocks of time.

The switch to digital tools mainly involved going from live to online meetings; the technical switch was not too challenging, but the meetings do not take place in the same way, as there is a lack of the social and physical aspects that are required in human interaction. There is little non-verbal communication. I think the toll of social isolation is becoming heavier on both staff and students. There is also the lack of informal meetings with colleagues 'in the hallway', picking up on news at receptions, etc. I also wonder what impact this will have on decision-making. On the other hand, I experienced it as 'better than nothing'. For teaching, the switch to online Zoom teaching in the first semester has been challenging. I see it working for small groups, but it is much more difficult for larger ones. I teach a gender studies class at the MA level and we had a 40% increase in student registrations this year, which means I am lecturing to 160 students whom I have never met in person. Didactically, I am sure online teaching also offers many opportunities, but becoming proficient and making use of its full potential requires extra time and effort and ideally additional staff and support. This is not provided, and ultimately teaching as such is not valued that much in research-excellence oriented institutions.

Anne Wagner: The pandemic has entirely changed my way of working, as everything has moved to remote. As a faculty member in a school of social work, I have not yet been fully challenged to be conversant in technology, beyond the basics. This shift has required me to self-learn numerous institutional electronic platforms.

In order to better contextualise my situation, I should explain that I work in a small, primarily undergraduate university. Our technical infrastructure is quite limited and our tech support minimal. Our excellent tech staff was already stretched to the limit before the pandemic. Hence, accessing needed support has been quite challenging and involves considerable waiting, which slows down my productivity.

Chia Longman: There are benefits and negative effects, very much depending on your position and situation. Digitalisation obviously opens up possibilities, for instance, for more efficiency, for saving time, and for participating in a cheaper and more ecological way in events, conferences, etc., instead of travel, so it might lead to more inclusion. So many lectures and workshops are now online and available to a larger audience at the click of a mouse! On the other hand, I find there is a study- or workplace intrusion into the private space and an accompanying

flexibility demand. With care and family obligations at home, this does not make work any easier, it might worsen it. For example, in my own position I would rather travel to a conference, having ample work and preparation time away from home, and also to network, etc., than do the work at home with children on my lap, not to mention trying to find the time and peace and quiet to participate in webinars at 17.00 PM, etc.

Similarly, teaching live or digitally has advantages and disadvantages depending on positionality, which is often gendered. But an intersectional analysis is required. For working students, distance education offers more flexibility, while for younger students it might lead to loneliness and a lack of motivation and interaction with peers, etc. Our courses this year are even obligatorily recorded and made available online, which, again, offers flexibility for some, but undermines the notion of a safe space to speak, besides taking away some of the dynamics of a live lecture.

Jeff Hearn: The digital tools themselves have generally been fine, and there have been a lot of online events, which have meant more contact with people whom I wouldn't have usually 'met'. However, I think it can sometimes be difficult to have delicate or potentially conflictual discussions online, for example, around racism. It can be hard to convey online that you think someone has poor judgement, or just doesn't know about certain things, even whilst they may, of course, be thinking the same about you.

Tamara Shefers: In terms of my own experience, it was also a huge shift and new learning. I am fortunate to live in a privileged space with access to the internet, but I also had to immediately upgrade my own internet system to accommodate the online activities of virtual meetings, etc. But what was more important was the extension of my own skills base for digital pedagogy and scholarship and negotiating the strangeness and alienation of online forums.

While we were fortunate in that our department has always used our online teaching and learning site and has been relatively creative with using new technologies and digital and other creative pedagogical practices, I personally still relied a lot on the face-to-face engagements with students. It has taken a long time to shift, to learn how to do things like narrated Powerpoint and video technologies, and most importantly I still find it a challenge to open up possibilities for participation and engagement. While our systems are now working, I still find a Zoom class extraordinarily empty, lacking in the vitality that group engagement brings, and it is really difficult to have a productive dialogue. Meetings online still feel so clumsy and are so much longer, often delayed and interrupted by our weak internet connectivity in this country in general. Similarly, we emphasise embodiment and affect in our pedagogical practices, and these technologies seem to further reiterate and reproduce the disembodied intellect that our patriarchal and (post)colonial scholarship privileges.

On the other hand, I value that I have become more skilled with respect to digital technologies and am also beginning to think more creatively about how we can interrupt the lack of dialogue and participation that they seem to emphasise, thus undermining our usual pedagogical intention to centre student agency and foreground student knowledge and work in ways that also engage art, creativity, embodiment, and affect.

Editors: Did you perceive positive aspects of the lockdown, online teaching, or other changes brought about by the pandemic?

Nicole Horáková: So, during the pandemic I developed my own working routine and, to be honest, I loved it – even when it was more time-consuming than the face-to-face meetings. My life became slower and I had much more time for other things in life like gardening, cooking, or reading a good book that does not relate to my work. In conclusion, I would say that I became more domestic, more focused on my own needs and those of my family members, and I enjoyed this extraordinary time. But my positive personal attitude towards this situation was mainly influenced by the circumstances I live in: I have my own room equipped as a home office, a stable connection to the internet, and my children are old enough to organise their days themselves. But I can imagine that families have had to face great challenges, especially those with younger school-kids, with less space for working and living, or with bad technical equipment. So, I am aware that my working experiences during the pandemic were really privileged.

Jeff Hearn: COVID has also meant getting fitter by walking regularly twice a day. We're very fortunate to live in the city but also next to open country and woods where walking is relaxed. My life has become more domestic than in the recent past, less rushed, with more regular contact with some friends and family members – one of whom has an immunity problem, so we've had daily contact. Gender issues pervade the content of my work, and my own immediate domestic routine has changed in a positive way.

Editors: That sounds quite relaxed, but if you have care obligations for children or relatives outside of your academic work, you were probably not quite as balanced. For example, studies on the gendered division of work in the household show that COVID-19 has led to a re-traditionalisation of house- and care-work. Mothers in particular have been heavily double-burdened. What are your experiences?

Chia Longman: The major affect was for me as it was for many parents, with the closure of day-care and schools during lockdown. This meant I had to combine working at home with caring for and home-schooling children, who received some

online education, but needed continual assistance and attention. In Belgium, schools closed from mid-March – and depending on the schoolyear – my youngest (5) returned to preschool mid-June. The eldest, in the first year in secondary school, did not go to school again until September.

Gender-related issues involve children generally being more geared to wanting attention and care from their mothers or mothers providing this more. This means that the opportunities for work performance for many mothers and others with caring roles, which is also often gendered, and which might even involve keeping up social contacts with the family online, etc., have certainly diminished and, because of this, women are more negatively affected by the pandemic generally. This is well-documented by now. Even with nurseries and schools re-opening, social reproductive work and responsibilities still remain very intense, such as the continued 'home' administration, management, and communication due to the continuous shifts in COVID regulations on hygiene, meals, mobility, extra-curricular activities, etc. Caregiving support by others such as grandparents might also have disappeared for many.

Mark Gatto: My way of working was significantly impacted at the start of the COVID-19 pandemic when the lockdown measures were applied in the UK. This was because my child, who was – 13 months old at the time – was previously in the nursery during the week but was now at home full time. My wife is a doctor, so I was working from home and looking after my child at the same time. This affected my work as I was no longer able to work during my usual hours (9am to 5pm). Instead, I was working early morning, during their mid-day nap, and then in the evenings after they[1] went to sleep. I was working from home on a laptop and it took a while to get used to the permanence of home-working compared to my previous mixture of office-based interactions with colleagues.

I became aware of the disproportionate impact of the lockdown on working carers, especially, as in my situation, for those with highly dependent infants. In conversations (online chat and video calls) with a fellow post-graduate student, we shared our struggles with childcare and work and I also learned about the gendered impact of the lockdown on caregiving mothers. As a working parent, I believe my experiences differed, to some extent, from the majority of fathers in the UK as I had sole responsibility for my child for extended periods of time while also working on my PhD and as a research associate. I was not alone in this experience, but it taught me a lot about the daily challenges and barriers facing working mothers who typically bear the greatest burden when it comes to childcare. In this sense, the COVID-19 pandemic and lockdowns have given me far greater personal insights into the value

[1] In order not to reveal the sex of the child, the plural is used.

of the caregiving experience as a basis upon which all working parents can build empathy and trust.

Anne Wagner: In terms of gendered impacts, I am acutely aware of the additional burdens women are experiencing as a result of caring responsibilities. In the Canadian context, we still have not established a national childcare programme, which continues to disproportionately impact women. Another issue that I expect will emerge is related to posting one's lectures on public platforms. At my institution, we are being directed to post lectures on You Tube. Although we are able to set privacy restrictions, as I am not familiar with this platform, I have concerns about who will have access. As has been widely documented, women tend to be at increased risk of cyber harassment. I am concerned that women may be at increased risk for such harassment as we increasingly move our lectures into the public domain.

Gabriele Kotsis: I personally didn´t experience any gender bias but learned from my friends that it was more difficult for women to handle home office because, at least in Austria, there is still the general opinion that a women being at home has to take most of the work in the house, taking care of the kids, etc.

Editors: Gabriele has just now referred to the gender regime in Austria, which is rather conservative. We are wondering what the gender regimes in the other countries are like and what kind of dynamics digitalisation might have there. How do you assess the current situation in your country with regard to unequal gender-specific work patterns and digitalisation?

Nicole Horáková: As I have mentioned above: digitalisation and its impact on work and on society in general is not a big research topic in the Czech Republic. Neither the economy nor society or politicians are somehow aware of the fundamental changes we will face. Even gender-related issues in terms of work are not really the subject of discussion. Overall, the attitude in Czech society is rather neoliberal in terms of economics, and conservative in terms of family politics. In the Czech Republic, we have the longest parental leave worldwide and – nomen est omen – it is called 'parental holidays'; in 98% of cases it is taken by young women/mothers. It is paradoxical, but my female students really think they have the same starting point and opportunities in their career as their male colleagues. Statistically, women earn around 22% less than men, politics are made by men, domestic and care work is still mainly done by women. My female students do not see a structural problem in this, but, consistent with a neoliberal attitude, they are convinced that, if they really want it and if they are good enough, they have the same opportunities as men in Czech society. But they are not aware that to be good is not enough; they have to be better to get nearly the same chances as the male students.

Jeff Hearn: My first reaction to this question is to link back to COVID-19. I live in Finland, and there has been a strong and important presence of a women-led coalition government, which has been very effective. There have been relatively fewer infections than in many countries. In the early days of COVID, the five leading women ministers were doing daily press conferences together – almost a unique series of events in international governmental politics. There have been stories of young girls playing 'press conferences'.

More generally, Finland has a high level of women's full-time employment, high education levels, strong presence of women in politics and the state, less so at the top level of business, a form of 'gender-neutral' gender equality politics, along with strong permeation of ICTs/digitalisation, and during COVID a high level of taking up remote/distance working (April/May 2020, estimates of between 60% and 76%, perhaps the highest in the EU, https://www.eurofound.europa.eu/data/covid-19/working-teleworking), especially in the capital region and the main cities. At least some form of information society 'exists' and has for some time, albeit unevenly by age, class, and region.

There are certainly strong, unequal gender-specific work patterns that accompany digitalisation, including in the ICT and related sectors themselves, in both educational and vocational routes, and in employment and workplaces. Susanna Bairoh, whose PhD on women and girls in ICT, engineering, and STEM in Finland I am supervising, has just published on this in the Finnish situation (Naukkarinen, Bairoh 2020). Another area of unequal gender-specific work patterns and digitalisation is what happens in high-intensity business companies, where digitalisation operates in a profound way throughout almost all their work. This digitalised working life is accompanied by professionalised presentations of self as the fit, healthy, able-bodied, heterosexual body, whilst the negative impacts of stressful work on well-being remain taboo to talk of at work.

There are many other relevant questions. An important one, in Finland and beyond, is the online manosphere, and how this feeds racist, misogynistic, and right-wing politics, even if in Finland the men-dominated right-wing party is no longer in government, as it was previously, before we had the current women-led government coalition, with its daily online press conferences of the five women ministerial leaders.

Editorial: Austria, the Czech Republic, and Germany have relatively similar conservative gender regimes, whereas Finland represents one of the Scandinavian models for a rather modern gender regime. What is the situation in South Africa?

Tamara Shefer: South Africa is a complex context in which racial and class inequalities

mean that many people do not have easy access to efficient and accessible digitalisation, so the move to work and study that is increasingly virtual widens the gap between those who are privileged and in privileged occupations and the majority who work in service industries, informal markets, etc.

South Africa remains a patriarchal society where gender binaries are still normative and policed across communities, notwithstanding a very progressive constitution and legal framework. Thus, the current lockdown and working from home undoubtedly will impact on women more negatively than men since women are still carrying more responsibility for care, often in either single-parent or patriarchal households. The lack of a divide between work and home may further add to women's multiple loads and capacity to balance diverse demands, when they are already burdened with greater care and reproductive labour in households.

Editors: Tamara, your observation that racial and class disadvantages overlap with patriarchy points to the need for research on intersectionality. Deevia, how do you see this for South Africa?

Deevia Bhana: South Africa's attack on COVID-19 was welcomed and generated a different view of the ruling ANC party and President Ramaphosa, especially as the speedy lockdown and efforts to curtail the spread were hailed as political gains. However, as the months went by, three issues stand out: Police brutality in enforcing adherence to the rules, domestic violence and women's vulnerability, and corruption, the abuse of disaster funds for COVID-19. Police brutality was especially visible in the township low-income settings and this caused a huge strain for the country as police were charged with murder in some instances. The focus on the police is not new – this focus has always been negative and what COVID-19 did was to expose further the gaps in the policing services, the flagrant violation of law, and police entitlements. Mainly poor people were impacted by police brutality.

With regards to gender, violence in the home was highlighted, exacerbating the already dangerous position of women and girls in the country. The effects of lockdown on family life exposed the gendered and sexual inequalities already in place, and the inability of the state to protect women is both a reality and exacerbated under lockdown. Finally, the issue of corruption placed the country back in the days of the Gupta saga and state corruption. Amidst concerns about people's suffering, especially poor and unemployed people, as well as the fact that people were dying of the disease, the effects of corruption were poorly addressed and remain a sore issue in the country. Indeed, discussions about children and young people in the midst of COVID-19 remain.

Clearly, access to the digital world remains unequal. This means that a majority

of poor Black and also older women do not access the digital world. Men then remain powerful in relation to the new work arrangements, and control and dominate what women can do and have access to in households. Where there are no men as providers in the household, as is the case in many South African families, poverty, infrastructure, and lack of access mean the reproduction of gender inequalities.

Editors: Mark, in your research you also problematise the cultural gender binaries that contribute to the 'breadwinner' and the 'maternity penalty'. Some hope that digital technologies will overcome these gender differences. What are your views on the UK in this respect?

Mark Gatto: The UK is a technologically enabled country, and many professional vocations are transferrable to online, home-working models. I can see a potential divide growing between people whose jobs can transfer to technology-enabled home-working, and people whose professions do not allow such working patterns. This disparity may unduly affect face-to-face professions, which are statistically primarily comprised of women in the UK, such as nursing home carers, cleaners, and hospitality staff. Of course, this will also affect male-dominated professions such as construction, but the UK culture was already skewed to favour men's work over women's, especially concerning childcare responsibilities and as shown in the gender pay gap data. We are hearing a clear divide in media discussions between the potential benefits of home-working for those who are fortunate enough to be able to access this type of working arrangement versus a section of society who may be left behind, this may be particularly damaging to working mothers. If working mothers, who were already disadvantaged in the marketplace, through having the majority of childcare responsibility, are further disadvantaged by not being able to access the benefits of home-working, it could cause further social divides according to the intersection of gender and socio-economic status.

My hope is that fathers who have been spending a greater proportion of their day on childcare may learn from their increased time doing childcare and continue to contribute more after the pandemic restrictions are lifted in the future. I hope that the digitalisation of work, which enables home-working, can be a catalyst for more involved fatherhood and a culture shift for working fathers through increased opportunities and normalised discourse on spending time with their children.

Chia Longman: It would depend on the type of work. Working at home is increasing now in Belgium; it provides options for less traffic, less wasted time commuting, lack of office space, etc. But it also means an intrusion on the private space, the potential dissolution of boundaries between work and private life, etc. Men might have become more involved in domestic work because of this, but I have not seen any research yet. In general, I think the outsourcing and sharing,

beyond the couple, of certain forms of care are required for gender equality; and digitalisation, involving more working at home, for example, and digital home schooling, will not benefit this.

Mark Gatto: From my own experiences, I am more committed to being a primary caregiver to my child than I was before the lockdown. This is a direct consequence of the sustained time I spent with my child and the freedom that digitalised working patterns affords. I hope that other fathers may also see the benefits of their increased caregiving role as a consequence of the time gained from home-working, but I worry there will be a digital divide between those whose professions enable home-working and those who must continue to commute and work away from home and family.

Editors: We come to the last question, which is of particular interest to us as researchers: How is your field of research currently changing on the connection between work, gender, and digitalisation? What do you think are the major issues regarding this?

Nicole Horáková: Maybe I have to disappoint you with my answer, but so far the pandemic and the ongoing changes due to COVID-19 have had no impact on my current fields of research. The issue of work in general is not a very widespread topic in Czech academia; there are some researchers dealing with gender issues also in connection to work, but I cannot say that we have a strong research tradition on these topics. Even the discussion in society was not much influenced by the changes we experienced during the pandemic: full-time working mothers substituting school teachers, working from home, the blurring of the private and the working space, the impact of the upcoming and/or ongoing digitalisation do not rank among the main topics of sociological research in the Czech Republic. So, what I am interested in is kind of 'exotic' here. And the pandemic – with the different working routine – gave me the chance to apply for a grant to investigate the migration of coalminers and their self-image in the region where I live in the Czech Republic. This has nothing to do with digitalisation or other actual topics that sociologists in other countries are dealing with, but for the sociology of work in the Czech Republic, it could be a beginning.

Anne Wagner: As my research spans higher education as well as social work, digitalisation is having an enormous impact on my work. One aspect that is challenging involves reaching potential research participants. Many of the women who are the focus of some of my research are extremely marginalised and often living in poverty. Consequently, many do not have easy access to the internet, nor may they have adequate technology. The pandemic has vastly increased their marginalisation.

Attempting to connect with potential research participants electronically is also challenging in terms of establishing rapport. It is much more challenging to establish a relationship remotely. As the women I am engaging all have histories of trauma, establishing rapport can be challenging even when face to face. Also, I think research participants may be difficult to recruit due to privacy concerns. Communicating remotely adds additional complexities that have yet to be fully revealed.

Chia Longman: For research, as an ethnographer, face-to-face research is difficult and the switch to digital research is possible, but with a different approach. Digitalisation requires a lot of energy; to interact constantly with other humans on a screen cannot supplant face-to-face interaction, although for sure certain types of meetings will be here to stay for more efficiency and possibly inclusion, I think. Personally, I aim to draw on the momentum of more distancing, fewer events, more solitude, etc., to concentrate on more writing, but that might be wishful thinking!

Gabriele Kotsis: I am currently working with a couple of PhD and Master's level students on scenarios for future meetings and conferences being characterised by hybrid collaboration, i.e. intersecting phases of synchronous/asynchronous and real/virtual presence in a mix. We are currently trying to come up with models for those hybrid collaboration scenarios, and if the data allow, we would also be very interested in studying difference with regard to gender.

Tamara Shefer: Generally, the research my students do in the areas of work that I research is focused on narratives and experiences related to sexuality and gender in/justices. The current context has meant that we have had to engage in digital research methods, which has been another learning curve. All our students engaging in research have been exploring ways of conducting qualitative research in contexts of distance – WhatsApp, email interviews, etc. – and this has actually been quite productive. It has also been really special to be collaborating across global contexts – I have found people all over very generous and inclusive about sharing ideas and resources in this respect, and this has definitely been a positive outcome. I also think the data may be very interesting – that people can share in different ways through these different modalities. But it also really makes it difficult to think about doing relational and participatory research, which we foreground in our teaching of research when we are so disconnected. But new ways to make connection and facilitate relationally need to be sought.

My own research field has increasingly moved into a post-qualitative way of doing scholarship. I have been thinking with material from the outside world and what others have written, rather than gathering data, so there is now, of course, even more material to think about – also about what has been raised in this time about

the areas of research I am working on. COVID-19 and our national and transnational responses to the virus have amplified existing global and local inequalities, particularly intersectional gendered inequalities and injustices, and there has been a lot of interesting scholarship that has raised key concerns in global and local contexts.

Jeff Hearn*:* I work across quite a few different areas and work, and gender and digitalisation affects all of them; the relations of work, gender, and digitalisation have been a major research preoccupation of mine since the late 1990s. Some important questions seem to include: the physical and social dispersion of work in relation to gender and digitalisation; uneven and changing (over time) gender effects of digitalisation on employment structures; gender structures of the ICT sector; the embedded pervasiveness of 'the transnational' and transnational socio-economic processes, including ICTs, and not just for transnational workers or those who migrate, as many, perhaps most, workplaces are in some sense transnational, even if just through the use of IT systems, as well as complex transnational business trading and ownership patterns, not least in the field of care; the everyday impacts of both the positive and negative aspects of greater digitalisation – for example, social and political networking, image- and text-based online abuse and violation, and their effects on the world of work and employment; new forms, and sometimes problems, of cyber-management; the closer intertwining of work and home/family/household, which have had negative effects for some women; changing and non-local forms of power for men and masculinities online; and increasingly the blurring of the on- and offline in hybrid forms of sociality.

More broadly, work, gender, and digitalisation operate in relation to further trans-societal processes; I've been reflecting on some of the implications of COVID in a blog that the Brazilian Sociological Association organised (https://blogbvps.files.wordpress.com/2020/05/jeff-hearn.pdf). Another key, and still neglected, angle is the interrelation of age, gender, work/organisations, and digitalisation. This has been very important in the book, *Age at Work*, that Wendy Parkin and I have just finished.

Deevia Bhana: I think that digital contact is important. It opens up new possibilities of connection and has a global impact as well. I have been able to hook into Zoom and webinars across the globe. But there are limits – the digital space also is limited. I lose focus – the human contact is missing; the debate is less rigorous, as is my concentration. I am unable to focus a full day on a Zoom meeting. Gender remains a key area of concern as women have to navigate work with digital demands, as noted above.

Editors: At the end we would like to thank you! Thank you for sharing your ideas, experiences, and knowledge with us during these troubling times. Take care and stay healthy.

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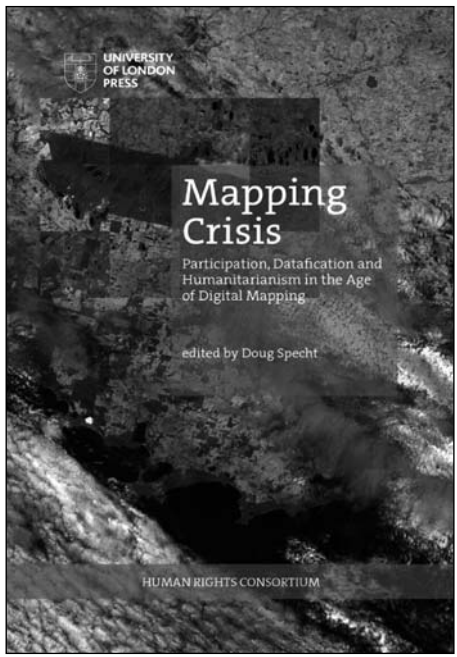
Mapping Crisis: Participation, Datafication and Humanitarianism in the Age of Digital Mapping

Doug Specht (ed.)



The digital age has thrown questions of representation, participation and humanitarianism back to the fore, as machine learning, algorithms and big data centres take over the process of mapping the subjugated and subaltern. Since the rise of Google Earth in 2005, there has been an explosion in the use of mapping tools to quantify and assess the needs of those in crisis, including those affected by climate change and the wider neo-liberal agenda. Yet, while there has been a huge upsurge in the data produced around these issues, the representation of people remains questionable. Some have argued that representation has diminished in humanitarian crises as people are increasingly reduced to data points. In turn, this data has become ever more difficult to analyse without vast computing power, leading to a dependency on the old colonial powers to refine the data collected from people in crisis, before selling it back to them.

This book brings together critical perspectives on the role that mapping people, knowledge and data now plays in humanitarian work, both in cartographic terms and through data visualisations, and questions whether, as we map crises, it is the map itself that is in crisis. It is open access.

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Exploitation in the Digital Economy

Sophie Krug von Nidda

Scholz, T. 2017. *Uberworked and Underpaid. How Workers Are Disrupting the Digital Economy.* Cambridge, Malden: Polity.

In recent years, digital platforms have been challenging the economy. High-rated internet companies like Airbnb and Uber solely relied on digital platforms for their economic success. Created as mere technical intermediaries, Airbnb did not itself have to own any holiday flats in order for it to become the world's biggest provider of overnight stays, and Uber did not have to own any cars to become the world's biggest taxi company. Their business models, based on connecting clients and suppliers, are not only calling existing economic structures into question, they are also restructuring 'labor markets on a global scale' (p. 15). These internet companies exploit regulatory loopholes and pose big challenges for existing national tax systems. The consequences of this economic change include enormous social transformations and the reorganisation of work. One of the books that has picked up on this ongoing transformation and reorganisation of digital work is *Uberworked and Underpaid. How Workers Are Disrupting the Digital Economy*.

Uberworked and Underpaid was written by Trebor Scholz and devotes itself to platform capitalism. It offers a broad overview of different types of digital labour and develops an analysis of the challenges posed by it. Furthermore, the author proposes a number of solutions, the most elaborate being the concept of platform cooperativism as a way of joining the platform economy while insisting on communal ownership and democratic governance (p. 170).

Trebor Scholz is associate professor of culture and media at the New School in New York City. He works on topics like the future of work, solidarity, and the internet. As a scholar and activist, Scholz started convening the digital labour conference in 2009 to provide a space for discussions between scholars and practitioners. His book has been influenced by discussions with media scholars, cooperativists, lawyers, activists, designers, developers, union leaders, and policymakers worldwide on how to create a sustainable future of digital work. Inspired by years of exchange with various different stakeholders, the book offers a broad analysis of digital labour, including a rich set of examples and a call for action.

The book is structured as follows: After the Acknowledgements (vii) and the Author's Note (x), the Introduction addresses the question 'Why Digital Labor Now?' (p. 1). Following the Introduction, the book consists of two parts with several chapters. Part I (Chapters 1–4) presents a broad overview of types of digital labour and the challenges

posed by platform capitalism. Part II (Chapters 5–7) encourages the reader to imagine a democratic digital future. The need for regulatory improvement is made clear, along with the need for action and solidarity. Cooperative platforms are introduced as a democratic alternative to the so-called sharing economy. All seven chapters in Part I and II include several subchapters presented in an overview at the beginning of each chapter. This helps readers not to lose track of the discussion of this highly complex and ever changing issue.

Part I commences with an analysis of new forms of money extraction in the digital economy. Scholz presents a typology including a wide field of digital labour. Chapter 1 focuses on paid digital labour. The typology ranges from crowdsourcing platforms to user-led innovations; from in-game labour to competitive crowdsourcing – a form of digital labour which is especially criticised by Scholz (p. 35) for producing hundreds of unpaid, wasted work hours, when designers enter competitions with fully developed designs from which the employer may choose one.

Exposing the myth of autonomy, choice, and flexibility (p. 5) as a mere marketing scheme of digital platforms like Amazon and Uber, Scholz shows 'what is lost in the transition from employment to contingent contract work' (p. 5). Key to Scholz's argument is the lack of choice of many workers to join platform capitalism or not. Driven by economic desperation, Scholz argues, they have no choice but to search for tasks on crowdsourcing platforms 24/7.

The author is no 'Luddite' (p. 54) and acknowledges the benefits of online labour brokerages or the Internet of Things. But more importantly he takes a detailed look at the relationship between digital platforms and those who actually do the work. Doing this, he reveals emerging vulnerabilities for workers. While employment came along with some kind of security, for example, in terms of minimum wage, social benefits, health insurance, and paid holidays, contract work on crowdsourcing platforms does not offer these advantages. Neither the employers outsourcing micro tasks to platform workers nor the platform owners themselves take responsibility for the workers. Workers' rights that have been fought for for hundreds of years are abolished or bypassed to maximise short-term profits for platform owners. The work and the worker become invisible because, as Scholz puts it, 'hiding the actual labor is key to get venture capital' (p. 22).

Scholz recognises the importance of a macro-analytical frame as it is not technology itself but 'the social vision behind technologies that colors its use' (p. 55). He contests the argument that platforms like Amazon Mechanical Turk are just technical intermediaries that connect different parties to each other. In fact, he believes that platforms are shaping work conditions because the work 'is changed by the platform' itself (p. 41). One example would be a platform that prevents direct contact between an employer and a worker and as such frames work relations.

As a continuation of the typology in Chapter 1, the second chapter focuses on the diverse and large segment of uncompensated digital work. Scholz redefines what we know as work. Work, according to Scholz, includes our day-to-day participation on Facebook and Instagram, unpaid internships, and solving CAPTCHAs. Have you already had to prove that you are a human today? If so, you helped Google to 'digitize text' or 'annotate images' (p. 83). Scholz does not see uncompensated digital work per se as the problem. The problem is the corporations' duty to extract value and maximise profits by exploiting the free work of millions of people to profit a few platform owners (p. 55). Payment per se is not the solution, as Scholz explains, using Wikipedia as an example. Wikipedia authors do not write articles to earn money, because payment would devalue the work itself. People feel good when volunteering for a good cause – like writing Wikipedia articles and thereby contributing to the free spread of knowledge. Scholz, referring to André Gorz, identifies the failure to distribute wealth as the main problem (p. 91). At the end of the chapter, the author therefore discusses the idea of universal basic income as one intervention. As this is not the author's main focus, this subchapter appears to be a little short compared to the detailed discussion of platform cooperativism in Chapter 7.

The comprehensive typology, though, includes a rich set of examples and reveals the various ways in which digital labour platforms are 'restructuring the labor market on a global scale' (p. 15). Even though Scholz includes all kinds of paid and unpaid digital labour, the real focus of his analysis lies on job service platforms, with the most powerful example being Amazon Mechanical Turk. The key concept behind these job service platforms is the nonstop availability of workers all over the world to fulfil micro tasks for anonymous employers while earning less than minimum wage.

Chapter 3 is 'looking for a common language and understanding' (p. 6) of digital labour. While 'the distinction between free time and labor time becomes less meaningful' (p. 101), Scholz argues 'against a surrender of the language of labor' (p. 106) in order to avoid the depoliticisation of the discussion.

Chapter 4, the last in Part I, introduces the concept of 'crowd fleecing', which refers to the 'real-time exploitation of millions of workers and netizens by a small number of companies online' (p. 109). Scholz concludes that traditional forms of exploitation differ from new forms of digital exploitation. He introduces the term 'crowd fleecing' to capture these new forms of exploitation in the digital economy and to distinguish them from traditional exploitation. Key to digital exploitation are the 'unprecedented numbers of globally distributed, mostly anonymous, invisible, solo workers, all synced and available to a small number of platform owners in real time' (pp. 113-114).

Having introduced and discussed sites of paid and unpaid digital labour and its

consequences for the situation of workers in Part I of the book, Part II is about alternatives. Scholz attempts to provide a 'vision for the future of work based on democratic values, mutualism, and cooperativism' (p. 7). With this in mind, Part II is a call to action for every user of the internet.

Chapter 5 focuses on the 'legal gray zones' (p. 125) frequently used by globally operating internet companies like Amazon or Google. After showing how regulatory efforts cannot keep up with the pace of digital development leaving digital workers unprotected, the author highlights possibilities for action. One of his suggestions is to define digital workers as employees, to protect them as employees or at least giving them the same rights. Efforts have already been made in other sectors, as the examples in the book show: a 'Domestic Workers' Bill of Rights' was passed in New York State in 2010. An 'Intern Bill of Rights' was suggested by Ross Perlin in his book *Intern Nation*. Concerning the internet, Scholz criticises the fact that suggestions mainly concern data privacy and tax systems. Tim Berners-Lee, for example, proposed a 'Bill of Rights for the Internet', endorsing the protection of data (p. 135), and the French Colin & Collin tax proposal suggests taxing internet companies according to the profit they make using the country's population data (p. 138). None of them, however, deal with digital workers' rights.

Chapter 6 is about selective engagement: Can you 'break off', 'switch off', and 'disengage' from the network? Can you 'unthink the network' (p. 146)? Scholz is not suggesting a dichotomy of ON and OFF but is reminding the reader that there is a choice about when, where, and how to engage in platform capitalism.

As an alternative to platform capitalism, he introduces the concept of platform cooperativism in Chapter 7. This chapter puts job service platforms once again into the spotlight. Scholz introduces the concept of platform cooperativism as a way of joining the platform economy while advocating democratic governance. Scholz, although being a critical observer of platform capitalism, does not reject platforms per se. He endorses cooperative concepts of platform organisation. Key to platform cooperativism is the question of ownership. He suggests that platforms are owned by the workers, governed in a democratic way and keep the workers' interests in mind. The goal of these cooperatives would be to build 'lasting businesses over decades to come' that 'take care' of their workers (p. 190). Giving various international examples, Scholz demonstrates that platform cooperativism is a realistic alternative to the capitalist model of the platform economy. Nevertheless, it seems unlikely that a comprehensive transformation of platform capitalism will occur, which means that cooperatives have to compete with platforms that are built on the digital exploitation of workers. Referring to Rosa Luxemburg (p. 172), Scholz himself poses the question: How can non-capitalist platforms exist in a capitalist environment? His rather realistic suggestions include targeting niche markets or low-income clients (p. 173). If readers

are expecting a revolution and a way to transform the digital capitalist system as a whole, they will be disappointed. Scholz's strength lies in describing possible realistic actions and underscoring them with numerous examples.

Scholz has written a well-informed book about platform capitalism with a profound analysis of its influence on labour market structures. His typology is an extensive overview of the platform economy and its pitfalls. The broad typology of digital work raises the question as to whether all platforms pose the same difficulties for digital workers. Digging deeper into the details of the different platforms and forms of digital work, showing their similarities and differences, would be another interesting endeavour. Scholz's detailed analysis mainly focuses on the workers' situation on job service platforms. This is the unique strength of his book.

The author shows that the sharing economy is not about sharing at all. Instead, it is a matter of radical, quick economisation and precarious work arrangements, a central aspect being the new regulation of work relationships.

The dehumanisation – the pseudo-immateriality – of work is one of the central problems identified by Scholz. The internet lets its users forget that there are real people behind the screen who get tired; who get sick; and who have bills to pay. Digital work is just as material as the companies themselves. Calling for action, Scholz points out that internet companies have headquarters with real addresses. This leads to another of Scholz's priorities: solidarity. Organising collective action in a work environment where workers do not know each other or their employers is difficult but not impossible. Scholz gives various examples of protests and digital initiatives with the aim of improving the workers' work conditions. One of the most pressing issues, according to Scholz, is adequate and timely payment. Another is the constant surveillance of digital workers. In real life, Scholz argues, no employee would put up with this kind of surveillance. On the internet, however, constant rating, ranking, and reviewing is daily routine. A routine that can leave a worker from one day to the next without any income.

Written in the American context, the analysis cannot be transposed to the European context as such. Amazon Mechanical Turk operates primarily in the United States and India, owing to different work regulations in other countries, as Scholz describes. Nevertheless, development in the European context points in the same direction. In the future, an analysis in the European context would be a fruitful endeavour.

The book does not include an analysis of the author's own empirical material. But even without such an empirical analysis *Uberworked and Underpaid* is a critical reflection of todays' practices in platform capitalism and an important contribution to the discussion of digital labour and the future of work. The combination of extensive analysis and directions for action make it an inspiring reading experience.

Uberworked and Underpaid is a profound analysis of the ever changing field

of digital work written in a very accessible and engaging style. With its innumerable examples on roughly 200 pages, it is recommended reading for scholars as well as practitioners or the interested public.

The Invisible Force – How Algorithms Shape Society

Matthias Philipper

O'Neal, C. 2016. *Weapons of Math Destruction: How Big Data Increases inequality and Threatens Democracy*. New York: Crown Publishers.

Big Data and algorithms have become more and more present in various aspects of modern life. They are either regarded as an efficient and objective tool for solving a broad variety of problems in the working world and governance processes or as a threat to democracy, equality, and familiar ways of life. Questions on how to deal with the ongoing data revolution and its side effects are increasingly depicted and critically discussed in mass media and literature. Hence it is not surprising that numerous publications about current developments in the field have been published over the last few years in either scholarly or popular science literature. In these Big Data analyses, algorithms and computational modelling of society are discussed from the perspective of the various academic disciplines, such as computer science, philosophy, or sociology. For readers who are interested in the subject the discourse in these fields may be demanding and the analyses thus less accessible. As well as scholarly routes into this field, there is a broad range of writing more generally accessible to the public on how data shapes the everyday life of an increasing number of people worldwide. The authors of these publications are mostly science journalists and bloggers who often present a rather critical approach to the topic. Some of these writings offer curious insights on how the Data Economy works and how it develops its state-of-the-art technology. This is especially the case, when the developers of the algorithms and techniques of machine learning want to present their inside knowledge to a wide group of readers. One of these books is *Weapons of Math Destruction* by Cathy O'Neal.

Although the author, Cathy O'Neil, is not specialised in the social sciences or questions of inequality, her knowledge and thoughts about mathematical modelling, algorithms, or, as she calls them, 'Weapons of Math Destruction' (p. 3) shed an interesting light on the different effects that these systems can have on society. Her expertise in the field derives from a broad variety of different professions

and assignments that O'Neal has worked in over the course of her diverse career. Early on she turned her enthusiasm about math and numbers that had accompanied her since childhood into an academic career by obtaining a PhD in algebraic number theory, which eventually led to a tenure track professorship at Barnard College in the United States (p. 2). More interested in the possibilities of the non-theoretical use of mathematics and its application in new contexts, O'Neal soon changed the course of her career to a more practical and 'fast-paced' (p. 33) one and joined the thriving Data Economy. The conjunction between the academic world and the practical application of math in Big Data sets the tone for her book and makes her perspective particularly interesting. Throughout the first chapters of her book she characterises her different occupations as a quantitative data analyst for a hedge fund and as a data scientist in the internet economy. The focus lies on the different, predominantly disillusioning, insights about the practical use of mathematic models she gained in these fields and in her subsequent engagement against the current practice of the mathematical modelling of society. Experiencing and even cultivating the destructive potential of these models herself in her occupations, she reflects on her trajectory and the ways in which mathematical models are used in different social contexts. Her book *Weapons of Math Destruction* is the result of this investigation into the disruptive impact of algorithms on US society.

The very clear and guiding structure of the book will help readers who may lack in-depth knowledge about mathematical models and their dominant position in the US society to easily access the topic. After the Introduction, the first chapter explains what a model is and where models can be found in daily life, even outside computational systems. In the next chapter, she explains her disillusionment about the application of this technology. From this point onward she examines different areas in which Big Data, algorithms, and mathematical models are used and where the pitfalls of their usage lie. She closes the book with a conclusion and suggestions on how math and algorithms can be used in a fairer manner for the public good. The book's general tone is somewhat pessimistic, and viewed together with the book's guiding structure it underlines O'Neal's urgent call to foster public discourse and to find different ways of using Big Data.

The Introduction begins with a description of O'Neal's personal connection to math and the trajectory of her professional life. Initially enthusiastic about the possibilities and application of mathematical models, her perspective quickly shifted after she began working in the 'Big Data economy' (p. 3). She persuasively presents one of her recurring arguments against the current use of mathematical models in Big Data: the opacity of their functioning and the common belief in their infallibility. To illustrate their harmful force and her arguments, she describes the implementation of 'a teacher assessment tool called IMPACT' (p. 4) in schools in Washington DC to rate

the performance of teachers by assigning them a certain score. This score measures a student's skills in math and language skills and gives the administration the ability to identify teachers who are not performing well. Originally intended to improve the quality of teaching in Washington's schools, O'Neal shows how the assessment system focuses only on a small and insufficient variety of relevant data to measure and score the teachers' performance. Specifically, environmental variables are not considered when calculating the skills of students and therefore also the teachers' scores (p. 5). As a result, the underlying algorithm takes a small section of reality and presents it as an unquestionable instructional guideline for the administration to act on. She furthermore argues that the algorithms behind the scoring system are not designed to receive feedback (p. 7). This leads to the problem that certain issues, such as the inaccurate measurement of a teacher's performance, are not ultimately clarified. Hence the algorithm has no chance to develop new and more accurate techniques to assess the work of the teachers. It remains blind and is therefore unable to provide a reliable evaluation of a teacher's skills. She demonstrates this by presenting the case of a competent teacher who is assessed with a low score and eventually has to leave her job and then find new employment at a richer school. The two schools use different evaluation and assessment systems. The wealthier school relies on humans to rate the quality and performance of an applicant by means of thorough interviews and observations instead of using a data driven scoring algorithm. This important observation reveals a major and recurring point of criticism that O'Neal sees in the common use of Big Data: algorithms benefit the privileged over the unprivileged.

Chapter 1 lays the foundations that are important for reading the following chapters. O'Neal explains the basic concepts of models, where they can be found in daily life, and both the possibilities and the limitations of their use. The example she uses to illustrate the basal functions of mathematical models especially is baseball. She argues that the models used to describe this sport are a perfect example of a fair and especially transparent algorithm (p. 17). The data that are used to calculate the success of a certain team or player in the various situations of a game is available to anyone interested, and how the different models function is clearly visible. More importantly, the data about the different players and their skills is very accurate and open for feedback after every game. In contrast to this, algorithms in the Data Economy work with approximate values, because the reality they are trying to depict and calculate is too complex for a model to grasp. Moreover, they do not receive any external feedback, which makes them prone to blind spots and gaps in knowledge, especially when used on a large scale. According to O'Neal, many decisions made by these models are inaccurate and often discriminating. They do not question their data themselves and as a result their decisions are made on a rather vague basis that often

reflects the prejudices of its creators (p. 23). Since most commercially used models and algorithms are opaque and their functions are kept secret, it is difficult to identify their mistakes. A striking example of this that O'Neal introduces later in this chapter are the recidivism models used to determine whether a prisoner can be released from prison early or not. She explains that the models and the data collected for them is often biased by racist perspectives and prejudices, making an early release for people of colour less likely than for whites (p. 25). Moreover, the decisions based on these toxic models are widely perceived to be a dictum of objective truth that cannot be argued against, because only the programmers of the algorithm themselves actually understand what the model is doing (p. 25). At the end of the chapter, O'Neal summarises the issues presented in the example cases and traces their origins back to the use of mathematical models. She applies these characteristics to her concept of a 'weapon of math destruction' and applies it to different areas of society in the following chapters. In each of these areas she presents different examples and explains the environment in which they are in practice and the havoc they cause in these contexts. She presents a large number of different examples in each of the chapters, giving the reader a broad idea of how Big Data are used in society. The outcome in almost any case remains the same. Weapons of math destruction support social division and benefit mainly the privileged.

The central idea of chapter two is to explain the process by which O'Neal began to question the impact of Big Data use while she was working as an analyst in different areas of the US working world. After her academic career, she began working at a hedge fund and experienced the financial crisis in 2009 as a quantitative analyst. She explains here how the procedures and weapons of math destruction in the financial economy work and how she realised the faulty impact they have on society. While the hedge funds were searching for new ways to maximise their profits through implementation of algorithms and mathematical models, many people worldwide lost their jobs (p. 40). The use of weapons of math destruction in this field clearly supports her observation that only certain people actually profit from the use of these models, whereas mainly underprivileged social groups are systematically discriminated by it. Reflecting her own responsibility of working on the math behind the models, O'Neal changed her career with the intention to prevent financial weapons of math destruction from causing harm again (p. 44). She therefore started to work for a company that analyses the risk of failure in the financial economy. Her statements about the ineffectiveness of this measure are especially striking, showing that most of the inherent risks of the use of the models are ignored (p. 45). She then changed her occupation again and began working as a data scientist in e-commerce. While describing her daily tasks in this new economy, it becomes clear that the same toxic algorithms are used throughout this field as well (p. 47). These experiences led O'Neal

to the point where she grew more and more disillusioned and became involved with the Occupy Movement. Ultimately, she quit her job in order 'to investigate the issue in earnest' (p. 49).

Beginning with Chapter 3, O'Neal presents a narrower analysis of the role of the explained models in various areas of social life, from the creation of college rankings to the micro targeting of citizens in political contexts. She begins by explaining how weapons of math destruction influence college rankings and their impact on educational infrastructure. She first gives a brief outline of how college rankings were invented in the first place and how weapons of math destruction create these rankings to find suitable applicants. She discusses how the models involved focus on the characteristics that expensive private universities throughout the US already do well in, which turns the rating system into a self-fulfilling prophecy (p. 60). O'Neal makes it clear that these evaluations do not represent high quality in education, because they are unable to measure the qualities of a college convincingly (p. 55). To illustrate this, she shows how different colleges manipulate these scores and how subjective and vague some of the selected variables used to rate the colleges are. According to O'Neal, ways of achieving better scores in the rankings include, for example, lowering standards for applicants, giving graduates better grades, or accepting a relatively small number of applicants with especially high scores to increase the average performance (p. 54). She further argues that because of the power the established models have, the majority of American colleges seek to improve their scores rather than the quality of their teaching. Students face the same issue of having to try to present themselves in a way that suits the model's expectations. Again, the weapons of math destruction in this area largely benefit the already established and expensive colleges and the students who have the opportunity to make themselves more appealing to the algorithm's preferences. Privileged students are therefore more likely to apply to a well rated college and to profit from the advantages of the given rating, which in the end supports social division (p. 65).

In Chapter 4, O'Neal analyses how weapons of math destruction are used in online advertising. The goal of the applied models is to maximise sales by identifying certain demands. In order to do this, the models find '… inequality and feast on it. The result is that they perpetuate our existing social stratification, with all of its injustices' (p. 70). The algorithms are 'trained' to find certain weaknesses, the 'pain point[s]' (p. 73) of the people browsing the internet, to create personalised adverts and to exploit them. The companies behind this deliberately target the vulnerable in order to increase sales. It is not surprising that the recruiters in these businesses search for 'Welfare Mom w/Kids. Pregnant Ladies. Recent Divorce. Low Self-Esteem. Low Income Jobs. Experienced a Recent Death. Physically/Mentally Abused …' (p. 72), as O'Neal quotes. The image of the use of algorithms and the general practice

of some companies in online advertising are further supported by the large number of examples presented by the author and analysed in more detail in reference to 'for-profit colleges' (p. 81). These colleges make heavy use of the techniques that she describes in order to target students who cannot afford to attend a regular college. They promise them 'education … and upward mobility – while plunging them deeper into dept' (p. 81). O'Neal's descriptions in this chapter make it undoubtedly clear that automated systems are used on a great scale to exploit certain groups of people and to intensify social divisions.

Chapter 5 explores the impact of weapons of math destruction in the justice system. O'Neal's analysis reveals yet again how the application of algorithms on a large scale is harmful to certain groups of people. The weapons of math destruction used in this area are designed, for example, to predict the probability of crimes being committed (p. 85). In the light of her previous observations, it is not surprising that these algorithms rely on biased data to make their predictions. If a certain area shows a high number of minor crimes, the algorithms in use recommend deploying more police into this area. The high presence of police members then makes it more likely to discover even more crimes, eventually leading to the reinforcement of a police presence (p. 87). This strongly demonstrates how algorithms verify their own decision in toxic feedback loops. She further argues that the algorithms also identify the personal probability of a crime being committed. As seen before, the data used in this process are often biased by racist and stereotypical perspectives and ideas, even if the algorithm itself has to be blind with regard to ethnicity or race.

Chapters 6 and 7 show the difficulties algorithms create for people trying to find a job and job performance assessments. O'Neal's observations again reveal the problematic use of the technology, as it is mostly applied in low-wage areas of the employment market. Applicants for higher paid jobs are more likely to be reviewed by human workers in human resources departments, as they know about 'what machines appreciate' (p. 114). By passing this first obstacle in the process, misunderstandings and problems that may occur in the application procedure are far more likely to be noticed and solved in the case of applicants with a higher level of education than in the case of applicants for low-paid jobs. The algorithms that are used also show a large rejection rate for female applicants, because the weapons of math destruction calculate the probability of a person leaving the job for maternity leave or for longer periods of time, which are too long for them to be recommended as worth being invited for an interview (p. 117). O'Neal vividly describes the formation of this kind of algorithm and how discriminatory views find their way into the underlying weapon of math destruction. The assessment of scores in employee ratings also presents itself as highly biased. Again, O'Neal shows that the data used by the algorithms is insufficient to capture certain areas and skills in the work environment. The current

algorithms can, for instance, hardly measure soft skills (p. 133). This may ultimately benefit male workers over female workers. In Chapter 7, O'Neal again inspects scoring algorithms in education and examines how these affect local and national educational policies (p. 134ff). Further, she shows how personnel planning software used to maximise the profit of certain companies impacts the everyday life of families and exploits the time of low-paid workers in different areas of the working world (p. 123ff).

The destructive force of weapons of math destruction is also observable in the financial areas of social life. O'Neal analyses their impact on 'landing credit' (Chapter 8) and 'getting insurance' (Chapter 9). Decisions on credit applications have always been influenced by markers like race, class, and gender, and in case of doubt the bank clerk decided whether the applicant was credible in each individual case (p. 141). In Chapter 8, O'Neal demonstrates how different scoring algorithms have now superseded the position of bank clerks and how the use of weapons of math destruction in this context exacerbates this harmful practice. Here, as well as elsewhere, the scoring systems are opaque and offer no opportunity for feedback, making it even more difficult for minority groups to qualify for credit. Moreover, the algorithms do not elaborate on the individual risk of illiquidity. They rate applicants' solvency based on their belonging to different social groups (p. 145). Again, the use of these systems is not open to feedback and well-situated people have a better chance of avoiding contact with a weapon of math destruction when they apply for a credit. Another reason to be distrustful of the use of algorithms in this context is the economy that developed around the different scoring systems. As O'Neal shows, the personal scores are sold to other companies and interested parties for profiling (p. 148). These profiles are increasingly used to test the quality of applicants in job interviews or to decide whether a worker deserves promotion to a major position or not (p. 148). Especially alarming is the fact that Facebook patented their own technology to determine the credit rating of applicants based on the social networks they belong to on Facebook itself (p. 155). In Chapter 9, O'Neal shows how scoring algorithms assess people's behaviour and how insurance companies use the data thus generated to determine insurance premiums. She shows that health scores are increasingly generated and used in the context of work to determine whether workers have to pay additional fees for their health insurance or not (p. 175). O'Neal fears that in the near future it may even be possible that these health data could be used in job application processes or for other purposes (p. 175).

Since Cambridge Analytica massively influenced the outcome of the presidential election in the United States in 2016, it has become clear that algorithms have the potential to alter the political course of an entire country. Micro targeting allows political parties, lobbyists, and polling institutes to target individual groups and people

based on personal data to influence their opinions. In Chapter 10, O'Neal describes the algorithms behind this and observes the different consequences. She demonstrates how various companies in the communications business, especially Facebook, are able to use the data they collect to influence democratic processes (p. 181). A particularly insightful point that O'Neal makes is how the individual newsfeeds of people on social media are curated by algorithms, which thereby affect their mood and general attitude (p. 183). Although she sees no sign of misuse of this technique by the big internet companies themselves, there undeniably lies a destructive potential within the technology (p. 185).

In the Conclusion, the O'Neal discusses her general findings from each area and once again describes the universal characteristics of a weapon of math destruction and how these 'weapons' could be altered to produce fairer algorithms. She argues that the general public and the government have to take a closer look at the ways in which these systems work and at the inequality they produce. In the second part of the Conclusion, O'Neal presents her suggestions about what can be done to improve the use of Big Data. In her opinion, one way of achieving a better practice, besides appealing to the developers of algorithms (p. 205), would be to establish a 'regulatory system for WMDs' (p.207) and a closer auditing of algorithms by experts and the government (p. 211). She calls upon 'academic support' to train 'people with the skills to build them' to monitor the results of the use of algorithms in different areas of society (p. 211). In the end she presents examples of algorithms that were actually used to improve the living conditions of marginalised groups in the US.

A dominant theme of the book is the question of how algorithms affect the equality of distinct groups in society. Even if O'Neal's analysis remains rather superficial, it becomes clear that those who profit from the use of such models are mainly well situated, white, and male. Established to prevent biased decisions in different contexts, algorithms reveal themselves as doing the exact opposite. In almost every field presented in the book, from going to college to finding a job and making a career, it is women, people of colour, and people with a low level of education who are discriminated against by the advice given by the models. This is aggravated by the fact that the choices algorithms and mathematical models make are widely perceived as objective truth, meaning that there is no discussion about the rightness of these choices. This makes it impossible to move towards a more just use of mathematical models and Big Data. Interestingly, O'Neal does not argue against the use of Big Data in society. She rather criticises the implementation and purpose of the algorithms in practice. In her view they are 'primitive tools, which hammer complexity into simplicity' (p. 166e), but ones that could be changed to serve and benefit the public.

It has to be taken into consideration that O'Neal's book is more a work of popular

science than an in-depth sociological analysis. For her writing she relies mostly on newspaper articles and government documents, and less on scholarly publications. Nevertheless, her book remains interesting to read and opens a great range of perspectives for social scientists to further pursue. Her concept of a weapon of math destruction is interesting and comprehensibly established in the beginning, but it is not elaborated on as thoroughly as one would expect for a scientific analysis. Nevertheless, its application in various areas strikingly reveals the problematic utilisation of mathematic models in almost every context of modern life. Her strong use of many examples in each chapter and her rather non-theoretical style of writing make her book easily accessible for all kinds of readers, although the examples she presents are more likely to interest an American audience. The use of baseball and profit colleges to illustrate the models may be confusing to readers outside the United States. Also, the prevalence of mathematical models in the United States differs from the situation in other parts of the world. The book thus grants valuable insights into the possible direction of the increasing use of big data even in non-US countries. Given the book's structure, the discussion remains on a practical and comprehensive level and does not offer a scientifically detailed approach to the various presented topics and example cases. As stated above, these topics and cases represent opportunities for social scientists to raise more questions and further analyse the issues presented in the book. The book does not explore in detail the reasons why mathematical models are put into practice in the first place, and while recurring motives such as efficiency and profit maximisation are mentioned, they are not linked to the general discourse about capitalism and the neoliberal economy. For a detailed look at specific areas, O'Neal's book may therefore not be the right choice, but it offers a good overview of the destructive power of algorithms and the use of mathematical models, and it makes it remarkably clear why the topic should be of interest to the general public and the social sciences.

In Memoriam: Hana Havelková

Věra Sokolová

Hana Havelková (1949–2020) was one of the most influential figures of her generation. An internationally renowned thinker and the author of more than seventy publications in Czech, English, and German, she formulated many original and complex arguments about feminist political philosophy, gender theory of culture and society, feminist epistemology, women in science, and the representation of women in politics, media, and public discourse. After the Velvet Revolution, she significantly enriched feminist theorising between 'East' and 'West', helped to create the conceptual apparatus for a gender analysis of state socialism, participated in oral history research of experiences of women during and after socialism. The thematic breath and analytical depth of Hana Havelková's scholarship is impressive and remains unparalleled within Czech feminist sociology.

From the 1970s, Hana Havelková worked as a researcher in the Institute of Philosophy of the Czech Academy of Sciences. In 1996 she joined the Faculty of Humanities at Charles University in Prague, where she remained until her retirement in 2018. For many scholars across disciplines, she was a source of intellectual and personal inspiration, not only because of her ideas but also for the ways in which she was able to communicate those ideas.

Havelková's charisma as a teacher was legendary. Her lectures were contagious in the best sense of the word. Interestingly, Havelková did not take her own pedagogical contribution too seriously and was humble when evaluating her influence. She was well aware that her courses on feminist theories were popular and overcrowded, but she always attributed the attention to the topic itself. 'There is a tremendous need for reflection. In the Faculty where I teach, I can see that students' interest in feminism is huge … even antifeminism did a great service … many students told me that it was such attacks which motivated the young and curious generation to study feminism.' (Havelková 2003: 3) However, students' reflections made it clear where their enthusiasm stemmed from. Students dubbed her courses on feminist theories as 'Hana Havelková's courses'. She was able to appropriate a topic and make it her own and enthuse students hungry for new information with her critical and open-minded approach.

Havelková's texts were unique for their complexity, depth, and a systematic and bold writing style. Her argumentation was refined, theoretically grounded, and analytically probing. In the 1990s, when the vast majority of Czech feminist texts defined feminism as a struggle between men and women, Hana Havelková proclaimed, with her typical boldness, that 'feminism is a method', which is to say

that it is an epistemological method created and developed 'in relative independence even of women's political practice… and extensively surpasses it' (Havelková 1992: 731). Moreover, unlike most of her colleagues writing in the same period who turned exclusively to Anglo-American feminist discourse, Havelková drew inspiration from Italian, German, Austrian, French, and Scandinavian feminisms, thus making her texts all the more exciting. It was Hana Havelková who introduced Italian feminism and Rosi Braidoitti as well as Austrian philosopher Herta Nagl-Docekal into Czech sociology in the 1990s.

Hana Havelková considered feminism to be 'an important part of modern thinking, an intellectual paradigm whose application offers not only an alternative view on gender questions, but it also broadens social and cultural contexts, redefines the essence of institutions, revisits the periodisation of history, etc.' (Havelková 1999b: 258). She also insisted that the term 'feminist' is explicitly named. She remembered its roots and in both her writing and teaching she continuously reminded her readers and students that the feminist project had its historical heroines, to whom we owe a debt for having paved the way. Brave and resolute women who sacrificed a lot in their fight for women's political and civil rights, sometimes even their lives. Brilliant women, excelling in their fields: 'Suddenly, I realised once again the remarkable autonomy of Božena Němcová, who self-confidently and matter-of-factly placed female heroines in the centre of her stories, doing so in a completely original way, not copying the narrative forms of male literature.' (Havelková 1999b: 56)

It was also Havelková who openly and explicitly identified the tensions within the feminist debates of the 1990s as a problem of the unreflected interaction between 'Western theory' and 'Eastern reality'. She criticised the 'enlightened activism' of some 'enthusiastic Western feminists', arguing that 'if, on the one hand, we have a reality without theory, then, on the other hand, we also have a theory without reality. What I mean by that is the universalising tone of Western theories that continuously talk of "man" and "woman" without situating them in particular social contexts' (Havelková 1996: 244). She argued that the problem is not the use of 'Western' feminist theoretical approaches as such, but their unreflected 'direct application' to post-communist societies without their proper contextualisation and respect for the agency of women in post-communist countries.

Coping with the communist past, and especially 'the thematisation of our specific communist and post-communist experience from a gendered perspective' (Havelková 2007a: 108), was one of the most important questions that Havelková repeatedly posed in her scholarship and tirelessly strove to answer. Her ability to reformulate this crucial question, to hoist its sails in new directions, was a part of her intellectual greatness and inspiration. The effort which began in 1992 with the seemingly simple question 'Who is afraid of feminist philosophy?' (Havelková 1992: 729) gradually grew

into a lifelong project of fighting against the amnesia of feminist thought, which for Havelková had a personal and reflexive dimension. According to her, a quarter century later, it still 'remains a mystery why nobody (it seems) really missed feminism during the communist era as well as after its demise, despite the fact that feminism was a significant segment of pre-communist society… and, on top of that, was supported by its greatest icon, President T. G. Masaryk' (Havelková 2015: 128).

Hana Havelková's key thoughts bear several characteristic features. Due to her extensive training in sociology, political philosophy, and history, her main arguments are formulated in interdisciplinary ways. She also paid special attention to what she called the 'technical side' of scholarship. From herself, her colleagues, and her students she expected only the highest standards and theoretical-methodological thoroughness. She insisted that the house be built from the ground up and had little patience for those who were concerned more about the colour of the façade than the foundations. She never stagnated in one place. On the contrary, the more sophisticated her arguments were, the more unexamined issues she identified, and, as a result, she was continuously broadening the scope of her research interests. Even after she retired, when it was clear that the illness was winning over her body, she was immersed in work on her new book – a collection of her popular lectures on feminist theory.

In all of her writings and teaching, Havelková consistently practised the classic feminist dictum: the personal is political. Her texts reveal her efforts to merge the theoretical and analytical with the practical and engaged. In the totality of her work, she strived for nothing less than a transformation of society. With her typical charisma, she invited her readers to critically read and think about relations between the individual and society and our place in society. She put great emphasis on the institutional aspect of feminist analysis. However, she never forgot that institutions are not merely an abstract concept and that they are full of active agents who exercise their power in concrete ways. She upheld this political dimension of her argumentation throughout her career through her active engagement in state institutions and civil society organisations. She worked for the European UNESCO Center for Education in Human Rights, was a member of the Board of Trustees of Gender Studies o.p.s., and served on the Czech Government Councils for equal opportunities and for the representation of women in politics. For many years, she served as the chairwoman of the Czech Helsinki Committee.

At the heart of Havelková's approach to academic work was her emphasis on the intersubjectivity of research. In 1999, Havelková admitted her interest in feminism was, in fact, forced by circumstances: 'I did not start to take an interest in the question of the position of women in our republic at my own initiative. I had to be asked to do so, and even then, around 1990, I thought, like many others did, that there is not

much to say about the topic of men and women, that there are not many problems in this area. I quickly learned how very wrong I was. I realised with a shock that the communist authorities had managed to erase from public attention and discussion even such elementary human questions as the relations between the sexes and the transformations of male and female roles, including, for example, the parental roles.' She argued that 'we have an enormous cultural debt' and declared that 'for this reason alone I feel it is my personal and professional duty to get engaged in this matter' (Havelková 1999a: 46). Such a statement was typical for Hana Havelková. She did not wait for someone else to do the job. Instead, she always took personal responsibility: 'The need to deal with the past and especially the need to study the past in a competent way is always crucial for our understanding of the present – of ourselves, too. We still owe ourselves, and the public as well, a thorough gender inquiry into the communist and transformational periods.' (Havelková 2007a: 108) This appeal culminated between 2012 and 2015 with a ground-breaking research project focused on the transformation of gender culture in the period of state socialism. Hana Havelková led an interdisciplinary team of 15 researchers dealing with these issues from diverse methodological perspectives. The resulting anthology, co-edited with Libora Oates-Indruchová*, Politics of Gender Culture under State Socialism*, received the 2015 British Association for Slavic and Easter European Studies (BASEES) Award for the best book on gender issues in Eastern and Central Europe.

In her research, Havelková put great emphasis on the analysis of structures and institutions. She was interested in the production of expert knowledge and its influence on the functioning of the socialist system. In all her texts and research projects, she focused her systematic and analytical attention on tensions, paradoxes, and discontinuities. Havelková's prime concern was the relationship between abstract concerns and lived experiences, such as the concept of citizenship and the position of women in socialist society (Havelková 1995, 1996), the concept of patriarchy and the political representation of women in the post-communist transformation (Havelková 1993, 2006), or the concept of state feminism and socialist emancipated womanhood (Havelková 2011). During her childhood, Havelková was protected by her parents from having to confront the conflicts produced by the political regime in which she was growing up. However, as soon as she discovered the contours of the paradoxes of which she herself was a product, she made them the central point of her inquiry. The compelling statement by Olympe de Gouges, in which she described herself as 'a woman who has only paradoxes to offer and not problems easy to resolve' (Scott 1996: xii), mirrors the life journey of Hana Havelková as well.

Hana Havelková's professional and personal path was neither straight nor smooth. It was a demanding and complicated journey full of twists and turns. But it certainly was not a solitary path. It was filled with many colleagues, both Czech

and international, who respected and admired her academic work. It was lined with hundreds of eager and grateful students whose lives she changed. Together with her husband, Professor Miloš Havelka, they raised two wonderful and successful daughters – Tereza, who teaches musicology at Charles University's Faculty of Arts, and Barbara, who teaches law at the University of Oxford. Hana Havelková's life was also enriched by her three grandchildren, Oskar, Luisa, and Simon, whom she loved more than anything.

We will all miss her amazing personality – the greatness of her spirit, her generosity, empathy, relentless energy, and endless optimism. The legacy of Hana Havelková, however, and the values she cared about will remain a source of inspiration for generations to come.

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Conference Report on the Digital Congress of the German Sociological Association: 'Society under Pressure'

Mara Kastein

The theme of the 40th Congress of the German Sociological Association (DGS) held this year was 'Society under Pressure'. It examined various tensions in society such as the tension 'between rich and poor ..., between political camps and ideologies, between religions and cultural forms, between (re)emerging nations, regions and transnational organisations, between society and nature, between town and country, between generations, and ... between the sexes'.[1]

In order to approach a 'society under pressure' and social tensions sociologically, different triggers such as climate change, demographic change, migration movements and capitalism (see ibid.) were considered.

Berlin was originally intended to be the conference venue, but due to the Covid-19 pandemic, a total of 2,268 people attended 231 sessions and plenary events at the first digital congress of the DGS via Zoom instead. From more than 30 countries around the world (including 607 from Austria, 263 from Switzerland, 100 from the USA and 45 from Japan), an average of 104 people listened to the lectures of all in all 1009 speakers[2].

'Please wait. The webinar will start shortly.'

This phrase especially addressed the early birds to the Zoom meeting and myself too

[1] https://kongress2020.soziologie.de/thema.

[2] This is how Hubert Knoblauch, spokesman of this year's organizing team, sums up the congress in his closing speech.

as the digital 'greeting' when joining the opening event a few minutes early. What can be an advantage at face-to-face events is somewhat inappropriate in a digital space: joining in too early can lead to a situation where the organisers are still making the final preparations. The unpredictability of technology was a constant companion of every event, and even if the organizers' efforts were obvious, technical difficulties were sometimes inevitable. Some participants also used the chat function a bit too trustfully, which – if a person's chat partner is thrown out of the meeting for technical reasons – could result in the person's message being sent to everyone.

In his short report titled 'The Presentation of Self in Digital Life' (in an allusion to Erving Goffman's 'The Presentation of Self in Everyday Life', 1956), Michael Wetzels describes the meeting rooms at the digital conference as 'new staging possibilities for participants'. Participants' decorated backgrounds (often a full wall of books), suggesting that they are well-read, are, of course, also a part of this. Some also chose one of the background images provided online by the DGS (e.g. a public square or construction site in Berlin, or a concert hall) or used their own vacation pictures. Yet others sat in front of a white wall. Wetzels noted humorously that 'conventional clothing' ought to convey 'prestige' to many of the congress participants.[3] On the one hand, this is certainly not to be dismissed. On the other hand, not wearing pyjamas in front of the screen is definitely a sign of respect.

Much like the usual DGS congresses, it was difficult again this time to decide which event to participate in. The 'simultaneity of millions upon millions of alternatives on the Internet', which, according to Hubert Knoblauch, has led to mass media showing little interest in reporting on this year's congress (Knoblauch in the final lecture), makes the selection process a challenge for the participants as well, and often leads people to change 'rooms' in the middle of an event. However, this is less noticeable or disturbing than it is at face-to-face conferences.

Anti-migration discourses, diversity, organisational change and feminist ecology - selected insights

I decided to focus on themes such as diversity, migration, organisational change, right-wing extremism and anti-feminism, work and gender, and socio-ecological transformation, climate crisis, and feminism. Below I would like to present some of my personal highlights from the congress.

In the plenum 'Social Entanglements: (Re)Nationalization Processes and Solidarities', Anna Amelina (Cottbus) gave an interesting lecture on discourses hostile to migration in the new German states. She asked about the actors who drive this discourse and about the 'interplay between post-socialist and post-colonial forms

[3] http://blog.soziologie.de/tag/dgs-kongress/.

of making "migration" foreign'.[4] She took as her starting point conflicts surrounding integration and diversity in Brandenburg - not least violent attacks on refugees. Drawing on Connell's concept of masculinity, Amelina identified hegemonic and complicit masculinity among three types of actors: (1) the pioneers (NPD, identitarian movement); (2) the closest supporters (AfD, Pegida, 'Zukunft Heimat'); and (3) the accomplices, which according to Amelina also includes various municipal and security authorities, such as the police, as well as all those who do not openly oppose these tendencies. All three groups of actors are engaged in a migrantisation of conflicts, which is accompanied by a shift in the boundaries of what can be said and, in the case of migration, is considered to be 'alien' to a nation that imagines itself as homogeneous. Discourses hostile to migration combine the disparagement of the migrant 'other' with a simultaneous self-victimisation. The self-victimisation that resonates in the narrative of Brandenburg as an 'overburdened region' is fed by the lack of recognition of East German life plans and creates a hierarchy between the 'inferior East' and the 'superior West'. According to Amelina, however, this self-victimization is not accidental in the context of migration; rather, the experience of socialist colonialism is transferred here to the process of unification and the strengthening of the European Union (which is viewed by the peripheries as a distanced, hegemonic power). On the one hand, the unification process would have made the GDR or the new federal states a colonised region. In view of the links between the GDR and Vietnam, Angola, or Cuba, however, the new states themselves have a colonial past.

The police organisation, which Amelina only tangentially referred to as a complicit security authority in the anti-migration discourse, moved into the limelight in the lecture 'Kulturlotsen oder Alleskönner? Das Ideal polizeilicher Personalarbeit im migrationsbedingten Wandel' by Martin Brussig, Alexandra Graevskaia, Benedikt Müller and Anja Weiß (Duisburg-Essen), which was about the ideal form of police staffing policy in the face of migration-related change. In the so-called *Ad Hoc* group 'Organisations under Pressure: Migration, Diversity, and Organisational Change', the speakers presented the first results from the ongoing BMBF-funded research project 'Personnel Policy and Diversity Management in the Police', which is investigating the consequences of migration-related change for police personnel work. The principle of general applicability (see Behr 2016) has been questioned for some time and is becoming increasingly obsolete, not least due to developments such as the demographically induced shortage of young police officers, legal foundations such as the General Equal Treatment Act, or organisational changes such as special

[4] For a description see: https://www.conftool.pro/dgs2020/index.php?page=browseSessions&form_session=74#paperID615.

recruitment measures or the creation of new organisational units. In addition to the principle of general applicability, police personnel are also assigned to specific areas of interest. On the one hand, language skills are urgently needed and promoted for operations, on the other hand they are met with mistrust, since officers quickly expose themselves to accusations of disloyalty if they do not speak German in operational situations or among themselves. Migrant police officers are often used as 'mediators between cultures', which implies an essentialist understanding of culture and an 'othering'. The speakers summarised that the police organisation uses and (informally) accesses diversity but does not systematically cultivate it or reward it. Ultimately, the police need to think about how they want to deal with specialisation in organisational and formal terms.

'Environmental Disasters, Solidarity and "Science Fiction". Feminist Analyses of Ecologies and Natural Conditions' was the title of a session in the 'Women's and Gender Studies' section of the congress and it was somewhat overloaded in that it had five very rich lectures. Julia Wustmann and Angelika Poferl (Dortmund) spoke of the re-feminisation of environmental discourse and the feminisation of environmental politics in their lecture '"We Could Be Heroines, Just for One Day?" - Crisis Heroines as Prototypes of a New Social Figure'. The climate activism of the Fridays for Future movement is often referred to in the media as a religion and thus on the one hand is sacralised and rendered inaccessible while on the other hand it is discredited. Significantly, over half of the demonstrators are read as female. Using the example of the media portrayal of climate activist Greta Thunberg, the speakers presented the novel social figure of the 'crisis heroine' as a phenomenon that opens up new spaces for thought and action and points to the erosion of gender relations.

In the other lectures presented in this session, Clean Meat (= in vitro meat) was discussed as a biotechnology that saves us consumers from having to change our behaviour in everyday life and thus continues to nourish the deeply rooted belief in the legitimacy of our 'entitled subject' existence ('Berechtigungssubjekt', cf. Reckwitz 2019) (Sandra Matthäus, Chemnitz). *Caring* was discussed as a political-ecological transformation practice that is not only desirable but absolutely necessary (Christina Katz/ Daniela Gottschlich, Lüneburg), and two lectures dealt with Haraway's concept of 'speculative fabulation' (Josef Barla from Frankfurt and Susanne Völker from Cologne with Stephan Trinkaus from Bayreuth).

All in all, the digital communication of the content worked well. However, it should not be underestimated that a digital congress can also be very stressful, especially because when you are attending it at your desk at home you may feel tempted to still do your regular daily work during the breaks, on the side, or afterwards.

'To be allowed to see oneself like this once again, that is certainly great luck'

At the end of the congress, after a touching laudatory speech by sociologists Sarah Speck (Frankfurt) and Paula-Irene Villa Braslavsky (Munich), the women's and gender researcher Regina Becker-Schmidt was honoured as one of 'the giants on whose shoulders we stand' (DGS chairwoman Birgit Blättel-Mink) and given an award for outstanding life work as a sociologist. Becker-Schmidt, sitting in her home office with the printed lecture in front of the camera, was visibly overwhelmed by the laudation at the beginning of her speech and said: 'To be allowed to see oneself like this once again, that is certainly great luck, it has made me really happy. I am 83 years old ... Now it can be over, now I can do something else'. Thereupon she began her lecture titled 'Critique as the Ferment of Sociology'.

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Conference Report on the Austrian-Czech Symposium 'Where Does Work Stop, Where Does Life Begin? – The Transformation of Work in Austria and the Czech Republic'

Julia Gruhlich, Nicole Horáková

The world of work is changing rapidly. While this may not be a new discovery, it is still of high political, economic, cultural, and social relevance. The biggest trends include globalisation, transnationalisation, the digitalisation of work, and the flexibilisation of work with new standards for employment (e.g. part-time work, teleworking, positions with changing workplaces, virtual teamwork). In modern societies, the expectation

of being geographically mobile, spatially flexible, and available online at all times is increasing. As a consequence, the formerly clear boundaries between the areas of work, family, and private life are becoming increasingly blurred. On the one hand, the 'blurring of boundaries at work' allows employees to design the work process more according to their individual ideas and to organise work according to their own needs. On the other hand, work and its functional principles are also penetrating the private sphere and it is increasingly challenging for employees to align their lives with economic goals. Although there are some universal trends in the world of work, it is questionable what form these developments will take in the different countries of Europe and what opportunities and risks are associated with it.

From 23 May 2019 to 24 May 2019 scholars were discussing the chances and risks associated with these changes in an Austrian-Czech symposium titled 'Where Does Work Stop, Where Does Life Begin? – The Transformation of Work in Austria and the Czech Republic'. The symposium took place at the University of Ostrava and was funded by 'AKTION Czech Republic – Austria'[5]. It was organised by Dr phil. Nicole Horáková (Department of Sociology, University of Ostrava), Dr Julia Gruhlich, (at that time a guest member of the Department of Sociology, University of Ostrava), and Dr Kristina Binner (Institute of Sociology, Johannes Kepler University Linz).

The first day of the conference was divided into three thematic areas that reflect some of the major trends in work studies: (a) neoliberalism, rationalisation, and the economisation of the social; (b) skills shortages and working (time) policy; (c) family and the gender-specific division of labour in private life. In each session both countries contributed their perspectives on the topic.

The symposium started with a historical introduction by Stanislav Knob (Centre for Economic and Social History, Ostrava) on the subject of work and life in the industrial age. The lecture dealt with the transformation of work in the Habsburg Empire during industrialisation and clearly showed both the geographical and the historical connection that exists between Austria and the Czech Republic when it comes to the topic of work.

The first thematic session was 'Neoliberalism, Rationalisation, and the Economisation of the Social'. The country-specific perspectives on this topic promise to be very controversial, as both countries took different pathways: Austria implemented neoliberal policies comparably late in relation to other Western European countries, but in recent years they have been more and more radical in certain welfare sectors – for example, higher education. In contrast, the Czech Republic which is characterised by the experience of the transition from a planned to a market economy and the early

[5] This programme funds bilateral cooperation in education and research at the tertiary level between the Czech Republic and Austria. It is a joint programme of both countries' ministries of education.

adoption of neoliberal reforms in the 1990s. Fabienne Décieux (Johannes Kepler University, Linz) presented the consequences of neoliberalism for (early) childcare and asks for the consequences of the economisation of the social in the sphere of social services. Her contribution highlighted that love, affection, upbringing and care work are difficult to rationalize in numerical terms and that attempts to rationalise might lead to a loss of quality in both performance and working conditions. *Kateřina Cidlinská* (Czech Academy of Sciences) presented the neo-liberal discourse in Czech academia and its impact on HR policies and academic careers from a gender perspective. It shows how economic criteria are increasingly being transferred to science in order to make scientific performance more measurable and better comparable. However, on the one hand only certain achievements are measured (especially the number of certain publications) and on the other hand it is ignored that female researchers have worse starting conditions due to their poorer integration into mostly male scientific networks and their double burden with work and family.

In the second session the focus was on the 'Skills shortage and working (time) policy'. The shortage of skilled workers in both countries is considered a serious economic problem. In many industries and services, it is becoming increasingly difficult to find and recruit skilled and / or qualified workers. *Karin Sardadvar* (Vienna University of Economics and Business) presented empirical results about 'Current working time regimes' in the cleaning and care sectors, using the example of split shifts, a working time model in which the workday is interrupted by one or more hours of an unpaid break and, thus, poses particular challenges to the individual mobility and compatibility of work and life. The Czech lecture by *Kateřina Nedbálková* (Masaryk University) on 'The precarity of female workers in the Czech Republic' was unfortunately cancelled due to illness.

The final session was titled 'Family and the Gender-Specific Division of Labour in Private Life'. Marta Vohlídalová (Institute of Sociology of the Czech Academy of Science and AMBIS College) and Kristina Binner (Johannes Kepler University, Linz) independently presented country-specific studies on the situation of women scientists. It turned out that not only are the questions very similar, but the results are comparable as well. In both countries, it is difficult to reconcile academic career and family, which is then one of the major mechanisms of exclusion experienced by women in science. The system of full-time employment is based on the gender-specific division of labour in the private sphere, which declares women to be primarily responsible for raising children and caring for relatives. This division of labour is still very pronounced in 'family-oriented' Austria – even if childcare options have been expanded in recent years and legal options for paternity leave have been given. The Czech Republic has the longest maternity leave and subsequent parental leave in all of Europe. Mothers are expected to stay at home and look after their children for at

least three years. As soon as the child attends (all-day) kindergarten, most mothers work full-time again and are therefore exposed to an enormous double burden.

On the second day the participants jointly made an excursion to the industrial area Dolní Vítkovice (DOV). In the 19th and 20th centuries, this industrial area was famous for its coal mining, iron production, steel refining and processing, and mechanical engineering and it still shapes the cityscape of Ostrava. Although the Ostrava region is characterised by coal mining, it is also a region in transition, where the industrial work of the past is increasingly being replaced by new knowledge work. This also raises questions about which forms of employment are being lost, whether working conditions are improving, and which groups of people are benefiting from these developments and who is being left behind and is at risk of unemployment. The visit to the DOV-area offered valuable cultural and historical dimensions to supplement and round out the academic programme.

So, what are the results of the symposium?

The country comparison proved to be important, especially because universal trends assume different forms locally and nationally. The everyday work is influenced, among other things, by nationally shaped labour market structures, juridical frameworks, welfare states, and family norms (e.g. the male breadwinner model) and culturally supported gender relationships (e.g. the gender pay gap, the gender-specific division of work in the private sphere). A look at the neighbouring countries of Austria and the Czech Republic, with their shared past, seems particularly worthwhile, because despite the geographical proximity there are sufficient differences between the countries and a wide range of developments can be discussed. Against this background, the symposium was devoted to the similarities and differences between the two countries in terms of how work has changed. A country contribution was included in each session, which stimulated and intensified the international dialogue and cooperation on specific topics.

The symposium was just the beginning of more joint and transnational research. The questions of what constitutes decent work, what do good jobs look like, and how do we want to live always need asking. Future research needs are particularly evident in the area of the digitalisation of work, in new work (time) models, and in precarious forms of employment. It is to be hoped that this event will give impetus to further Austrian-Czech research exchanges – for example, through Erasmus cooperation and the associated exchange between students and staff, in the form of joint publications and applications for EU research projects, or through the networking of local scientific communities such as the Austrian Society for Sociology (ÖGS) and the Czech Sociological Society (Česká sociologická společnost / ČSS).

Report on the Conference 'Change in Work through Digitalisation = Change in Gender Relations?'

Ines Entgelmeier

How does the digitalisation of work change gender relations? And how can digitalisation create new opportunities for more gender justice? These are the questions that were addressed at the conference 'Wandel der Arbeit durch Digitalisierung = Wandel der Geschlechterverhältnisse?' ('Change in Work through Digitalisation = Change in Gender Relations?'), which was organised by the 'Network for Labour Research NRW' as a joint event of the Düsseldorf Research Institute for Social Development and the Dortmund Social Research Centre on 19 May 2019 in Dortmund. The organisers, Dr Saskia Freye and Ellen Hilf, welcomed over 100 guests at the Erich Brost House in Dortmund. Speakers from different scholarly fields, politicians, and trade unionists discussed how 'Work 4.0' can be made more gender equitable.

Prof. Dr Nicole Mayer-Ahuja (University Göttingen and Sociological Research Institute SOFI) opened the event with her talk 'Frauen – Arbeit – 4.0? Ein Blick zurück nach vorn auf Veränderungen weiblicher Erwerbsarbeit' (Women – Work – 4.0? A Retrospective Look at Changes in Female Employment) offering an introduction to the topic of the conference. Mayer-Ahuja started with a brief discussion of media, which highlighted people's fears about job losses caused by new technologies in the past and today. So far, however, predictions of factories with no workers have not been fulfilled. According to Mayer-Ahuja, the reason for this is that there is no one digitalisation or one kind of digital work, and instead digitalisation manifests itself in very different ways, each of which has different ramifications for employees. She also argued that the impact of technologies on employees does not depend on their mere existence, but on their design in companies, political regulations, and the power of interest groups. She pointed out that the existence of technologies does not necessarily lead to their use and that digitalisation not only makes occupations replaceable but also creates new ones.

Nevertheless, if new technologies take over human activities, Mayer-Ahuja predicted that the prospects for women on the labour market would not be good, and she gave three reasons for this. First, history shows that women are the first to lose their jobs if there is a shortage of work. Second, women in particular tend to work in the sectors in which jobs are being reduced or where there are new precarious types of jobs emerging, such as crowd working. In both cases there are no adequate working standards and rights in place. Third, good working conditions need strong

employee representation. But women are less organised in companies and trade unions than men.

The topic of the substitutability of occupations through digitalisation was explored more deeply in the presentation given by Dr Britta Matthes (Institute of Labour Market and Occupational Research Nürnberg). Matthes presented an indicator that she and Dr Katharina Dengler developed which calculates the potential substitutability of job activities by digital technologies. Matthes does not believe that occupations will disappear completely, but rather that certain activities within occupations will be performed by technologies instead. The indicator is based on a review of 8,000 activities examining their potential to be automated. Results show that on average men are more likely than women to work in occupations with a high potential for this kind of substitution. Matthes and Dengler found that for the year 2013, on average, 33% of women's activities and 42% of men's activities could be automated. For 2016, they found that the proportion of activities for women had increased to 45% on average and to 53% for men. However, Matthes pointed out that these results vary according to profession. For example, in occupations in the areas of management and organisation, women are, on average, more strongly affected by substitutability than men. Matthes emphasised, however, that a high potential for substitutability does not necessarily mean that substitution will occur. She explained that 'the use of technologies is not determined solely by what is technically feasible, but depends in particular on economic considerations.'

Britta Matthes noted overall that these results do not indicate more gender equality on the labour market. If the cost of the substitution of work done by men are higher than the cost of the substitution of work done by women, it is more likely that the activities that women perform are that ones that will be replaced. In addition, new jobs created by digitalisation are more likely to be carried out by men. Therefore, Matthes came to the conclusion that, as long as there are no changes in the gender-specific segregation of labour market, digitalisation will exacerbate rather than improve gender equality.

As well as changes in the employment structure, possible changes in the evaluation of occupations were also discussed. Dr Edelgard Kutzner (Dortmund Technical University, Social Research Centre), presented empirical results from her quantitative research project 'Gender Relations and the Digitalisation of Work', which she worked on together with Dr Victoria Schnier. They explored the impact of digitalisation on work in industrial production ('Einfacharbeit') with a focus on gender. Kutzner could see that levels of automation differ greatly between companies. These different developments do not necessarily depend on the sector, and even within one sector she found divergent paths. Kutzner identified three patterns of development in relation to gender. First, the introduction of new technologies and work organisations can

upgrade women's work because these technologies are often come with more demanding activities. Therefore, women could benefit from increased wages when their jobs are reassessed. Second, women's work may be devalued. Women carry out the kinds of activities that cannot yet be performed by machines or that would be too costly to replace with automation. Kutzner called this 'women as stopgaps in technological development'. And third, there is the pattern of stabilisation. The introduction of new technologies does not change the segregation of work along gender lines. Gender stereotypes are still used to justify the filling of a job position. According to Kutzner, for more gender-equal work, technical changes must be accompanied by changes in the way work is organised and in the division of labour. Furthermore, technical changes must entail a reassessment of jobs and women and men have to be involved in the design of work and technology.

In addition to the influence of digitalisation on the occupational activities of women and men, the conference also dealt with interactions between the different areas of life. Dr Tanja Carstensen (Ludwig-Maximilians University Munich) reported on her current research project on the digitalisation of office work. One of her interests here was the connection between flexible working arrangements and the possibilities of reconciling work and family life. She evaluated her interviews with a focus on new gender arrangements and changes in the division of paid and unpaid work. Carstensen pointed out that work and technology have always been strongly gendered. But at the same time, technical change has the potential to lead to social upheavals. So far, research has indicated that 'home office' work can exacerbate gender inequality, as women use the flexibility for care work while men use it for overtime work. Also, Carstensen's findings are in line with these results. She found no evidence of a renegotiation of work and family life between women and men. However, Carstensen noted that technology could help people to better manage the double burden. On the one hand, this could be an advantage for women who still have more responsibility for the family as well as doing gainful work. On the other hand, Carstensen underlines the danger of hidden overtime and stress for women, because while technologies may help to integrate more activities into daily life, they also tend to make associated burdens and inequalities less visible.

Carstensen summed up by saying that digitalisation does not promote new gender arrangements, because the division between paid and unpaid work remains unquestioned. More important than technologies themselves are their design and usage in companies and the society.

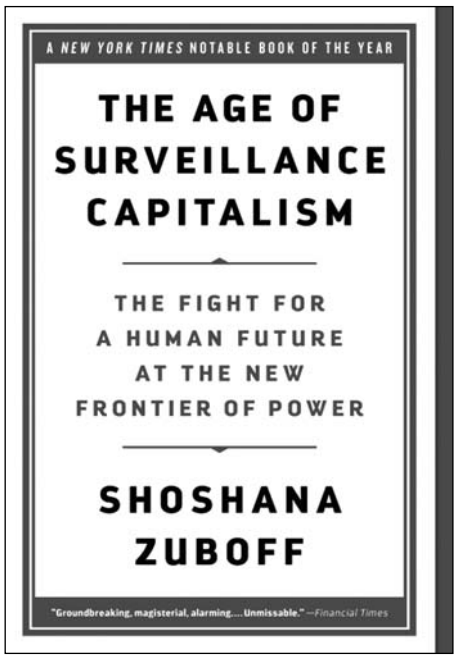
After the previous speakers had focused on the social conditions of digitalisation and gender, Prof. Dr Corinna Bath (Technical University Braunschweig and Ostfalia University of Applied Sciences) turned her attention to the technical side and what it means for gender-equitable work. Bath summed up that digitalisation is still a gender-

neutral project. This is evident, on the one hand, in the small share of women in technical professions and courses of study and, on the other, in the fact that they are hardly represented in the media and in political and scientific discourses on this topic. Bath pointed out that technology is not deterministic and that, within certain limits, it can be shaped. Therefore, she referred to the concept of participatory design, which was aimed at involving the users of a technology in its design. The idea was to integrate users not only into the application of technologies but also into the process of development. This must also be taken into account in the development of algorithms. The way algorithms have worked to now is that they learn from data from the past; these data are, however, characterised by gender-specific discrimination. Bath argued: 'We need to think about how we can generate "better" data sets from which the AI systems can "learn"'. Automated decision-making systems need to be discussed, as they can reinforce stereotypes and social injustices. In order to achieve responsible digitalisation, it is necessary for Bath to make complex technical processes visible and understandable for everyone.

Finally, the conference closed with a discussion about gender-equal Work 4.0. Participants were Anke Bössow (Union of Food and Catering Workers), Romy Stühmeier (Competence Centre for Technology – Diversity – Equality]), Prof. Dr Ute Klammer (University of Duisburg - Essen, Institute for Work and Qualification), Dr Wiebke Lange (Ministry of Labour, Health and Social Affairs NRW), and Dr Edelgard Kutzner (TU Dortmund, Social Research Centre). Despite different perspectives on the topic, the participants agreed that digitalisation opens up opportunities for gender-equitable work, but only for a limited time. That is why the discourse must be strengthened now, especially with regard to its significance for women. Furthermore, the qualification and participation of employees were discussed as central conditions for a gender-equal Work 4.0. This requires the transparent usage of digital applications and employees must therefore learn how to handle data and to understand the underlying processes. Women in particular should be more involved in the development of technologies. In addition, knowledge about gender-specific inequalities should be taken into account. In the view of the discussants, another important condition for gender-equitable Work 4.0 is the dismantling of institutionalised and formalised gender stereotypes. The impending digitalisation of business processes, in administration, for example, must be critically questioned and redesigned with regard to its gender aspects.

The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power

Shoshana Zuboff



Shoshana Zuboff provides startling insights into the phenomenon that she has named surveillance capitalism. Technologies that were meant to liberate us have deepened inequality and stoked divisions. Tech companies gather our information online and sell it to the highest bidder, whether government or retailer. Profits now depend not only on predicting our behaviour but modifying it too. Zuboff vividly brings to life the consequences as surveillance capitalism advances from Silicon Valley into every economic sector. The threat has shifted from a totalitarian Big Brother state to a ubiquitous digital architecture: a 'Big Other' operating in the interests o surveillance capital.

The Age of Surveillance Capitalism is a deeply-reasoned examination of the threat of unprecedented power free from democratic oversight. As it explores this new capitalism's impact on society, politics, business, and technology, it exposes the struggles that will decide both the next chapter of capitalism and the meaning of information civilization. Most critically, it shows how we can protect ourselves and our communities and ensure we are the masters of the digital rather than its slaves.

Public Affairs 2019.

The journal Gender a výzkum / Gender and Research would like to thank all its reviewers for their participation in the review process in 2020. We greatly appreciate the voluntary contribution that each reviewer gives to the journal.

Kadri Aavik (University of Helsinki); Betty Akullu Ezati (Makerere University, Kampala); Erin Baines (University of British Columbia, Vancouver); Corinna Bath (Technical University of Braunschweig); Fabienne Décieux (University of Vienna); Radka Dudová (Institute of Sociology CAS, Prague); Sverker Finnström (University of Uppsala); Jaroslava Hasmanová Marhánková (Charles University, Prague); Zora Hesová (Institute of Philosophy CAS, Prague); Heike Jacobsen (BTU Cottbus-Senftenberg); Adriana Jesenková (Pavol Jozef Šafárik University, Košice); Sandra F. Joireman (University of Richmond); Nancy Jurik (Arizona State University, Tempe); Jaroslav Klepal (Charles University, Prague); Mara Kastein (University of Paderborn); Christina Klenner (INES Berlin); Ľuba Kobová (Charles University, Prague); Kateřina Krulisová (Nottingham Trent University); Tereza Kynčlová (Charles University, Prague); MariaCaterina La Barbera (Nebrija University, Madrid); Miroslav Libicher (Palacký University Olomouc); Vera Lopez (Arizona State University, Tempe); Kira Marrs (ISF Munich); Alexandra Mergener (BIBB, Bonn); Mechthild Nagel (SUNY Cortland); Zahara Nampewo (Makerere University, Kampala); Edith Natukunda (Makerere University, Kampala); Betty J. Okot (Kampala); Bianca Prietl (Johannes Kepler University, Linz); Britta Rehder (Ruhr-University Bochum); Alexandra Scheele (Bielefeld University); Julia Schuster (Johannes Kepler University, Linz); Iva Šmídová (Masaryk University, Brno); Njoki Wamai (United States International University-Africa, Nairobi); Mascha Will-Zocholl (Hessian University for Police and Administration, Wiesbaden).

Gender a výzkum / *Gender and Research* is a peer-reviewed transdisciplinary journal of gender studies and feminist theory. The journal publishes articles with gender or feminist perspective in the fields of sociology, philosophy, political science, history, cultural studies, and other fields of the social sciences and humanities. The journal was founded in 2000; it is published biannually by the Gender & Sociology Department of the Institute of Sociology of the Czech Academy of Sciences. Until 2016, the journal was published under the name *Gender, rovné příležitosti, výzkum* / *Gender and Research*. The editorial board supports work that represents a contribution to the development of transdisciplinary gender studies and it takes into account the analytical contribution of manuscripts.

The journal is listed in the SCOPUS, ERIH PLUS, CEJSH, DOAJ and other databases.

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Economy 4.0 – The Digitalization of Labour from a Gender Perspective

GENDER A VÝZKUM
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