



The digital society comes sneaking in. An emerging field and its disabling barriers

Hanna Egard & Kristofer Hansson

To cite this article: Hanna Egard & Kristofer Hansson (2021): The digital society comes sneaking in. An emerging field and its disabling barriers, *Disability & Society*, DOI: [10.1080/09687599.2021.1960275](https://doi.org/10.1080/09687599.2021.1960275)

To link to this article: <https://doi.org/10.1080/09687599.2021.1960275>



© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 23 Aug 2021.



Submit your article to this journal [↗](#)



View related articles [↗](#)



View Crossmark data [↗](#)

The digital society comes sneaking in. An emerging field and its disabling barriers

Hanna Egard  and Kristofer Hansson 

Department of Social Work, Malmö universitet Fakulteten för hälsa och samhälle, Malmö, Sweden

ABSTRACT

This study examines disabled people's everyday experience of social exclusion in relation to the rapid growth of digital technologies in everyday practices. It highlights the relationships between the growing theoretical apparatus on how society changes with new digital technologies, and theories about how this might lead to new disabling barriers in the everyday lives of disabled people. To better understand disabled people's everyday experiences of social exclusion in the digital age, it brings together insights from two different fields: digital technology, mainly in digital social science and digital humanities; and disability studies, with a focus on the digital divide. The study draws on empirical observations, photographs and interviews with adults with various disabilities in Sweden, and analyses their everyday experiences with the help of a theoretical framework.

ARTICLE HISTORY

Received 18 February 2020
Accepted 10 July 2021

KEYWORDS

Digital age; exclusion;
digital technology;
digital divide; disability;
accessibility

Points of interest

- To improve participation, it is critical to understand disabling barriers in a digital society.
- By bringing together digital technology and disability studies, it is possible to understand day-to-day contexts where there is potential for the digital divide to grow, especially for disabled people.
- Digital technologies designed for use in day-to-day life need to be more inclusive, and the barriers they create for individuals need to be understood before they are implemented.
- Digital technologies can construct disabling barriers in mundane contexts, even in some non-digital contexts where there is digital technology in the back-end, as for example, the internet of things.

Introduction

This article aims to examine disabled people's experiences of social exclusion in relation to the growing use of digital self-service technologies in

CONTACT Kristofer Hansson  kristofer.hansson@mau.se  Department of Social Work, Malmö university, Faculty of Health and Society, Sweden.

© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.
This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

everyday practices. Previous research in the field of disability studies has examined digital technologies in relation to their use in individuals' homes and in different rehabilitation contexts (Watling 2011; Wästerfors 2011; Macdonald and Clayton 2013; Wästerfors and Hansson 2017). The focus of such studies has mainly been on the so-called 'digital divide' in access to technologies, appropriate training, and the fact that technologies do not follow principles of inclusive digital design (Watling 2011; Johansson 2019). This study examines something different: the digital divide that emerges when analogue technology for payment and registration converges with digital technology in everyday contexts. The digital objects emerging from this convergence have become a part of everyday life and are now inseparable elements of various service contexts (Vakulenko, Oghazi, and Hellström 2019). For example, computer and smartphone apps for registration and payment, self-service checkout kiosks and digitally-operated security revolving doors are all widely used in transport, retail, health, work, leisure and in many other everyday social functions. Digital objects may also interact with, and influence, daily life at second hand: for example, online shopping may influence how individuals interact with parcel delivery and collection services.

This article considers these self-service technologies primarily as digital objects. Yet, although the objects are digital, they are not simply abstract phenomena but real objects that are used on a daily basis (Miller 2010; Hansson 2015). Self-service technologies are 'technological interfaces that enable customers to produce a service independent of direct service employee involvement' (Meuter et al. 2000, 50). The implementation of these technologies changes the prerequisites for accessing services and products. It increases their accessibility and availability, since the product or service is available for a longer period, or even anytime, anywhere. At the same time, new technologies have contributed to a reduction in direct service staff and delegated a large part of service delivery to the consumer (Meuter et al. 2000; Vakulenko, Oghazi, and Hellström 2019). Self-service technologies presuppose that the user is able to act as an 'independent service producer'; under this assumption the design of self-service technologies becomes crucial (Jokisuu et al. 2015). Yet, although designers certainly consider accessibility important, digital objects tend to be designed with features that exclude people with disabilities (Putnam et al. 2012; Jokisuu et al. 2015; Johansson 2019).

This article examines the relationships between the growing theoretical apparatus on how society changes with new digital technologies, and how this can create new disabling barriers in everyday life. It brings together perspectives from two different fields to better understand disabled people's everyday experiences of social exclusion in the digital age, drawing on empirical research conducted through interviews and 'go-along' observations

with disabled adults in Sweden. Sweden is undergoing rapid digitalisation processes (Länsstyrelsen 2019), making it a good case in which to study novel technological solutions such as, for example, smartphones, the Internet of things (IoT) or artificial intelligence (AI), and how these may create new disabling barriers for individuals.

Two theoretical fields

We argue that the study of the digital age, i.e. the growing theoretical and empirical field of digital technology studies – mainly in digital social science and humanities – lacks perspectives from the field of disability studies, and vice versa. Bringing together these two fields can offer new insights into the challenges around exclusion that societies confront today and in the near future. We first present the two fields separately, and then make some synthesising theoretical suggestions.

The digital age

Digital technologies have far-reaching effects on society today, and are rapidly changing how people communicate, work, study, shop, play and so on. This digitalisation of society affects society and people in fundamental ways. A central part of this change is that new digitalised hardware, software and networks are rapidly developed and implemented in society. These new technologies have similar effects on society as the introduction of the steam engine, electricity and internal combustion engine, leading to some dubbing our time ‘the third industrial revolution’ (Gordon 2012). This has been debated: Brynjolfsson and McAfee instead frame this period as ‘the second machine age’, and write that digital technologies are in this age ‘the ones with computer hardware, software and network at their core’ (2014, 9). A central part of this digitalisation is that it enables ‘time-space compression’, which fundamentally changes how information is produced and consumed globally (Harvey 1990; Crary 2013). In this article, we view our society as situated in the *digital age* (Schaefer et al. 2018): ‘[...] “digital age” denotes the wide-spread diffusion of digital technologies, whereas “digitalisation” refers to the changes it leads to in technical, cultural, economic, ecological, ideological and societal spheres’ (Schaefer et al. 2018, 11). We prefer this term as it does not pre-evaluate digital technology as revolutionary.

Analysis of the digital age and its technologies, as Wajcman points out, should not begin by applying abstract theories which tend to conceal minor technologies that may yet have a considerable influence on everyday life (Wajcman 2015). Instead, everyday processes, which are not articulated or particularly noticed when it comes to the technologies involved, should be studied (Ehn and Löfgren 2010). In this article we use digital objects for

payment and registration as examples through which to study changes in everyday processes that, at first, may appear insignificant, but which, in the end, have substantial impacts on daily life in the digital age.

An example from the Swedish context is mobile ticketing and payment for public transportation. In southern Sweden it was, in 2019, possible to buy a ticket using at least four different ways. Mobile ticketing is the most recently introduced digital system, where the smartphone becomes a uniting technology in which booking, paying for and receiving tickets are all managed. The paper timetable becomes available on the Internet; the cashier is replaced by an app for making online payments; coins and notes transform into digital money; the ticket becomes a digital object received by email. As analogue technology converges into/with digital technology, what previously required different technologies is now possible with one (Jenkins 2004; Olawuyi and Mgbale 2012). This gives society, and people living in that society, new and beneficial opportunities to create novel everyday practices, whilst also creating challenges (Brynjolfsson and McAfee 2014). To understand these challenges, we link the growing theoretical and empirical field of digital technology with disability studies, focusing on the digital divide and digital exclusion.

Disability and the digital divide

In many ways, digital technologies are generators of inclusive processes in society, and of inclusion into digital worlds. The latter creates possibilities for new and evolving lifestyles, such as, for instance, playing computer games whilst living with impairment or chronic disease (Hansson 2015; Wästerfors and Hansson 2017). At the same time, as Mairs has highlighted, the development of mainstream technologies not only gives access to new lifestyles, it also creates new forms of exclusion from the digital world (Mairs 2007) and in this way hinders inclusive social processes (Johansson 2019). One of Mairs' examples is the telephone, and how its development has changed accessibility in the context of vision impairment. To use the first telephones at the end of the nineteenth century, the caller spoke directly with an operator who used jack plugs to connect the call to the right person. This was very accessible compared to mobile phones at the beginning of this century, which had a small screen with a complex interface and small buttons. This technological development created exclusion for some, even while the technology of text messaging created inclusion for others with hearing impairments. Mairs describes this contradiction in digital technology development: 'The explosive growth of digital technologies provides enormous opportunities for creating specialised devices to access existing lifestyle, but that very same digital technology explosion has spawned lifestyles which have themselves excluded various groups of the

community' (Mairs 2007, 280). In this way, digital exclusion is a central component of new disabling barriers that emerge in society (Macdonald and Clayton 2013).

Digital exclusion and disabling barriers are two of the key theoretical perspectives through which to understand the social and cultural processes behind the digital divide (Watling 2011; Macdonald and Clayton 2013). 'Digital divide' describes the uneven distribution of digital technology in a society (van Dijk and Hacker 2003; Warschauer 2003). It includes at least three distinct types of barriers: (1) the cost of digital technology; (2) access to appropriate training to use the technologies; and (3) whether the digital technology has an inclusive design (Watling 2011). When it comes to point one, the technology can be said to reproduce the inequalities that exist in a particular society and which are based on intersectional categories such as class, gender, generation, ethnicity, disability, etc (Wilkie 2011). Points two and three are interrelated: there is a relation between a user's knowledge of how to use digital technology and the design of that technology (Galis 2011; Näslund and Gardelli 2013). Analysing statistical data, Macdonald and Clayton conclude that 'poverty, a lack of ownership, restricted knowledge and inaccessible ICT' (Macdonald and Clayton 2013, 716) maintain the digital divide.

Thus, it is not extraordinary that studies have demonstrated, using statistical data, that disabled people are over-represented on the wrong side of the digital divide (Harris 2010; Brundell 2011; Dobransky and Hargittai 2016; Scholz, Yalcin, and Priestley 2017; Johansson 2019). But this does not mean that the digital divide is a matter of impairment. Rather, it is a matter of how disability interacts with other social effects (Scholz, Yalcin, and Priestley 2017). According to Johansson (2019), the digital exclusion of disabled people is due to several interacting factors at both societal and individual levels. Apart from the accessibility and affordability of digital technology education, expectations and attitudes to technology and different impairments are at play. This means that there are digital divides even within the heterogeneous group of disabled people, and large individual differences (ibid.). However, in this digital age, there is a risk that the digital divide will grow significantly as more and more contexts are digitalised. Not to have access and be able to use digital technology because it is too expensive because one lacks knowledge of how to use it, or because it is not developed to be user-friendly, hinders the individual's digital participation in everyday life (Hansson 2015).

Disability in the digital age

There are many overlaps between the study of the 'digital age' and of 'disability and the digital divide'; some may contend that they are, in fact, the same field. Nevertheless, we argue, with help from the empirical material, that the acceleration towards the digital age represents something genuinely

new, and that theories of the digital divide need to be developed in a new direction. It is increasingly necessary to study how digitalisation infiltrates different arenas of society. It is not only the computer in the home or the workplace that affects everyday life: all kinds of private and public services now digitally engage individuals. This change is not necessarily visible: in many service situations there is not always a computer or smartphone directly in front of the individual, instead, there is an invisible digitalisation in the background of service utilisation. The digital age is sneaking in everywhere.

This is a process of rapid transformation, and new technological solutions are constantly emerging. For this reason, there is an urgent need to come up with theoretical and empirical perspectives that can analyse the new digital divides that challenge disabled people today and in the future. In this study we use interviews and go-alongs to study these changes.

Research process

Using observations, photographs and qualitative interviews with adults with various disabilities in Sweden, this study examines the limitations and obstacles posed by different digital technologies. Methodologically, this is difficult because the phenomenon studied is not necessarily always directly visible. Digital technology changes people's habits and routines in many aspects of everyday life, but is not much discussed. At the same time, new technologies may also make people frustrated or angry; such instances are, of course, easier to observe.

The participants in this study were recruited in various ways. Some were recruited through calls made with the help of disability organisations, others through the snowball method. Our material thus consists of a variety of narratives, accounts and observed situations.

The interviews were based on a thematic question guide which focuses on inaccessibility in the urban and digital arenas (Kvale 1996). We used open questions to encourage informants to tell us about their experiences, such as: Do you use digital products? Is there any product that you think is inaccessible? Are there any similarities or differences in the availability of the products you have in the home and those that are in the public domain? Have you opted out of using any digital products because they are inaccessible? As these examples illustrate, the questions were mainly about limitations and obstacles since these were our area of study, rather than the benefits.

A total of 30 persons with various disabilities were interviewed. The interviews were recorded and transcribed, and the text was used for analysis. Because all the interviews were conducted in Swedish, the extracts used in

this article have been translated into written English without changing the meaning.

All those interviewed were also asked to participate in the observation study. Of these, 16 adults agreed to take part. They talked with the researchers whilst touring different urban settings to highlight shortcomings in accessibility. Through observation and conversation, therefore, another layer was added to the understanding of digital technology. This method is similar to 'go-along' and 'walk-around' interviews (Carpiano 2009; Griffin, Lahman, and Opitz 2016). The observations made visible, unconditionally, the limitations created by new technologies. At the same time, the method highlighted what was not discussed in interviews and which related to specific situations. Observations were written down as short notes in the moment, and fleshed out into complete observations on the computer directly after returning from the field. Sometimes we used a camera to capture observations, however these images were primarily aides-mémoire rather than empirical background for analysis.

The analysis was conducted using an inductive thematic approach (Riessman 2008). The interviews and the observation texts were scrutinised repeatedly to find patterns and themes. This was done by both authors who then critically examined and discussed the material.

Results

Our analysis of the empirical material revealed two central themes: 'imperative digital objects' and 'digital objects in context'. The themes will be presented here in the form of an ethnographic text. We begin by describing and analysing imperative digital objects, and then zoom out to illuminate digital objects anchored in the broader everyday context.

Imperative digital objects

When participants were questioned about digital technology in their everyday life, a variety of examples came up. These may be categorised into technology that is *spontaneously* used, and technology that it is *imperative* to use. Spontaneous technology includes those things that participants often had in their own homes and used regularly for work and pleasure, such as smartphones, computers and smart televisions. These digital objects were voluntarily introduced into the home or the life of the participant. The participants most often spoke about them as things that made their lives easier. These may be contrasted to digital objects that were not selected by the participants, but are instead part of the digital society. The introduction and use of these objects was more or less an imperative, something that

participants could not choose for themselves, but were forced into if they wanted to use the service provided by digital technology.

It is not directly obvious from the interviews and observations how smart-phones, IoT and AI are changing the everyday lives of study participants. However, this is in line with societal changes in the digital age; digital technology is typically implemented in very ordinary practices and slowly changes the practices that previously existed in everyday life. Sometimes the old practices continue to exist, sometimes not. One example that has already been mentioned is that of mobile ticketing. Tickets may be booked, paid for and received, all using a smartphone; not only is there a transformation of the technology used (the smartphone, in this case), new ways of handling an element of everyday life are generated. At the same time, it remains possible to buy tickets the old way, with coins.

It is in the *agency*, the act of using the hardware, app or both, that disability in relation to the digital object becomes a reality to which an individual must relate. This means that the disability is not a given but is constructed in the relationship between the individual and the digital object (Galis 2011; Näslund and Gardelli 2013). One example of this agency perspective is of an individual with impaired finger mobility. The impairment becomes a disability when, at a busy grocery store, the person reaches the front of a long queue, wishes to enter her bank code to make the payment, and finds that she is unable to use her fingers. In this situation, the relation between the participant and the digital object, as hardware, becomes an obstacle and can create exclusion that may be understood as both technological and social. Thus, understanding digital exclusion not only requires understanding how new disabling barriers emerge in society (Macdonald and Clayton 2013), but also the agency perspective in relation to digital objects (Latour 1991).

'Digital object' refers not only to hardware but also to software: the programmes and apps inside the device. Designs change rapidly and digital objects are therefore somewhat unpredictable when it comes to accessibility and usability. One version or design might be accessible and contribute to social inclusion, while a new version or a software update might exclude and disable an individual user in different everyday settings.

For example, a blind woman interviewed for this study experienced challenges in the transition from a mobile phone with push buttons to a smartphone. The touchscreen of the smartphone made calling, answering, reading and writing texts very hard for her, and the phone became almost unusable. To be able to use the phone she had to install a text-to speech app, but also needed professional guidance and intensive training. Yet, the interviewed woman described the new smartphone as an imperative object: 'We are increasingly tied to the phone' she said, and described how she more-or-less forced herself to learn to use it although it was hard. She added that she

did not care for digital services that are not necessary, since she experienced so many barriers to using them.

Another digital object that she found essential yet challenging to use was her computer. During the interview she gave several examples of how the computer's design and software updates affected her everyday life. Because of a recent software update and a new version of an Internet banking site, she had to seek help from family and friends to read emails and deal with her banking. Due to this she lost some of her independence. As Mairs (2007) states, the accessibility of the Web and telephone technology is crucial for social inclusion. Without help from others, those who cannot use the technology are not only excluded from the digital technology itself, they are also at risk of exclusion from parts of the community and social groupings.

Digital objects in context

Digitalisation is a central part of 24/7 society. Different forms of self-service technologies have contributed to non-stop information, services and consumption. Self-service technologies could be defined as everyday technologies because they are used for everyday practices that need to be done repeatedly. Through the implementation of these digital solutions, the consumer is promised more accessible and easy services. During interviews and go-alongs, participants talked about and demonstrated to us the self-service technologies they used: online shopping and booking services, self-service kiosks, self-scanners and checkouts of various kinds, etc. During the go-alongs we came across self-service technologies that the participants on the other hand either could or even did intend to use. This might be, for instance, at a hamburger restaurant which had a self-service kiosk with a touchscreen display, low-contrast text in small fonts which was unreadable by the visually impaired, and card readers that could not be reached by wheelchair users. Unusable self-service technology of this kind was perceived as annoying or sad, and at times hilarious. But as long as there were other options available (such as a manned cash register at the restaurant), this was not described as an actual obstacle or hindrance to independent living. When participants pointed out inaccessibility and hindrances during interviews or go-alongs, was in situations where the use of self-service technology was the only available option, or when the use of this technology was hindered by obstacles in the physical environment.

To understand how disabling barriers are constructed in everyday situations where the use of self-service technology has become imperative, we present three ethnographic examples. The first illustrates how online shopping may be obstructed when a parcel is delivered to a post office with an inaccessible entrance. The second and third examples illustrate how self-service technologies and a reduction in staff can disable and limit

independence and participation in settings where participants were formerly self-sufficient.

Online shopping is open and available at any time: all sorts of things can be ordered and paid for. One of our participants stated that digitalisation had helped him and many other people with disabilities, but there were still some issues that needed to be dealt with. He felt that online accessibility issues were handled quite quickly and there was ongoing improvement. By contrast, he said, the built environment 'hardly ever changes'. During the go-along he showed us the entrance to his local post office where parcels ordered online were to be picked up. The post office was situated on the first floor of a building without an elevator. To reach the parcel collection counter, one had to climb a steep staircase. While a ramp to push strollers had been installed, it was far too steep for wheelchair users. The participant, who was a wheelchair user, said that inaccessible entrances were no surprise to him: they were more or less part of his everyday life. He could handle this by simply opting out of using inaccessible entrances as long as other, accessible, options were available. But, when it came to collecting his parcel, it was different. He had no choice but to use the post office entrance. Angry and upset that it was inaccessible, he said, 'parcel delivery is a community facility which should be accessible for everyone'. On the wall beside the staircase, not visible from the entrance, was a sign asking: 'Do you need help to get up the stairs?'; followed by a phone number. The participant found this provoking. He refused to ask for help to be pushed up the stairs in his wheelchair. Instead, he called the number (which had been noted for him by an assistant) and then waited in his car for the parcel to be delivered to him by the post office staff. Although the means for online shopping were usable and accessible, the obstacles of the built environment still created barriers and hindrances.

As the two next ethnographic examples will show, obstacles and hindrances are also constructed in everyday situations where the use of self-service technology has become imperative since other options are no longer available.

As several participants pointed out, the self-scanning and self-checkout machines at grocery stores are not always universally designed, which makes grocery shopping hard or even impossible when the manned cash registers are closed. One of the participants recounted an incident that occurred at her local grocery store. The woman used an electric wheelchair scooter. She would put her groceries in the small basket attached to the scooter and take them to the check-out which had a human cashier, where it was easy for her to place the goods on the conveyor belt. She could not use self-checkout as she could not scan the goods and put them in a basket whilst sitting on the scooter. One evening, she said, she went late to the grocery store to buy some fruit and yoghurt for breakfast the next morning.

When she went to the checkout, she discovered that all the manned services were closed, and only self-checkout was open. Instead of managing the process independently like the other customers, the woman would now have to get help from the only staff member monitoring the self-scanners. She felt this was discriminatory, saying: 'I have the same democratic right as everyone else to get to shop all by myself.' She decided to leave the store and the groceries. But even to leave she needed help from the staff to get out, because you had to scan a valid receipt to open the exit gate. She left the store enraged, feeling that she didn't ever want to go back.

New barriers and obstacles can also emerge in life arenas and contexts where self-service technologies are installed to improve availability and usability. Another woman described how the installation of a digitally-operated security revolving door at the gym made it impossible for her to carry on with daily exercise. She visited the local gym regularly since she needed to be physically strong to manage as a wheelchair user. The location of her gym was perfect since it was close to her workplace and she could go there after work. Things changed once the revolving door was installed. Although the opening hours of the gym were extended, she could no longer go after work as the manned reception desk now closed earlier, and the gym could only be entered by scanning a member card at the revolving door. As the participant told us, and then demonstrated during the go-along, that entrance was inaccessible for her. The revolving door in itself would have been manageable, although it was narrow and could only barely fit a wheelchair. What made it impossible for her to enter were the steps leading right up to the revolving door, and also that the entrance from the street was not fitted with an electronic door opener. She found it upsetting that the accessibility that had once existed was now gone. From being a regular at the gym for many years, she now felt excluded and discriminated against. She was considering filing a discrimination complaint, and at the same time she was trying to figure out where and when she could now go for her regular workout.

As illustrated by these three ethnographic examples, emerging disabling barriers cannot be understood or explained solely by the inaccessible design of the self-service technology. Although self-service technology which is not universally designed can become an obstacle in itself, disabling barriers become evident and inevitable when the accessible alternative – a manned entrance or service delivery option – is closed. Then, when the use of self-service technology becomes imperative, its design becomes crucial for participation and independence. But even if the self-service technology were universally designed, it could not compensate for existing obstacles in the physical environment, such as a staircase. Inaccessibility and accessibility are constructed in a specific context and within the interaction of digital and physical objects, built environments, technical aids and people (Hedvall 2009).

As illustrated by the ethnographic examples, either accessibility or inaccessibility can be categorised as digital, physical or social, since the aspects coincide with specific contexts. To understand the disabling barriers of the digital age, therefore, it is imperative to bring together digital technology studies and disability studies.

Conclusion

Society is changing rapidly and technological solutions such as smartphones, IoT and AI are central parts of this change. Self-service kiosks and other self-service technologies, in particular, demand such technologies. This is an example of the widespread diffusion of digital technologies that, according to Schaefer et al. (2018), characterises the digital age. This is an age in which traditional work is increasingly digitalised and customers are expected to fulfil the role of independent service producers. By bringing together growing scholarly interest on how society changes with new digital technologies and research on digital divides and barriers in the everyday lives of disabled people, this article argues that a new perspective is needed to study the digital society.

First, a central perspective from the theoretical study of the digital age is to understand how different technologies converge into/with digital technologies (Jenkins 2004; Olawuyi and Mgbale 2012). Much of the rapid transformation towards the digital age occurs through the digitalisation of ordinary analogue technologies. In this process, new digital objects emerge in various social contexts. From the empirical examples in this article, it becomes clear that changes that appear insignificant at first sight can have a substantial impact on the daily lives of people with disabilities. In this way, it is the *convergence* of technologies that needs to be understood in new ways. Digital objects not only introduce new opportunities in everyday life, they can also bring new losses. Things that an individual could do independently may disappear with the convergence of technologies, rendering the individual less autonomous.

Second, it could be argued that theories about the convergence of technologies are relatively blind to the disability perspective, and there is a need to develop them further. It is within the convergence process itself that new disabling barriers emerge (Mairs 2007; Macdonald and Clayton 2013). The empirical examples in this article suggest that when older technologies are brought together with digitalisation processes, both old and new barriers may arise. Some of these barriers are new – as, for example, the inaccessible design of self-scanning services. Others transfer old barriers to new places – as, for example, in the entrance to the post office from where online shopping must be collected. The theoretical study of the digital age is central to understanding the processes around the digital transformation of society, but these theories need to be reframed in the light of disability theory.

Third, the digital divide helps us to understand the uneven distribution of digital technology in society (van Dijk and Hacker 2003; Warschauer 2003; Watling 2011), but understanding of the digital divide itself must be developed in relation to the new digitalisation processes discussed in this article. It could be argued that it is crucial for digital technology to have inclusive and accessible design (Watling 2011; Macdonald and Clayton 2013). Some of the barriers presented in our observations relate to seemingly minor problems: touchscreen displays, low-contrast text in small fonts, card readers that cannot be reached by a person in a wheelchair. But it is also clear that some barriers emerge from other contexts, such as the entrance to the post office at the top of a staircase, or the absence of direct service staff. Such barriers have only indirect connections to digital technology, but become important in the digital society. If the digital divide is to be understood in the digital age, it needs to be broadened and to make use of theories in the field of the digital age.

By bringing these theoretical fields together and developing them in relation to empirical data, it is possible to develop a new understanding of how the heterogeneous group of disabled people, with large individual differences, tackle digital technologies (cf. Johansson 2019). This new knowledge is useful when designing and implementing digital objects in a specific context. Instead of going into the digital age with a widening digital divide, it becomes possible to examine how digital technology can contribute to participation and social inclusion, and to make new lifestyles accessible for a larger part of the population.

Acknowledgements

We are very grateful for the helpful comments that we have got from project team member David Wästerfors and two anonymous reviewers for helpful comments on earlier drafts of the manuscript.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by FORTE, the Swedish Research Council of Health, Working Life and Welfare.

ORCID

Kristofer Hansson  <http://orcid.org/0000-0001-9039-2201>

Hanna Egard  <http://orcid.org/0000-0002-6532-5549>

References

- Brundell, S. 2011. *Dator och internet i hemmet hos personer med funktionsnedsättning – en jämförelse över åren 2006/07 och 2008/09* [Computer and Internet in the Home of People with Disabilities – A Comparison over the Years 2006/07 and 2008/09]. Stockholm: Hjälpmedelsinstitutet.
- Brynjolfsson, E., and A. McAfee. 2014. *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York: W. W. Norton & Company.
- Carpiano, R. 2009. "Come Take a Walk with Me: The "Go-Along" Interview as a Novel Method for Studying the Implications of Place for Health and Well-Being." *Health & Place* 15: 263–272.
- Crary, J. 2013. *24/7: Late Capitalism and the End of Sleep*. London: Verso.
- Dobransky, Kerry, and Eszter Hargittai. 2016. "Unrealized Potential: Exploring the Digital Disability Divide." *Poetics* 58: 18–28. doi:10.1016/j.poetic.2016.08.003.
- Ehn, B., and O. Löfgren. 2010. *The Secret World of Doing Nothing*. Berkeley: University of California Press.
- Galis, V. 2011. "Enacting Disability: How Can Science and Technology Studies Inform Disability Studies?" *Disability & Society* 26 (7): 825–838. doi:10.1080/09687599.2011.618737.
- Gordon, R. 2012. *Is US Economic Growth Over? Faltering Innovation Confronts the Six Headwinds*. No. w18315, Cambridge: National Bureau of Economic Research.
- Griffin, Krista M., Maria K. E. Lahman, and Michael F. Opitz. 2016. "Shoulder-to-Shoulder Research with Children." *Journal of Early Childhood Research* 14 (1): 18–27. doi:10.1177/1476718X14523747.
- Hansson, K. 2015. "Digital delaktighet utifrån ett funktionshinderperspektiv [Digital Participation from a Disability Perspective]." In *Att arbeta med delaktighet inom habilitering* [To Work with Participation in Habilitation], edited by K. Hansson and E. Nordmark, 169–183. Lund: Studentlitteratur.
- Harris, J. 2010. "The Use, Role and Application of Advanced Technology in the Lives of Disabled People in the UK." *Disability & Society* 25 (4): 427–439. doi:10.1080/09687591003755815.
- Harvey, D. 1990. *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change*. Cambridge, MA: Blackwell.
- Hedvall, P.-O. 2009. *Aktivitetdiamanten* [Activity Diamond]. Lund: Certec.
- Jenkins, H. 2004. "The Cultural Logic of Media Convergence." *International Journal of Cultural Studies* 7 (1): 33–43. doi:10.1177/1367877904040603.
- Johansson, S. 2019. *Design for Participation and Inclusion Will Follow. Disabled People and the Digital Society*. Stockholm: KTH Royal Institute of Technology.
- Jokisuu, E., M. McKenna, A. Smith, and P. Day. 2015. "Improving Touchscreen Accessibility in Self Service Technology." In *Universal Access in Human Computer Interaction. 9th International Conference. Part II, LNCS 9176*, edited by M. Antona and C. Stephanidis, 103–113. Swizerland: Springer International Publishing.
- Kvale, Steinar. 1996. *Interviews: An Introduction to Qualitative Research Interviewing*. Thousand Oaks, CA: SAGE.
- Länsstyrelsen. 2019. *Bevakning av grundläggande betaltjänster 2019*. Rapport 2019:10. Falun: Länsstyrelsen i Dalarnas län.
- Latour, B. 1991. "Technology is Society Made Durable." In *A Sociology of Monsters Essays on Power, Technology and Domination, Sociological Review Monograph*, edited by J. Law, 103–132. London: Routledge.

- Macdonald, S. J., and J. Clayton. 2013. "Back to the Future, Disability and the Digital Divide." *Disability & Society* 28 (5): 702–718. doi:10.1080/09687599.2012.732538.
- Mairs, C. 2007. "Inclusion and Exclusion in the Digital World: Turing Lecture 2006." *The Computer Journal* 50 (3): 274–280. doi:10.1093/comjnl/bxm001.
- Meuter, M., A. Ostrom, R. Roundtree, and M.-J. Bitner. 2000. "Self-Service Technologies: Understanding Customer Satisfaction With Technology-Based Service Encounters." *Journal of Marketing* 64 (3): 50–64. doi:10.1509/jmkg.64.3.50.18024.
- Miller, D. 2010. *Stuff*. Cambridge: Polity Press.
- Näslund, R., and Å. Gardelli. 2013. "I Know, I Can, I Will Try': Youths and Adults with Intellectual Disabilities in Sweden Using Information and Communication Technology in Their Everyday Life." *Disability & Society* 28 (1): 28–40. doi:10.1080/09687599.2012.695528.
- Olawuyi, J., and F. Mgbole. 2012. "Technological Convergence." *Science Journal of Physics* 2012. (sjp-221), 5 pp. doi:10.7237/sjp/221
- Putnam, C., M. J. Wozniak, J. Zafeldt, J. Cheng, M. Caputo, and C. Duffield. 2012. "How Do Professionals Who Create Computing Technologies Consider Accessibility?" In *Proceedings of the 14th international ACM SIGACCESS conference on Computers and accessibility*, October 22–24, 87–94.
- Riessman, Catherine Kohler. 2008. *Narrative Methods for the Human Sciences*. London: Sage Publications.
- Schaefer, S., M. Andersson, E. Bjarnason, and K. Hansson, 2018. "Introduction." In *Working and Organizing in the Digital Age*, edited by S. Schaefer, M. Andersson, E. Bjarnason, and K. Hansson, 9–18. Lund: The Pufendorf Institute for Advanced Studies, Lund University. <https://portal.research.lu.se/portal/files/57371038/workingandorganizinginthedigitalage.pdf>.
- Scholz, F., B. Yalcin, and M. Priestley. 2017. "Internet Access for Disabled People: Understanding Socio-Relational Factors in Europe." *Cyberpsychology: Journal of Psychosocial Research on Cyberspace* 11 (1): 4. doi:10.5817/CP2017-1-4.
- Vakulenko, Y., P. Oghazi, and D. Hellström. 2019. "Innovative Framework for Self-Service Kiosks: Integrating Customer Value Knowledge." *Journal of Innovation & Knowledge* 4 (4): 262–268. doi:10.1016/j.jik.2019.06.001.
- van Dijk, J. A. G. M., and K. Hacker. 2003. "The Digital Divide as a Complex and Dynamic Phenomenon." *The Information Society* 19 (4): 315–326. doi:10.1080/01972240309487.
- Wajcman, J. 2015. *Pressed for Time: The Acceleration of Life in Digital Capitalism*. Chicago, IL: The University of Chicago Press.
- Warschauer, M. 2003. *Technology and Social Inclusion: Rethinking the Digital Divide*. Cambridge, MA: MIT.
- Wästerfors, D. 2011. "Stretching Capabilities: Children with Disabilities Playing TV and Computer Games." *Disability & Society* 26 (3): 337–349. doi:10.1080/09687599.2011.560417.
- Wästerfors, D., and K. Hansson. 2017. "Taking Ownership of Gaming and Disability." *Journal of Youth Studies* 20 (9): 1143–1160. doi:10.1080/13676261.2017.1313969.
- Watling, S. 2011. "Digital Exclusion: Coming Out from behind Closed Doors." *Disability & Society* 26 (4): 491–495. doi:10.1080/09687599.2011.567802.
- Wilkie, R. 2011. *The Digital Condition: Class and Culture in the Information Network*. New York: Fordham University Press.

