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Sociologisk Forskning

Sociologisk Forskning har givits ut sedan 1964 och är en facktidskrift som publicerar vetenskapliga arbeten inom sociologins fält. Tidskriften riktar sig mot sociologer och andra grupper inom och utom akademin som intresserar sig för den empiriska, teoretiska och metodologiska utvecklingen inom sociologin och samhällsvetenskaperna. Tidskriften har ett särskilt fokus på svenska och nordiska samhällsförhållanden. I Sociologisk Forskning presenteras kontinuerligt resultat från pågående forskningsprojekt, recensioner av svensk och internationell sociologisk och samhällsvetenskaplig litteratur, debattinlägg samt andra bidrag av relevans för svensk sociologisk forskning. Tidskriften ges ut av Sveriges Sociologförbund med stöd av Vetenskapsrådet och kommer ut med 4 nummer om året.

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Redaktörer & ansvarig utgivare
Redaktörer: Marcus Persson och Christian Ståhl
Ansvarig utgivare: Åsa Wettergren
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Adress
Sociologisk Forskning, Christian Ståhl
Linköpings universitet
Institutionen för beteendevetenskap och lärande
Avdelningen för pedagogik och sociologi
581 83 Linköping
sociologiskforskning@sverigessociologforbund.se

Webbadresser
Tidskriftens hemsida: www.sociologiskforskning.se
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Innehåll

Om digital sociologi och datafierad livsföring

VARFÖR ETT SPECIALNUMMER om sociologins möte med kritisk datavetenskap? Vi sociologer har ju länge talat om det digitala samhället. Bourdieu (1998) studerade förhållandet mellan massmedier och kulturell produktion; Latour (1996) och Woolgar (1996) har lagt grunden för nya sätt att tänka kring sociotekniska relationer; Livingstone (1998) har påverkat synen på ungas digitala uppväxt; och Castells (1999) böcker om nätverkssamhället har haft inflytande på sociologers sätt att studera digitala infrastrukturer. I början av 2000-talets växte dessutom ”digital sociologi” fram – ett forskningsområde som intresserar sig för hur socialt beteende kommer till uttryck i digitala forum, såsom sociala medier och communities, och vad den digitala tekniken betyder i individers vardags- och arbetsliv (Lupton 2015).

Frågorna som den digitala sociologin tar sig an blir fler och fler, och gränsdragningen gentemot andra forskningsområden tycks bli allt svårare att göra i takt med att digitala aspekter genomsyrar fler delar av våra liv. Det digitala samhället inte längre är något som vi väljer eller väljer bort. Oavsett yrke krävs det att vi använder digital teknik i någon form. Även på fritiden blir den digitala tekniken en del av hur vi agerar. Möjligen tänker någon att i svampskogen eller på fotbollsplanen är jag odigital. Men det gäller enbart handlingar som utförs under en begränsad tidsrymd, när jag är på spelplanen eller kliver över en bäck i skogen. På väg till svampstället eller fotbollsplanen använder jag kanske Google Maps för att hitta rätt, och väl där kan jag behöva en svamp-app för att identifiera ätliga sorter. Kanske har jag också en smart klocka som räknar hur många steg jag tagit och mäter min puls. Och när jag kommer hem så vill jag skryta över den fulla svampkorgen genom en bild på sociala medier eller ta del av publikens bilder från fotbollsmatchen som någon lagt upp.

”I takt med samhällets digitalisering, och AI:s utveckling, blir denna teknik alltmer sammanflätad med samhället”, skriver Rolf Lidskog (2020:115f) och fortsätter: ”AI:s utveckling och aktörers förväntningar knutna till denna utveckling förändrar inte bara samhällets utformning och våra sociala praktiker och normer utan även vår förståelse av människa och samhälle.” Ett sätt att begreppsliggöra den nya förståelse som Lidskog nämner är att tala om *datafiering*. Detta innebär att mänskliga handlingar konverteras och definieras som data eller digital information. Det rör sig inte bara om en förändrad förståelse och värdering av mänskliga handlingar som data, utan även om en *normalisering* av denna omvandling.

Betänk till exempel datafieringen i den automatiserade handläggningen av en ansökan om sjukpenning till Försäkringskassan. Medborgaren fyller i ansökan genom att

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ange den information – de data – som myndigheten behöver för sin bedömning. Dessa data ligger inte bara till grund för beslut, utan begränsar även handläggares och medborgares möjliga handlingsutrymme. Sådana mänskliga behov och ömmande skäl som inte kan omsättas i mätbara data kan nämligen inte beaktas av handläggaren. Samma logik gäller inom vård- och omsorgsverksamhet, där digitala system genererar data som därefter blir styrande för såväl personalens arbetssätt som patienternas möjligheter att söka vård (Falk 2023). Konsekvenserna av att införa dåligt utformade digitala journalsystem har också visat sig kunna bli relativt omfattande problem med att bedriva en fungerande verksamhet. Inom utbildningssektorn (Jarke & Breiter 2019) sker på alla nivåer – bland individer (lärare och elever) och inom organisationen (huvudman och skolledning) – insamling av data som ska möjliggöra internationella jämförelser. Spridning av dessa data ligger till grund för beslutsfattande och opinionsbildande processer och påverkar innehållet i utbildningspolitik och skolmyndigheters uppdrag, genomförandet av skoltillsyn samt förväntningar på lärares sätt att undervisa och elevers sätt att lära. Således formas och begränsas individens handlingsutrymme av de data som samlas in om vederbörande.

För att förstå vilket handlingsutrymme individen har i denna normaliseringsprocess skulle man kunna återvända till Webers klassiska begrepp *Lebensführung*, som Carl-Göran Heidegren (2004: 55) förklarar på följande vis:

”Människor *väljer* under omständigheter i en emfatisk betydelse att gestalta sina liv på ett bestämt sätt. De gör det i ljuset av *starka värderingar* som de omhuldar och uppfattar som rättesnören i livet, och med vars hjälp de bedömer sina egna önskningar och handlingsmaximer. […] En livsföring i denna bemärkelse inbegriper en rationalisering av livet och ett handlande väglett av övergripande (”högsta”) värden.”

Översatt till resonemanget om datafiering skulle vi kunna säga att individen väljer att leva sitt liv på ett sätt som uppfattas som rätt och riktigt. Det rätta livet ska i sammanhanget förstås som det datafierade livet, där individen väljer att generera nya data för att hon bedömer det som något värdefullt och eftersträvansvärt. För individen blir mätbara data det verktyg genom vilket hon bedömer sina egna och andras handlingar. Analoga handlingar som inte genererar data ter sig värdelösa, eller åtminstone som mindre betydelsefulla. Kanske kan vi benämna detta sätt att leva ”datafierad livsföring”.

Individen kan bjuda motstånd mot den datafierade livsföringen på samma sätt som Webers puritaner valde att bryta med den tidens traditionella livsföring. Härvidlag finns en spänning mellan individens handlingsfrihet och det datafierade samhällets maxim, som till exempel uttrycks genom digitala förväntningar från skolor, företag, myndigheter, medier, och ideella organisationer. Om individen väljer att inte använda digitala verktyg och därmed generera nya data riskerar hon att uppfattas som suspekt eller inkompetent. Konsekvenserna för individen blir sannolikt negativa, till exempel i form av sämre skolbetyg eller avslag på sjukpenningsansökan. Bättre då att välja att leva sitt liv efter det rätta sättet. Datadrivna former för socialt liv och sociala interaktioner blir på detta vis vägledande på samma vis som andra normer som individen förhåller sig till. I mellanmänsklig interaktion används data som resurser för kommunikation

och fungerar därmed som verktyg för skapande av gemensam mening. I förlängningen blir datafieringen vägledande för individens strävan att fatta rätt beslut för att kunna uppfylla det moderna idealet om självförverkligande.

Att kombinera det moderna begreppet ”datafiering” med det klassiska begreppet ”livsföring” skapar inte bara en analytisk möjlighet, utan ska ses som svar på den inledande frågan om varför vi här initierar ett möte mellan sociologi och kritisk datavetenskap. Vi vill i detta nummer ta hjälp av den kritiska datavetenskapen i ett försök att skaka om det sociologiska sättet att tänka kring det sociala livet i den datadrivna samtiden.

Vi vill rikta ett stort tack till gästredaktörerna professor Ericka Johnsson och docent Julia Velkova för gott samarbete! Med imponerande förmåga att attrahera spännande forskare har de skapat ett nummer med bidrag som vi hoppas och tror kan stimulera det sociologiska tänkandet.

Vi önskar inspirerande läsning!

Marcus Persson och Christian Ståhl
Redaktörer för Sociologisk Forskning

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JULIA VELKOVA & ERICKA JOHNSON

Critical Data Studies Meet Sociology

LIFE TODAY IS data driven – and the basis of data collection. Industries and institutions gather more digital data for their potential to generate value and action than ever before. These range from health data (Stevens *et al*. 2018; Vezuridis & Timmons 2021) to environmental data (Deitz 2023; Vardy 2020) to "alternative" data which are cleaned, repackaged and sold for use by industries in need of predictive models, like finance (Hansen & Borch 2022; see also Plantin 2019).

This special issue provides a window onto the meeting of critical data studies and sociology in Scandinavia to explore the situated, localised modes of "being and becoming" with data (Lupton 2018:9) in a particular moment in time, a time when in the Northern European context, public administrators, institutions, software developers and scientists are busy imagining and trialling arrays of data-driven solutions to automate public services, intellectual work and infrastructure operations. Data, in these contexts, often figure as an element of already ongoing, much older practices of classifying, categorising, quantifying and producing actionability on the social. However, data bring to these the novel element of the imagined possibility for feeding these practices into machine learning, automation algorithms and computational models to fulfil ideas of efficiency, increased productivity or predictive potentials. Data become, in this context, part of a landscape of instrumenting actions and socio-technical structures that order social life at a distance and according to formal rules (Savolainen & Ruckenstein 2024).

This is not unique in the Nordic context, but there is a particular "early adopter" spirit here that drives development in the welfare state and other state/private entanglements. Likewise, there are significant funds being allocated to this development from public and private actors. Therefore, it is interesting to see how this impetus to adopt and adapt data-driven technological solutions is playing out in our area. And while not every article in this double issue is specifically focused on Nordic cases, many of them are, and engage a sensitivity for the situated structural entanglements of data, here.

One particular concern shared by many of the pieces in this special issue is care for the tensions that emerge as different actors try to locate themselves as users and developers in relation to these technologies and the values of efficiency they promise (Zakharova *et al*. 2024). The technologies are, unsurprisingly, employed with different means and ends in contexts as diverse as public schools, streets and scientific labs. Situated empirical analyses allow one to raise important questions: What does it mean when authorities use experimental, non-scientific methods to detect the age

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of unaccompanied minors who have arrived as refugees to Sweden, and render them into datasets of biometric data that inform institutional decisions on citizenship and migration? And how does this interact with changing refugee policies? What does it mean when software developers gain the authority to shape the truthfulness of datasets that inform medical professionals' decisions on whether someone has cancer? And what does that do in a context of state-funded healthcare for all? How do intersectional and geographic differences matter in the context of making education and security in Sweden data and algorithmically driven? And what role does the particular ways our cities have become segregated in Sweden play in this development? We see the granularity of the studies in this special issue as valuable in analysing these questions and using them to foreground the ongoing negotiations and transformations of agencies and power, knowledge and public values with data-driven technologies.

Context is important for each of these studies, yet we also think the observations made about the social-data-political entanglements can trigger research in other cultural contexts, too. For example, when Baki Cakici and Alena Thiel explore what it means to become an identifier – a number – useful for data collection and addressability, they are exploring the relationship to Nordic personal numbers that appears at the moment of assignment, at birth. But their conceptual nuance of addressability and communicative positions allows an affective analysis of this reductive practice that is also useful for surveillance literature at large. Amanda Lagerkvist, Jenny Eriksson-Lundström and Maria Rogg's use of crip theory to discuss biometric indexing at the nexus of commercial use of the hand palm will be relevant in many different contexts engaging biometrics, commercial or otherwise. And Francis Lee's discussion of agencing as a verb will, we are sure, prove useful for analysis of datafied scientific practice in many domains. We posit that these papers may act as a foil to observations in contexts dominated by different infrastructures and systems, and by different imaginaries. It is our hope that this special issue will serve up some inspirational tools and terms for many colleagues engaging data as an object of study.

Meets …

The articles presented here speak to the broader domain of scholarly work loosely labelled as "critical data studies", a relatively young, multidisciplinary field concerned with the inquiry into the politics of producing, organising, moving and materialising data in the world (Dalton *et al*. 2016). In a recent book, Rob Kitchin defines critical data studies as revolving around questions about "data forms, processes, and purposes, and consider what is at stake when data are produced and deployed to create knowledge, manage society, derive business value, and perform numerous other tasks" (Kitchin 2024:2). Much of the work in the field has discussed "data" and its corollary, "datafication" in the domains of economy, mythology and power that enforces a universalising epistemology which amplifies social discrimination, inequalities and toxicities (e.g. Benjamin 2019; D'Ignazio & Klein 2020; Douglas-Jones *et al*. 2021; Elish & boyd 2018; Milan and Treré 2019; Thylstrup 2019). Moreover, as data-driven solutions

and tech companies expand into different professional spheres, scholars explore the pressures that these practices put on welfare state values and on expertise for instance in domains such as public administration and healthcare (Dencik & Kaun 2020; Stevens et al. 2024).

These questions are, of course, also central to sociology and its diverse strands, flavours and modulations, perhaps especially science & technology studies (STS). Here one finds early insights into how scientific knowledge was produced as objective (Fleck 1929 [1986]) and mobilised (c.f. Latour & Woolgar 1979; Latour 1987; Law & Hassard 1999) and how categorisation practices (Bowker & Star 1999) and ways of knowing (Barad 2007) create and form the basis of "science", even when it is anything but objective (Shapin 2010). Sociology and critical data studies share many tools, concerns and insights.

For us, it also seemed natural to put together a special issue with critical data studies and sociology, because of the way that critical data studies have, from the very start, been sensitive to space and context (Dalton *et al*. 2016). That sensitivity is also found in sociology and neighbouring fields, where the research toolbox is filled with methods and theories to address it. We feel there is a productive synergy that arises in these disciplinary overlaps, one which allows us to engage nuanced and situated approaches to making structural power dynamics visible, and conduct work that is engaged with partial perspectives and the processes of othering that data involve.

The notion of human-data assemblages is another shared theoretical concept that feeds into this special issue. It directs attention to processes of transformation of social relations, the material contexts that produce them, and how data is not a "thing" but "a mode of being and becoming" (Lupton 2018:9). This analytical stance, which often analyses data and humans as entangled relations rather than ontologically discrete objects, is common in the borderlands between STS, critical data studies and sociology (c.f. Armstrong 2019; Kim *et al*. 2024; Leonelli *et al*. 2017; Ribes 2019; Stevens *et al*. 2018; Thompson 2020; Vardy 2020). It helps us see how the value of data emerges from the intra-action between matters and materials, discourses and knowledge, human and more-than human bodies and agencies. These, too, are contingent and situated, to borrow a word common in feminist technoscience (c.f. Suchman 2023). Studying them means paying attention to the details of how they are situated, with what implications and for whom. This care for context and contingencies is what can make a special issue in a regionally obscure and geographically peripheral journal interesting.

Actually, at this point in writing the Introduction, we sighed and wanted to stop going on about disciplines and borders. We, the guest editors, are both located in an interdisciplinary department (Department of Thematic Studies (TEMA), at Linköping University) and work in very undisciplined environments. For us, the whole mess of border-crossing, non-disciplined work we see daily, and also highlight in this special issue, provides us with really interesting analytical terms, tools and methods to try to make sense of data and what it is doing. As Metcalf notes, critical data studies "foregrounds questions about how data are produced, how they are maintained and mobilized over time, and in what ways they are interpreted. In doing so, it illuminates

how data themselves—rather than just the actors who rely on them—can drive shifts in larger social formations" (Metcalf 2024:3). Such a stance is almost more methodological than disciplinary. It is a stance that runs through many of the works we find inspiring and many of the studies this special issue gives a forum to – but these are studies which call many different types of departments home. We are grateful that *Sociologisk Forskning* makes space for this undisciplined stance at their hearth.

Making society legible to machines

During a recent seminar, a colleague of ours with a background in computer science exclaimed: "Data is not data until it is made machine-processable." Their statement highlights the crucial, if self-evident fact, that machines require formatted and ordered data. Put simply, messy social realities and processes have to be made legible to algorithms. Legibility demands reductions and cuts, formatting or excluding those facets of the social that do not fit data-processing logics (c.f. Plantin 2019; Nafus 2024). Several contributors in this special issue explore the forms that reduction can take and their implications.

Katarina Winter and Klara Hermansson discuss the reduction of the much broader issue of security and vulnerability produced via a child-tracking app that works in more resource-rich geographical areas of Stockholm but not in other areas. Their analysis helps us see how apps operate as agents in structuring the 'individualization and privatization' of responsibility for crime preventions (p. 61), while also normalising and enforcing insecurity and risk. Winter and Hermansson's example shows how data-driven apps are redefining the very meaning of security and safety, changing it "from a matter of passive vulnerability to one of active engagement aided by tracking children's location data". (p. 67).

Amanda Lagerkvist, Jenny Eriksson-Lundström and Maria Rogg explore another facet of reduction and legibility by following the implications of a palm-reading device developed and sold by Amazon. They discuss how the device requires making the human palm machine readable through biometric data, an act that discards the experiential, affective dimensions of being a body in the world through hand-touch while "indexing and fixing the self as a purchasing being" (p. 26). In this case, reduction favours values of "convenience" and ability, a generative act that produces new subjects in the commercial world of data while it simultaneously disavows being a "human in diversity and disability" (p. 19).

These examples expose the extent to which making bodies, lives and societal problems legible to algorithms demands reductive adjustments between algorithms and humans. Large societal issues are reduced to what algorithms can cope with or what their developers ask for (e.g. a paying subject). Crucially, the methods through which these reductions collapse and register messy social realities create the very realities that they try to capture (c.f. Bowker & Star 1999; Law 2004).

Why is this important? A lot of the critical work coming out of the Anglo-Saxon context shows that a machine-readable society enhances those qualities and procedures

that are easier to fit into machine logics, while simultaneously evacuating and discarding those that simply do not fit machine learning models and algorithmic logics (c.f. Benjamin 2019; Amaro 2023). Lagerkvist, Eriksson-Lundström and Rogg (this issue) posit that this leads to a crip society, with core qualities and values like care, humanness and shared responsibility removed from our understanding of the social, and replaced by convenience and trackability. To be sure, these are not deterministic or irreversible processes. We know that people are not passive protagonists, but regularly redefine and even abandon technologies that fail to speak to their concerns, as Winter & Hermansson show, too, in this issue. Examples from our Northern European context are a helpful reminder that data-driven futures are mouldable and open-ended, falling apart and re-emerging, by and with *us*. They remind us that while discursively these futures and the sociotechnical relations that produce them might seem durable, even inevitable, they are always already partially breaking down, abandoned and discarded (Velkova & Plantin 2023). And yet, what contributors show is also how what sticks in the friction between emergence and falling apartness, to paraphrase Anna Tsing (2005), is a society reduced to its machine-readable qualities.

Reordering machine-human agencies through data work

This brings us to the issue of shifting human-machine agencies. Much of the ongoing enthusiasm and capital vested in data-driven technologies stems from the belief that these can perform better than human insight. This belief in technologies' abilities is often coupled with an imaginary of obedient assistants and servants who do all that undesirable, undignifying or difficult work that (some often very privileged) people do not want to do (see Suchman 2007). These promises are not new (Armstrong 2019; Kaijser *et al*. 2024). But today, machine learning and "artificial intelligence" are the technologies that people in positions of power task with expectations to fulfil these promises. Of course, artificial intelligence is neither artificial nor intelligent (Crawford 2021). At best, the term is an empty signifier which diverts attention from the power relations and ordering logics through which it is produced (Suchman 2023). Machine learning algorithms gain their power as humans grant or revoke their agency.

Our view on agency has its base in feminist technoscience and the sociology of science and technology, which often approaches agency as a result of relations made between humans and nonhumans, while also acknowledging that there always exist power differentials between them (c.f. Barad 2007; Suchman 2007). Lee (this issue) proposes calling the process of authorising data-driven technologies to have agency in professional settings *agencing*, and reminds us that technologies do not land, fully formed and unchanging, into society but are actively socialised, negotiated and eventually discarded in already existing practices. Drawing on examples of data work from the biosciences, he shows how agencing can deny machines agency in certain contexts that are important for scientists, and enrol them in others as assistants or as co-explorers of knowledge, in the hope that they could deliver greater insight. Lee's example shows how these changes are not in human or machine "intelligence" as such, but in the

material and epistemic cultures of scientific work. Specimens get replaced with their computational representations and scientific work shifts towards machine-generated predictions based on such representations.

These shifts are tightly connected to data work. Data work can take many forms but generally refers to work that is crucial for maintaining, producing or simply demonstrating the value of data-driven technologies. This value is relational and context specific. In online environments, data work is gendered, racialised, and categorised in highly political ways, often by gig or temporary workers, including prisoners and refugees (D'Ignazio & Klein 2020; Kaun et al. 2023; Lehtiniemi and Ruckenstein 2022). This kind of work includes tasks like word annotation of images for machine learning algorithms, cleaning errors from scanning and digitising documents, or differentiating displayable from non-displayable content to different publics online. Data work of this type contributes to the public legitimacy of algorithmic systems and to the myth of human-free machinic capabilities. In the scientific laboratory, data work might be gendered and low-status, too, but it also has to be "truthful" and trustworthy, in order to be credible. The cultural practice of crafting and negotiating the "pristineness" or "rawness" of datasets becomes an art and a virtue of data work in the sciences (Harrison 2024; Plantin 2019).

The contexts and power dynamics surrounding data work matter for understanding how human-machine relations and agencies shift with data-driven technologies. In online platforms, powerful companies are in the position of agencing algorithms and redistributing agencies by positioning human workers in the role to behave like machines … and machines in a position to behave like humans, deprecating positive human abilities such as empathy and emotion (Ruckenstein and Turunen 2019).

Scientific practices engage different values and professional cultures, where human-machine agencies emerge from data work that might boil down to the search for credible data referents for scientific "truths" and the negotiation of knowledge between computer scientists and domain experts. Trials of machine-learning or automated decision-making algorithms draw data scientists and computer engineers out of their spheres of competence, granting them the position of experts in an expanding array of domains that they might know little about, as when computer engineers find themselves in a position to judge cancer through a range of pixel values on a digitised image, as Charlotte Högberg writes in this issue. She shows how health experts make medical problems doable for computer scientists, who in turn are expected to perform as health experts. Are health experts then in turn forced to become a kind of maintenance workers for computer engineers?[1] The articles in this issue suggest it may be time to pause and ask how shifting expertise and machine-human agencies impact professional domains.

1 The question draws on M. Ruckenstein (2024). Why Focus on Repair? Presented at Swedish STS Days 2024 3-4 October, Norrköping, Sweden.

Making subjects/subjectivities

Outside scientific laboratories and computer engineering offices, data work can also enact ordinary people as governable subjects. This, too, is nothing new (Armstrong 2019), but highly relevant today. Data work is an indelible part of statecraft and biopolitical governance, and of categorising people, for instance as "Europeans" (M'Charek *et al.* 2014). Statisticians and census workers, Ruppert & Scheel (2021) show, make people through "inscription devices and practices" (c.f Law 2004) such as procedures, registers, categories, standards, materials, infrastructures and more recently, big data and algorithmic technologies to sort people into categories and eventually make them into subjects and members of a "people", or deny them this status. Always political, this kind of work means that inclusions and exclusions have profound repercussions for people (Bowker & Star 1999; D'Ignazio & Klein 2020). Excluded subjects, for instance, have to negotiate with machine and human gateways to secure a place in core data categories in order to be recognised as addressable subjects with rights to the most mundane state services, such as a marriage certificate, as recent studies of large-scale roll-outs of biometric identification systems in India show (Singh 2023). In this special issue, Baki Cakici and Alena Tiel theorise further the notion of "addressability" for unpacking the communicative dimension of the work of subject construction and identification through data. Rather than issues of address and entitlement, they discuss addressability as "a reductive transformation that breaks chains of meaning, and … constructs the communicative position" (Cakici and Tiel, this issue: p. 116).

The work of making subjects addressable to statecraft through communication involves many actors. An obvious but often neglected example is media. Media co-produce addressability and have the power to legitimise for the public the state abuse of vulnerable people, as Matilda Tudor shows in this issue. She analyses media discourse on the ethically controversial medical age assessments that were conducted on unaccompanied minors who sought asylum in Sweden after the 2015 migration "crisis". Medical age assessments were used as a test of whether migrants had the right to protection by the state. Tudor notes the powerful truth-making effect that turning a body into data has, and how this process was used by the media to reframe the discourse on migration in Sweden, essentially weaponising and othering child refugees, denying them the right of protection by claiming they were adults. Her argument is a context sensitive example that shows how datafied bodies become objectified, racialised and othered, made into technical units and denied existence even *before* they become recognised as subjects by statecraft. Thinking with Ramon Amaro (2023:13–14) we see Tudor's work as an example of how data-driven decision-making systems operate as technologies of objectivity but are already produced through social relations that condition and racialise people, negating their value.

In another close study of how technology, the state, commercial actors and values are entangled in the process of making (future) citizens, Ingrid Forsler's nuanced research on Estonian and Swedish school policies for digital tools, in this issue, shows how

different collective imaginaries about the role of tech in a nation-state's future and the role of schools in social policy impact approaches to education. Through a series of "future workshops" which engaged actors from these different domains in Estonia and Sweden, distinct differences emerged in how technology was imagined to be useful in a school setting between the two countries, differences which also reflected how young students were imagined and addressed as future adult citizens. But Forsler's work demonstrates that using tech and data to address future citizens or today's students also means making them understandable to machines, returning our conversation to legibility and reductionism. These demands can impact how and where the classroom and learning is imagined.

What to do with all of this? With entanglements around data that engage state actors, laws & policies, commercial interests, scientific practices, our bodies, our lived experiences of the world, norms & values, ground truths and representations … an interdisciplinary approach does seem near to hand. We decided to close the special issue with Magdalena Kania-Lundholm's piece, which calls for sociological analyses of the systematic glitchiness of data-driven systems. Glitches, she writes, thinking of work on maintenance, repair and feminist data studies, are mirrors of systemic exclusion and discrimination that provide windows for intervention. Following the glitch is, then, a methodology for analysing transforming structures, agencies and power relations with data-driven technologies, and for "reimagining technologies with and for people" (Kania-Lundholm, this issue, p. 182). Her work intentionally bridges sociology and critical data studies, showing the essential political saliency of engaging data as an object of critical study, as the other theoretical approaches that comprise this special issue also do.

What's next?

We see potential for new lines of inquiry that emerge from the work presented in this special issue. One topic on the horizon is the relationship between ground truths and the generated (synthetic) data used by many AI systems. In this issue, Högberg starts to examine this with her work on medical AI and we think this exploration is only the beginning of a new line of discussion. Synthetic data produced by generative AI are intentionally different from original data. They are produced to assure privacy, create portable data, avoid regulations and – most interestingly – contribute new and additional "information" for machine learning algorithms training on the data. But the intersectional hallucinations (Johnson & Hajisharif 2024) these ontological differences inevitably introduce also trigger interesting questions about representation and reference, as well as silences on context, production and maintenance. Critical data studies, sociology and STS have many well-sharpened tools for discussing these and we look forward to future work that probes the contexts and contingencies of real and synthetic data, and hybrid versions of both. We suspect critical studies coming from all these areas (and the areas between, where most of us in this special issue are working) will have valuable tools for probing the "new" relationship to ground the truth and

representation it may trigger in some fields, the way boundaries are drawn around and between real and synthetic, for examining how the politics of categorisation are even more strongly obscured by the shimmer (and tarnish) of synthetic data and AI knowledge, and on the emerging practices that claim to assure provenance and pedigree.

These future analyses could also engage the constituent materialities and transforming computation and communication infrastructures of (synthetic) data, asking how they sustain, reinforce or transform inequalities and power structures in society. After all, synthetic data, and any digital data processing depends on minerals and metals, water, land, energy and human care. These have to be assembled in computers and communication systems, stacked in data centres, connected to fibre optic cables and power grids, financed, and maintained to materialise the digital computing infrastructure that makes digital data practices possible. A domain of fervent speculation and sociomaterial transformation, decisions about these matters result in environmental and energy "crises", as they, too, generate new regimes of worth and inequalities through imaginative relations with uncanny elements, such as the heat generated from data processing that today warms many Nordic citizens (Velkova 2016). We therefore believe that (new) materialist sensitivities could fruitfully complement sociological analyses in tracking the different decisions, imaginings and (de-)materialisations of computing infrastructure for data in places, contexts and over time. These analyses could unearth how new elements, such as atoms and gases, wind and the sun are reimagined to sustain computing infrastructure, how they become invisibilised in everyday data-processing contexts, and how these relations co-produce and normalise societal inequalities. Such analyses, we suspect, might push scholars to craft new conceptual tools and intellectual pathlines that explore how the promise of making every issue in the world computable by machines remakes differently and differentially the very categories, economies and infrastructures on which society stands.

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Author presentations

Ericka Johnson is a professor in Gender & Society at the Department of Thematic Studies, Linköping University.
Contact information: Ericka.johnson@liu.se

Julia Velkova is an associate professor of media and communication studies, and senior lecturer in technology and social change at the Department of Thematic Studies, Linköping University. She is also a Profutura Scientia fellow (2023-2028), in residence at the Swedish Collegium for Advanced Studies during the fall 2025 and spring 2026.
Contact information: julia.velkova@liu.se

AMANDA LAGERKVIST, JENNY ERIKSSON LUNDSTRÖM & MARIA ROGG

The Senseless Machine

Towards a Crip Reading of (No-touch) Hands and Human Value from Eugenics to Biometrics

Abstract
Combining crip theory and existential media studies, the purpose of this theoretical essay is to critically interrogate a biometric palm-reading device that turns the hand into a means for payment – connecting its datafied veins to one's assets – by unpacking its specific "technologics" and probing its forceful yet ambivalent sociotechnical imaginary. Palm recognition technology relies on the annulment of touch which calls forth, and depends on, what we call the existential–phenomenological chasm. The argument is that as hands are reduced to touch-free functionalist components, the realities of the embodied existential self are made invisible, and so is a fuller perceptual field of being human in diversity and disability. The chasm thus reinforces the ableism of the normate, instrumental hand, while also invoking dark genealogies of measuring bodies in culture. We caution that if biometrics were to be turned into a primary signifier of human identity and value ascription, this would reactivate eugenic hauntings with consequences for "human value". This fact calls for "cripping" the senseless machine, subjecting it to the crucial work of crip technoscience.

Keywords: biometrics, AI imaginaries, apocalypticism, existential media studies, crip theory

REIMAGINE YOUR HAND as a touch-free technology that identifies "you", and then instantly connects you to your bank account. No more chagrin in case of forgetting your wallet or smart phone with its payment apps. It is always there with you: the palm of your hand. A machine translates its textures and veins into data implied in its workings. Placed centrally, yet without any touching, your hand then hovers above the palm reading device that scans it. Smoothly operating, your hand does not lie. It efficiently nails "you", and provides access to your assets.

Amazon One is a palm-reading device that functions as a credit card. It is a form of biometric artificial intelligence (AI) that seeks to secure and verify the identity of the user, and more specifically, the person in possession of the claimed holdings. Biometrics is technology built to identify people, and to verify and ascertain their individual identities, by recognising faces, voices, hands, eye retinas, irises, body odours and gait (Mordini & Massari 2008). Since it relies on the metrics of the datafied body, it is thus a technology to literally measure life. Biometrics is presumed to be more accurate and reliable than other systems for securing and authenticating identity. In

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post-pandemic times, it can also be perceived as a much welcome "cultural technique"[1] of social distancing, that works as a form of biopolitics of outsourced species survival. But it is simultaneously, a critic might quickly argue, resuscitating consumerist ideals and seduction of business as usual, thus digging a new and deep narcissistic pond for (some parts of) humanity – even as our technologised world is "burning" (Mullaney et al. 2021).

But even more profoundly, as we will discuss in this article, data mining is bound to our bodies in paradoxical ways and with deep existential repercussions. The systems rely on and exploit existential needs as well as behavioural and body data, and yet the no-touch trend suggests that bodies (once emptied out or reduced into functionalist components) are simultaneously rendered phenomenologically insignificant.[2] This is paramount since hands are first and foremost, we argue, media of touch, affect, care and caress (Schwartz 2018).[3] The phenomenology of handedness also places "knowledge in the hands"; it is a way of knowing through tacit habits in the body. This is a case in point for Merleau-Ponty's claim that the perceiving body is *not an object*; it is an expressive unity that allows humans to experience the world, but also to transcend themselves toward others in order to care for them (Merleau-Ponty 1946 [2011]:239). *We reach out with our hands to touch, therefore we are.*

For the philosopher Vilém Flusser the hand is also what characterises our human existence, but his hand grasps things and transforms worlds.[4] Flusser argues that ever since

> human beings have been human beings, they have been handling their environment. It is the hand with its opposable thumb that characteries human existence in the world. The world is grasped, by the hand, as being made up of things. And not just grasped: The things grasped by the hand are possessed so as to be transformed. The hand in-forms the things grasped by it. (1991:90–91)

He claims that these able and dexterious hands – hands that are tinkering – are in fact withering in this type of desolate environment: "The hands have become redundant and can atrophy." But fingertips have on the contrary "become the most important

1 According to Bernard Siegert cultural techniques have a natural affinity with and involve hands, bodies and tools; they are "operative chains that precede the media concepts they generate" (2015:58).

2 In the mid-twentieth century debates were running high on how to distinguish phenomenology and existential philosophy. Mark B. Wrathall and Hubert Dreyfus (2006) show that this debate is antiquated today, since hybrids between the schools are very common. Our article is written in this spirit and merges concerns with authenticity, irreducibility, responsibility, being human in and with the world of technology; embodiment, perception and deep relationality.

3 It could also be argued that biometric hands are here removed from their feminine roles in human existence in the practices of caring, touching, repairing, embracing and washing etc. (See Schwartz 2018; cf. Young 2020).

4 This position on hands was also expressed by Richard Sennett in his 2008 book *The craftsman*.

organs of the body" (ibid.:92). This "handless" fingering and counting human being of the future, the philosopher Byung-Chul Han similarly reflects, is a *Homo digitalis* bereft of action (2017:32). For Flusser in this vein, technological developments profoundly incapacitate and thus *disable* us:

> As this situation is impossible to grab hold of, nothing in it is capable of being grasped, and nothing can be handled. In it the hand, the grasping and productive act of handling, has become redundant. Whatever can still be grasped and produced is done automatically by non-things, by programs, by "artificial intelligences" and robotic machines. (1991:91)

In the process of bequeathing to AI the role of making both meaning and worlds, and in a situation in which "there is nothing for the hands to get up to or do", some of our humanity is lost. In Flusser's reading something is thus cracked wide open by the decline and refiguration of the hand, leaving him with a sense of deep disorientation. By contrast, others see the "digital condition" of fingertip interfaces (Heilmann in Peters 2016:94) as providing an inflated ratio for hands and fingers in digital culture. Artist and media scholar Merlyna Lim emphasises not manual atrophy but instead an overload of tasks and thus an increased leeway for hands: "Click, hold, press, push, swipe, tap, touch. Hands have become the medium that mediates and 'massages' our ways of sensing, feeling, thinking, seeing, and being in the world" (2020:n.p.).

What is specific about palm recognition technology is that it inserts a rift into these common lived experiences of (digital) hands, by doing away with touch. As we intend to shed light on in this article, it is the very annulment of touch which calls forth and relies on what we call the existential-phenomenological chasm. For us, the touching hand is central and while the no-touch dimension is not unique for palm recognition but pertains for example to face recognition, eye retina scans and voice recognition technologies too, the argument is that when hands are evacuated of their phenomenological, ambivalent and open-ended roles, they are nailed and thereby deferred in ways that deeply affect human existence and flourishing in the world. The example reaffirms that digital technologies and AI manifest the cartesian project anew of severing the mind from the body in deeply problematic ways. But as we aim to further demonstrate, the chasm produces hands that cannot grasp and touch while also reinforcing ableism of the normate body. This pushes for a profound form of power analysis that also brings back from its mysterious disappearances on the scholarly and techno-cultural radar, *existential bodies* and thus *bodies that do (not) matter,* to paraphrase Judith Butler (1993). The goal is to unpack what feminist media theorist Sarah Sharma (2021:8) calls the specific "techno-logics" – and "illogics", we will add – at work in these touch-free and thus sense-less machines. While there is a rich plethora of possibilities and roles for (biometric) hands, those roles are always to some extent conditioned by a techno-logics embedded in certain circumstances, power relations, norms, social rhythms and techniques.

These technological conditions echo concerns within sociological theorisation of the body. The hand itself has a central place in the classic sociology of George Herbert Mead whose concept of "manipulation" builds upon *manus*, the Latin origin of the word hand. He suggests that physical objects are socially mediated through perceptive, manipulatory experiences of endowing the things that surround us with a social perspective (1932 [2002]). In this manipulatory act, the constitution of the object is connected with the constitution of the individual's own body: "a cooperation of the hand and the eye that creates 'things', permanent objects, only when the capacity for role-taking, which has been developed in social intercourse, is also utilised in the individual's dealings with non-social objects" (Joas 1997 [1980]:153). Manipulation implies ultimately that individuals learn to perceive themselves as objects (Mead 1934 [1967]). This seems echoed in the datafication and/as objectification of the body today, including the role of biometrics for shaping self-perception. But like other later sociological theories of the body, Mead's theory reduces it to a facet of the social. This demonstrates, according to Bryan S. Turner, "an analytical gap at the core of sociological inquiry, a theoretical prudery in respect to human corporeality" (2008:33). He traces this back to the paradoxical beginnings of sociology as a discipline, based on a dismissal of positivist biologism (including eugenics and Darwinism) while relying both on a positivist institutional infrastructure and on a foundation in social constructivism. Founded upon the central assumption that nature is always already culturally mediated, socially constituted and transformed, "the human body as a limiting point of human experience and consciousness seemed less important than the collective reality of the social world within which the self was located" (ibid.:34). Hence, we find here an incompatibility between sociological investigations of social constructions of the self and the phenomenological insistence on the body never simply being an object, but always a situated, singular–plural embodiment of existence. Turner's analysis thus brings to the fore that the existential-phenomenological chasm has in fact often been reproduced in sociological inquiry.

In this article, we will be discussing the inherent ambiguities at play *vis-à-vis* the existential bodies that palm recognition essentially depend upon and make invisible – bodies in diversity, singularity and dis/ability – by attending to the repercussions and risks if palm metrics should become the primary signifier of identity, nature and value. Previous research on biometrics has mainly centred on two dimensions: *the coded body as the future of identification* bringing to the fore "the normative and unquestioned types of classification, categorisation and even discrimination on which the technologies are built" (Olwig, Grünenberg, Møhl, & Simonsen 2019:8), and the *reception and renegotiation of biometrics* among vulnerable populations. The main focus has been on security after 9/11. In sum, critical research on biometrics has primarily focused on surveillance, security, race, migration and biopolitics and has often placed face recognition centrally (cf. Gates 2011; Magnet 2011; Ajana 2013; Browne 2015; Andrejevic & Selwyn 2022). Here instead palm recognition and thus hands are placed centrally, examined through a bifocal lens of existentiality and disability. In the hope

of contributing to and thus to stoke what Rob Heynen (2020) calls a "critical theory of the biometric body" the essay subjects the technology to a series of critical impulses and inquiries inspired by debates mainly in existential media studies and crip theory while also drawing on insights from feminist science and technology studies (STS), critical data studies, the new materialism and more.

For existential media studies the introduction of touch-less biometrics constitutes a "digital limit situation", which implies increased vulnerabilities and stakes for the very definition of human value. And by re-conceiving of media as existential media of limits, we may examine how they set parameters that enable or disable both bodies and discourse (Lagerkvist 2022). In pursuing this analysis further, we draw particular inspiration from key interventions in feminist crip theory. "Cripping" is defined as an approach that allows for overturning the ableist matrix, and as a way to challenge normative justifications of technology. Placing disability centrally to problematise compulsory ablebodiedness also offers a radical reconceptualisation of human value in terms of desirable disability (Kafer 2013). It thus counters assimilation, as an ideology embedded in universalist technologies, and sees disability as a desirable, generative and disordering force (Garland-Thomson 1997 [2017]). For us then, cripping means subjecting palm recognition to "the powerful, messy, non-innocent, contradictory, and nevertheless crucial work of crip technoscience" (Hamraie & Fritsch 2019:2). This implies a critical interrogation of how tying assets to the physical body risks affecting the very concept of human value in deeply disturbing ways. An eerie scenario is invoked: turning the socioeconomic realities of poverty or wealth into an embodied faculty, an inner quality of the embodied person, brings about startling prospects for projecting "human trash" as *inherent qualities of one's body*. In this way, biometrics evokes what scholars have stressed recently, namely that AI developments are both indebted to eugenic genealogies (Chun 2021; Torres 2023) and set in motion, worryingly, eugenic world building for the future (Garland-Thomson 2017a).

To explore these matters the article offers a theoretically informed close reading of the palm reading device as "a concrete object to think with" (Frosh 2018:25). Inspired by "digital technography" (Berg 2022), space is also afforded to a few reactions to the palm reading technology that speak to the current AI imaginary,[5] weighed against

5 Acknowledging that these biometric systems are powered by AI engines today we also approach the phenomenon of palm geometry as it is construed through the forceful yet ambivalent socio-technical "AI imaginary", visible in posts on YouTube and at Hacker News from 2020-2023. Without aiming to offer a conclusive picture of what touch-less technologies mean to people across the globe—and in acknowledgement of the limited nativist origins of the US context of the reactions studied—we have been "pawing" these materials with theoretical sensibility. A range of themes emerged that nevertheless offer cues for further engagement and critical analysis. Posts on YouTube https://www.youtube.com/watch?v=4WaOq3wQlxI and at Hacker News: https://news.ycombinator.com from 2020-2023, have been thematically analysed, inspired by Ryan & Bernard (2003). It must be noted that the essay provides an exploration of initial reactions, not the practices of appropriating, using or renegotiating the technology, which always go in diverse directions. For an example of this type of approach, see Olwig, Grünenberg, Møhl & Simonsen (2019).

the market rhetoric of promoting and rolling out the device. This latter context is also key for parsing the sense in which Amazon One and other palm reading devices transform veins into data and thus the phenomenological hand into a harsh, instrumental technique and component of platform capitalism. This prompts a mapping of the criticalities and imaginaries evoked by these systems, as well as a brief insight into how the technology works.

The workings of awesome and apocalyptic biometric hands

"[T]echnology is the realm of the hand", argues Liam Cole Young, and the hand is "the first and primary interface between the human body and most technical objects […]. Today there is no liking, sharing, retweeting, posting, or streaming without these *humble techniques* of the hand" (2020:n.p, emphasis added). On closer inspection hands are not always humble. Instrumental hands are about craft and skill but also, as Young concedes, our primal weapon and power technology. As such instrumental biometric hands can stir up emotions. Biometrics, including palm recognition, is imbricated in the AI imaginary reflecting a series of ambivalent concerns, hopes and worries about the future (Campolo & Crawford 2020; Coeckelbergh 2021). But how does the technology work?

Amazon One gives a technically rudimentary, yet quite revelatory, explanation of the ideas behind its set-up. The device drafts you securely through extracting what is deeply embedded in your palm. Beyond what is visible or knowable to you, the machine *knows you* every time:

> *Your hands are uniquely yours*
> Your palm is made up of tiny, distinct features on and below the surface, many that are indiscernible to the human eye or a standard camera.
> *The Amazon One device is designed to read them*
> In seconds, a process of proprietary imaging and computer vision algorithms capture and encrypt your palm image.
> *To create your unique palm signature*
> Amazon One uses the information embedded in your palm to create a unique palm signature that it can read each and every time you use it.[6]

Recogtech, in collaboration with Fujitsu, has its own version of palm recognition. They explain the workings of its technological operations, and its purpose in securing human identification:

6 https://one.amazon.com/how-it-works

> Every palm has a unique vein pattern, which can be scanned using an infrared camera. As veins are under the skin rather than on the surface, the Palm-ID is considerably more resistant to fraud than fingerprint recognition, for example. Besides being accurate and fraud-proof, the Palm-ID is also hygienic, quick and extremely easy to use. Users are very positive about the system.[7]

Vein recognition operates so as to measure the difference between deoxidised and oxygenated hemoglobin in your blood composition. So, while the system relies on vein patterns that in themselves sit deep in the hand, the veins become "extracted" as they are translated into body data. They are turned into instrumental objects in the very act of being scanned. This may sound worrying for users, but Recogtech stress that the technology is well received.

Such positive opinions were indeed reflected in commentary fields online, after the launch of Amazon One. Some voices welcomed the new mode of contactless payment. For those citizens who also feel safe in the digital ecology at large, there is nothing to worry about: "who cares, it's awesome. I have nothing to hide"[8] says one of them. Such responses are in affinity with the classic ideology of the technological sublime, and its oft-professed libertarian inevitabilism: "The world is changing fast, some people may not like this but it's the direction where life is taking us. Some things we saw in movies are becoming a reality. I like it." Within an American techno-culture of manifest destiny, "MachineGod" also embraces the robot in the garden, as an inevitable fact of techno-genesis (cf. Nye 1996): "It's in our nature to want to rise above our limits. Think about it. We were cold, so we harnessed fire. We were weak, so we invented tools. Every time we met an obstacle, we used creativity and ingenuity to overcome it. The cycle is inevitable."[9] Hence, the ableist assumption that technology will cure us and alleviate our human impairments, to which we will return later, is here given expression in the reception of palm recognition.

But a sense of insecurity and ethical urgency in our time of technological development is also visible. In a series of high-strung critical posts Amazon One is likened to "the Mark of the Beast", that is to signs of the Apocalypse in religious and eschatological sense.[10] Some members of the public cite the Book of Revelation in which hands are referred to as means of payment when the dark powers wield their ultimate weapon at the end of the world: "And he causeth all, both small and great, rich and poor, free and bond, *to receive a mark in their right hand,* or in their foreheads: and *that no man might buy or sell, save he that had the mark*, or the name of the beast, or the number of his name" (Revelation 13:16–17, emphasis added). The apocalyptic AI imaginary

7 https://www.recogtech.com/en/products/palm-id, italics added.

8 @goopei5303 (August 2022).

9 @jarrodhollie8244 (April 2022); MachineGod (April 2022).

10 In the US context, this is a classic trope in pious and evangelical reactions to modern social developments including new technologies. The Apocalypse and the Book of Revelation have a central place in their imagination, and American evangelicals read it as a revelation of the impending demolition of secular cosmopolitan globalism (McQueen 2017; Beal 2018).

is pervaded by a sense of imminent violent disruption: "This is the mark of the beast! Don't do it!" is one recommendation.[11] The end seems near at hand, and "it's getting closer each day" allowing for the conclusion that this is "Beast system step by step".[12] Less eccentric critical remarks concern privacy, and often echo worries about Orwellian surveillance and control, security and integrity: "If my credit card number is hacked I get a new card, if my palm biometric is hacked does Amazon get you a new palm?"[13] For many, biometrics thus ushers in new contingencies and existential insecurities.

Scholars have similarly pointed to the vexed context for its emergence today. They stress the sense in which governments and businesses alike sped up the project of deep datafication of our societies during the pandemic, heightening human vulnerabilities to the exploitative regime of surveillance capitalism, and profiting from the crisis (Burckhardt et al. 2022). Or as the social critic Naomi Klein pointed out in *The Guardian* early on during the pandemic:

> It has taken some time to gel, but something resembling a coherent pandemic shock doctrine is beginning to emerge. Call it the Screen New Deal. Far more hi-tech than anything we have seen during previous disasters, the future that is being rushed into being as the bodies still pile up treats our past weeks of physical isolation not as a painful necessity to save lives, but as a living laboratory for a permanent—and highly profitable—no-touch future (2020, n.p).

Klein envisaged the touch-free near future as a dystopian and deeply undemocratic space, built from the ruins of the late modern capitalism in one of its most callous reinventions of itself. After the creative destructions of the pandemic moment, covid-deaths and despair were turned into testbeds for new products. These practices of datafication within our platform ecologies thus also carry numerous problems of extractivism, oppression and exploitation; a fact that many critical scholars have staunchly pointed out of late (O'Neil 2017; Couldry & Mejias 2019; Zuboff 2019; Chun 2021; Crawford 2021). In this context Amazon One turns your living, existential body into a means for literally indexing and fixing the self as a purchasing being, whose palm becomes instrumental for actions of solipsist consumption. There is thus a streamlining of the potential meanings and repercussions of these systems and of the body itself. This is connected to the instrumentarianism of our age of platform capitalism (Zuboff 2019), in which biometric hands are means for categorising human beings. As part

11 @1210katie0121, YouTube (September 2022).

12 @believeinjesus8300, YouTube (January 2023). Counter-voices resort to good sense, and to reason, comparison and irony to deconstruct the fears of the new technology. nugagator-hag-1 argues that this looks just like conspiracy theories in circulation: "I worked in retail years ago when only a few companies used cash registers able to read barcodes. I had customers come into the store to warn us that the barcodes were the 'mark of the beast.' Times really haven't changed, these freaks just find new things to be frightened of." Hacker.com (August 2022).

13 @FredFons1YouTube (April 2022). See also @salmollica1846, YouTube (May 2022); ballenf, Hacker News (Sept 29, 2020).

of contemporary culture's invisible information infrastructures, western cultural and historical patterns of classification are through biometric hands here afforded excessive algorithmic guise (Bowker & Leigh Star 2000).

In sum, through such reductions, extractions and classifications, the techno-logics of the biometric hand renders it existentially vacant. And yet, the body is never left without a mark in technological culture, subjected to various ideological claims and inscriptions within particular utopian and dystopian imaginaries. To further explore the significance of the existential crevice at the heart of biometric technologies, and to then examine their role in dis/abling bodies and shaping human value, there is reason to interrogate the relationship between bodies and mediation. We thus turn next to the cartesian legacies in the age of biometrics, and to what looks like a return of bodies at the same time.

The map and the terrain: Biometric representations and phenomenological dreams

Biometric hands are, as explained above, captured, encrypted, drafted while read "hygienically" and "securely". But what is actually the relationship between the map and the terrain here? This is a contentious scholarly discussion, in which we identify several different positions.

Some place emphasis on the fact that no technology can ever perfectly represent the body. Hence "… we need to understand biometric technologies as a map of the body, one that leaves much out and which fails to represent bodily complexity" (Magnet 2011:156). In other words, while the body itself can only be known through mediation, this does not mean that it exhausts its meaningfulness and textural and experiential richness: "the body is given through language, but it is not, for that reason, reducible to language" (Butler 2005:21). Others argue that today the ontology of body as information flattens out definite distinctions between the body and its representations: data selves and data doubles are thus enmeshed in the very definition and understanding of the body in digital existence (Haggerty & Ericson 2000). The stress is here also on the porousness of bodies and on bodies bleeding into machines. Or as Luna Dolezal explains, in her discussion on the usage of the prosthetic metaphor in cultural theory and posthuman discourse: "[T]he living body" is in this perspective "in a constant dynamic interaction with its social and material milieu, incorporating instruments, tools, and technologies as *prostheses* to generate 'new bodily capacities'" (2020:126). Hence, among posthumanists *prosthesis* has been invoked as a "metaphor for the technological extension of human capacities to overcome the limitations inherent to the 'natural' human body. In this vein, the prosthetic metaphor is also deployed to signify the body as inherently fluid, malleable, and dynamic" (ibid.). This brings to mind Marshall McLuhan's (1964) medium theory, which places the body centrally for understanding media, and sees technologies as universalist and generic *"extensions of Man"*. The biometric person would in this perspective be understood to be a new rendering of Donna Haraway's cyborg, a once progressive figuration, made more or less mainstream.

From within crip theory there are also representatives that stress that technologies may be essential "extensions" for people with disabilities, and that they can literally enable life (Forlano 2016, 2019). Dolezal (2020) also brings out that Merleau-Ponty's phenomenological project actually underwrites the technicity of the lived body, for example in his discussion of tool usage. He used the visually impaired person's cane as his case in point to claim that it had indeed ceased to be an object for the disabled person. He however also made a point about touch as key for these technologies of extension: "the cane's furthest point is transformed into a sensitive zone, it increases the scope and the radius of the act of touching" (Merleau-Ponty 1946 [2011]:144). This means the impaired person incorporates the body schema of the cane into his own lived experience and habitual extended touch. For Hamraie and Fritsch (2019) this is captured under the heading of "interdependence"; a deep crip relationality with technology. In this reading the touch-free trend may in some cases be assistive and can work in ways that can potentially be liberating, augmenting and enhancing for people with disabilities.

Yet others have been cripping such approaches as being too sanguine. The underlying assumptions in medium theory, expressed through its common use of prosthetic allegories of bodily extensions and amputations – often overtaken in mainstream cultural theory as well as in the history of computing – have been avidly problematised by critical disability studies as an expression of ableist ideology (Mitchell and Snyder 1997, 2001; Jain 1999; Sobchack 2006; Mills & Sterne 2017; Dolezal 2020; Petrick 2022; Butnaro 2023). Disability critics of the cyborg figure have also argued that disabled people often have an uneasy or "ambivalent relationship to technology" (Kafer 2013:119) and that "Haraway's approach to the cyborg takes for granted that disabled people easily meld into technological circuits, an assumption shaped by imperatives for rehabilitation, cure, independence, and productivity" (Hamraie & Fritsch 2019:13). The metaphorical usage of *prosthesis* also invokes the complexities that pertain to the cartesian imaginary which afforded little role to the body and saw it as a hindrance to objectivity, or as "the primary prosthetic: it is the machine-like 'technology' that is controlled and utilised by consciousness" (Dolezal 2020:126). Today, in a communication culture of automation that continues to downplay the body within this tradition, it is actually making a series of returns (Lagerkvist 2021).[14] For starters, biometrics and other incarnate, corporeal and sensory AI technologies[15] ostensibly recall us

14 In an essay that discusses hands, "How can I deny that these hands and this body are mine?" Butler has also pointed out that the cartesian modernist denial of the body was dependent upon media representations effectuated by the hand, which actually returned it through the very forms that sought to deny it. The body is in fact a limit case of *res extensa,* poised on the threshold between mind and matter. She demonstrates the centrality of the hand in Descartes' *Meditations*, in which he is famously setting forth a subtraction of the body, in the quest for certainty in the realm of the soul. But the practice that Descartes himself is involved in of *reasoning-cum-writing* (by hand), both returns the incontestable body and turns it into a specter (Butler 2005).

15 Examples include wearables such as health apps and biometric bracelets and watches; the fast

to the phenomenological acknowledgement of the reality of the sensing body as the source of our worldly being.

At first glance, it may thus seem that biometrics reconciles the body since it makes it central for knowledge in ways that dispel cartesian dualism and celebrates the corporeal. In other words, since bodies are so central to these datafication processes they thus seem at first value reclaimed. In this way there is something about these technologies that reawakens the phenomenological dream. But if we recall that for Merleau-Ponty the body – and the hand – guides and allows for an orientation toward others in the world, and thus for becoming an ethical subject, remote and touch-free biometrics affords the radical opposite of a relational and ethical mode of *being-in-and-with-and-for-the-world*, that searchingly and carefully senses and tries to make sense of and care for the world around them, with the help of their hands. Amazon One illustrates instead the problems of tying identities to bodies by effectively decoupling the body from phenomenological and situated experience.

So, in reality we argue, biometrics actually turns the body into an object anew. As Btihaj Ajana has stressed, the process implies that the *who* of a person (the irreducible biographic person) is reduced to the *what* (what can be known through the passport, name, metadata, biometrics, etc.) (2013). By turning the body into a stabiliser of identity, while converting the body itself into an object for indexing whatness, the question of identity shifts from the domain of narrative (the story or lived experience of who someone is) to that of reductive templates (hence, to the digital samples of one's biological data). Biometrics thus secures what Paul Ricoeur calls *idem* identity (what one has, what is permanent) as it evacuates the *ipse* identity (the embodied and lived self that one is, what is changing) (1992:2–3, 121). As the existential chasm opens up, the fundamentals of our unique physiology are immediately turned into something we possess: a face, a fingerprint, an iris, a palm, etc. It thus renders insignificant the existential body of human narration, perception and sense-making: the phenomenological reality of *being a body in the world.* The severing of mind and body in cybernetics is hence downplayed, but replenished by a severing of the biologically and geometrically measurable body from the phenomenological and diverse existential body. Biometrics here implies the transformation of the body into processable, storable and retrievable forms of information. Instead of being the container of the soul as in Descartes, the body is now regarded as the source of instant truth. In this way it gives supremacy to the body over the mind, and thereby actually reaffirms the dualism.

development of exoskeletons and sensory AI modalities that mimic the senses, for example olfactory sensory analysis. See: https://brainchip.com/real-world-ai-processing-all-five-senses/. In the realm of *psychophysics* we see designs of perception and sensing machines (Salter 2023).

The palm becomes in this process a medium of perfected correlation and of complete disambiguation. In the engineering of biometric systems there is "quite a general agreement" (Fairhurst 2018:8) about which criteria of human characteristics that should be chosen in creating a biometric data source: universality, uniqueness, permanence and collectability. These characteristics should be objectively measurable in a quantitative way, and there should be "no ambiguity about what is being measured" (ibid.). The criteria invoke immediate scrutiny. Overall, it seems ill-advised that living existential beings are mapped by the biometric system, as if they were universally recognisable *objects*. Crip sensibilities will also trace an inherent ableism to the very idea of the universal: bodies are different, and some of them matter and "function" within the system more than others. The straightforward *leaving out of complexity*, as stressed by Magnet, is however crucial and constitutes the very ableist crux of the problem: it is what fractures open the existential chasm.

To sum up, we maintain that even though people (with disabilities) co-evolve with, are enabled by or ambivalently live through technologies and media representations, a lived sense of embodiment will to some extent defy being fully inscribed or marked. The body is not reducible to an object, and yet as we stress here in relation to biometrics, this is in fact what is at risk of happening in this domain. As the realities of the embodied and vulnerable self are rendered invisible,[16] so is a fuller perceptual field of being human in diversity and disability. Turning bodies into measurable means thus implies that rich and varied forms of embodiment and experience are quenched and extinguished. What is more: as the technology instrumentalises and rationalises the body as mere function within a universalist machinery, this recalls eugenic hauntings in culture. Our argument is that the touch-less dimension is here key. When objectified the body is evacuated of phenomenological meaning, sensibility and sense-making, invoking our culture's darkest media histories of measuring human physiques – *eugenics* – and in the process distinguishes and reproduces the normal versus the abnormal, ability versus disability, human value versus trash. The dangerous link between contemporary biometric technologies and eugenics urgently calls for cripping the senseless machine. In the next section we shall turn to these practices of measuring bodies, with old and thorny roots, that resurface in today's conflicted environments of datafication. We will prod some of the lineages from eugenics to biometrics.

16 Or as John D. Peters put it "Information is knowledge with the human body taken out of it" (1988:15).

The techno-logics of measuring and defining human value – from eugenics to biometrics

> "I don't like the idea of a human body becoming synonymous with the amount of money they have."[17]

As a range of scholars in critical data studies have shown, datafication transforms human life and generates different kinds of normative figurations in the process of extracting *new forms of value* from data (Couldry & Meijas 2019; Burckhardt et al. 2022). In an analysis of Microsoft's Azure "Face Cognitive Service", which reads inner moods on the face through affect recognition (following seven "universal emotions"), Jeremy W. Crampton similarly argues that the implementation of biometrics has "taken surveillance beyond simply seeing and recognizing, to categorizing and inferring *a subject's innermost nature*". Importantly, he argues, this shift "from surveillance as epistemology (what is seen is known) to surveillance as ontology (what is seen as comes into being)" (2019:55, emphasis added) thus also informs what can be conceived to be existing at all. This is a superstitious techno-logics which sees data and algorithms as unambiguous, precise and clear-cut, with the ability to objectively determine and nail someone's existence, nature and future through "objective" measurements (Browne 2015; Kaminska & Grondin 2020:7). This immediately infers a particular form of value, and transforms in the process how we understand "human value". To further offer a crip reading of this, we must start where the problems begin: with the historical enlightenment legacies of defining "the Human", and with metrics as means of nailing human value.

It must be noted that there is increasing awareness both in engineering circles and critical AI research that biometrics has a long-standing political and historical lineage with powerful colonial and racial subcurrents (Valdivia, Serrajòrdia and Swianiewicz 2023). As Simone Browne has argued: "a critical biometric consciousness must acknowledge the connections between contemporary biometric information technologies and their historical antecedents" (2015:118; see also Maguire 2009). In this vein, media theorist Wendy Hui Kyong Chun has identified a series of similarities between twentieth-century eugenics and twenty-first century data analytics, as they depend on surveillance and enforce segregation. She argues that machine learning has "founded a revised form of eugenics today, in which discriminatory pasts, presents and futures coincide" (2021:66). Chun observes an inequitable eugenic logic of correlation at work in our time of datafication, as bodies are mapped by default through homophily. Correlation not only predicts but forges certain actions, within a broader process of "cultivating physical similarities in order to control the future" (ibid.:59). It is not the breeding of a healthy nation state, as in older eugenic projects, which sits at the heart of discriminating data, however, but *the person* and their preferences, through which

17 @LizzyAlexis (August 2022)

clusters of networked neighbourhoods are constructed and positioned antagonistically. Yet, she argues that the firm belief in eugenic solutions and the predisposition toward correlation of the past century, are replayed in this world of data science and predictive modelling.

One may complement Chun's astute observations, by zooming in on the straightforward and linked lineage of *metrifying the body* – or allowing the body to be measured or to be a measure[18] – across these projects. Measuring human beings and their bodies, and in turn, nailing their "nature" and "value" is never innocent and a historical practice in deep disrepute. Disability and race sit at the heart of the project. This is evidenced as drafting the body in eugenic-adjacent fields in the eighteenth and nineteenth centuries, was a practice characterised with an obsession with the abnormal, to be ascertained through the measuring of proportions of nose, mouth, forehead and the crane (Schaffzin 2020:37). *Anthropometry* was a technique for measuring the human individual for the purposes of understanding human physical variation, used in physical anthropology by for example Franz Boas in the late nineteenth century (Donnelly 2020, Olwig, Grünenberg, Møhl, & Simonsen 2019). It involved various attempts to correlate physical with racial and psychological traits. Similarly, *physiognomy* was a pseudoscience that connected facial traits to human character (Pearl 2010). A key figure in this field was the Italian professor of psychiatry, Cesare Lombroso, who measured skulls and other bodily proportions, in order to try to identify and classify criminal bodies. The history of biometry as an applied form of science thus has a strong link to ideas about biological foundations for criminal behaviour. This is exemplified also in the work the French policeman Alphonse Bertillon, who developed a categorisation system for criminal records, based on measuring different parts of the body.

In turn, these measuring practices informed the founding father of eugenics: Francis Galton. The classic project of eugenics was closely connected to heredity and improving the human material. It was a hybrid enterprise drawing on interdisciplinary qualitative anthropology, anthropometry and mythology. Within its more applied branches, as already mentioned, it employed biometrics by means of literally measuring skulls, etc. The project later transformed into reform eugenics in the 1930s, which began to rely more on statistics and quantitative medical science. The intervention in natural selection and the meddling with life and death were key and became part of the ideology in many welfare states. At the core of the project, valuable lives were pitted against less valuable lives: "Eugenics always had an evaluative logic at its core. Some human life was of more value—to the state, the nation, the race, future generations—than other human life, and thus its advocates sought to implement these practices differentially" (Bashford & Levine (Eds.) 2012:n.p).

Scholars today agree that "with the excessive use of biometrics" as media critic

18 Hands themselves have historically been connected to measurement. The breadth of the hand is an ancient unit of measuring length, standardised at 4 inches (10.16 cm) by a statute of King Henry VIII in 1540. It is still in use in Australia, Canada, Ireland and the UK, primarily for measuring the height of horses from the ground to the top of the shoulders.

Armand Mattelart puts it, "the old daemon of eugenic formatting has resurfaced in modern form" (cited in Kaminska & Grondin 2020:3). But how closely associated are these projects and how can their relations be analysed? We argue that the links are there, even as they may seem equivocal or indirect. While it may not be evident that palm reading can become discriminatory in the exact same and deeply crushing ways as in the practices of classical eugenics, its techno-logics of value ascription through measurement is still deeply problematic. Rob Heynen suggests the problem has to do with the forging of norms: "… contemporary biometric scientists share the nineteenth century desire to render bodies legible, to remake them as data; this raises a host of uncomfortable questions, not least around how biometric science *encodes normative conceptions of bodies*" (2020:110, emphasis added).

Today, such normative conceptions are visible, for example, in the aspirational practices for becoming an "optimal human" in self-tracking cultures (Lupton 2016:64–87). The current cult of measuring in mainstream culture is also fraught with ableism and scientific racism. And "prototypical whiteness, maleness, youth, and able-bodiedness" (Kaminska & Grondin 2020:7) are inscribed into biometrics of the past and the present. In this reading biometrics is a project involved in the fundamental normative forgings of who counts as being fully human, and what counts as human value. This is of course particularly painful in the case of people with disabilities. It invokes the entire debate about whether modernity will produce as Alison Kafer and others have discussed, a "future for crips" at all or, in effect, their eventual annihilation (cf. Kafer 2013; McRuer 2017; Garland-Thomson 2017b). Here our concerns echo those of Meredith Whittaker and colleagues who have argued that the very notion of ability is in itself "*defined (and redefined) through technologies of measurement and classification*" (2019:26, emphasis added). Furthermore, they show that determinations of "worth" and "ability" rely on "aberrance" which "is often used as a justification for disparate treatment, and connects AI's logics with *histories of exclusion*" (ibid., emphasis added). Hence, palm recognition has evident genealogical roots in the social and political histories of eugenics and contiguous fields – a legacy that is significant as it still acts upon our societies and affect people with disabilities.[19]

Yet, we also argue that this has vast and deeply problematic implications for all. It is not far-fetched to foresee serious repercussions of turning palm geometry into a primary signifier of identity – and of the practice overall of nailing (human) value to body features – in a no-touch future, in which bodies are obscured and thus cease to matter. Palm reading technology depends upon – while also cracking open and congealing – the existential–phenomenological chasm. Paradoxically, big tech companies try to address and perhaps cloak the chasm, by recurringly alluding to "your uniqueness".

19 The evident example is the excesses of eugenics within Nazism. Children with disabilities were the first to be sent off to the camps by the Nazi regime, and people with disabilities were part of a secret euthanasia program (Robertson, Ley and Light 2019). The sense in which this past is alive today has been addressed by for example David Pfeiffer (1994), Rosemarie Garland-Thomson (1997 [2017], 2017a, 2017b) and Olivia Banner (2019).

Or as Amazon One puts it: "No two palms are alike and the features of your palm change little over time making it *unique to you and you alone*." But it must be noted that the datafied hand as a representation is founded on innumerable other palms in anonymous sets of big data, and "[t]he data self can *achieve normality* relative to a statistical average profile based on users who share a similar data set within the various networks" (Horning 2012:n.p, emphasis added). While it has long been known that statistical averages never correspond to any one human being, they become realities as they act on beings in the world and bring them into being at the same time. Following Lennard Davies (1997), there is an ableist ideology at the heart of the project of statistics itself: "Cultural understandings of disability are intrinsically connected to the notion of normalcy. Normalcy is a historical and sociocultural construction that, in part, arose with industrialisation and the science of statistics where the average and the normal distribution became an imperative and was applied to ideal moral, intellectual, and bodily qualities" (Wälivaara and Ljuslinder 2020:80).

But it must also be noted that as a result of the straightforward overreliance on metrics and its neglect of the singular yet plural person, in all their uniqueness and extraordinariness, the senseless machine also produces an abject realm of unruly and ill-fitting disability. Biometrics thus forges a regulatory ableist matrix that defines and nails bodies and that produces a materialisation of norms in bodily formation. This in turn engenders "a domain of abjected bodies, a field of deformation, which in failing to qualify as fully human, fortifies those regulatory norms" (Butler 1993:xviii). Hence, with Butler "in hand", one may ask: What challenges are produced through those abjected bodies and hands? What if your hand does not follow the standards of normalcy? And what if you lack a hand altogether?[20] As Young observes: "[w]e have built a world that privileges and demands much of the hands that we otherwise take for granted. Such a world punishes hands that do not abide by the standards of normalcy that get designed into technical devices and networks." The differently-handed, he argues, are "shut out from many ecologies of making, shaping, and using" (2020: n.p.). On reflection, the differently-handed cannot grasp and shape the world as per Flusser's ideal, instrumental and able hand. Yet, Amazon One also disables his normate handling practices at the very same time. Hence, Flusser's grasping, productive, possessive hand is incapacitated by automation, which also illustrates that dis/ability is contextually dependent upon the technological environment, directing attention to how (digital) technologies are enabling and disabling humans at large on a continuum and in a variety of critical ways (Goggin & Newell 2003; Goggin & Ellis 2015; Adams, Reiss & Serlin (Eds.) 2015).

In sum: cripping the senseless machine means shedding sharp light on its technologics of metrification, classification and statistical probabilities, which distressingly

20 One voice in Amazon One's FAQ section illustrates the sense of not being recognised by the machine. The company explains the road to a functioning application in a way that reveals its ableist norms for a working hand that is steady and can hover, is not wearing any bandage, or obscured in any way. https://one.amazon.com/help

invokes the legacies of eugenics in western social, medical and political histories. Resituating these technologies of the "new" and glossy "AI era" in the context of these severe and shady circumstances, reveals how their techno-logics reforges ableist norms while (re)producing notions of human value. This occurs through its metric interventions into, extractions from and deep neglect of the existential body. Cripping, as we have proposed, allows for making visible the profound risks of connecting assets to body faculties. It also shows that biometric hands threaten the inherent inviolable value of each human being, and reformulate human value in deeply disturbing ways.

Conclusion: Offering alternatives by putting the finger in the wound

This article has focalised one form of biometrics: palm recognition technology that uses vein pattern recognition. It is a seemingly aberrant case, contravening the regular digital habits and modes of fingering and touching. The techno-logics of palm recognition is communicated through its touch-free mode and message. When turned into biometric data, the meaning of your sensing, fleshy and wrinkled hand – with bones, tendons, ligaments, veins and sensuous and highly sensitive, porous skin – is turned into measurable and reduced features that represent individual patterns for recognition. If your hand fits the data set, the device perpetuates swift movements that turn your will to purchase or to move about, or your projections into the future, into a fulfilment of that will. Your palm is a fortune teller in hand of sorts. The scanner is a "palm reader", reading value off your hand in more than one sense.

Your biometric hand – depending upon where and how you are situated in the social world – is thus revelatory not of "the end" of the world, but of the powerful regulatory matrix of bodies that matter or cease to matter or never mattered at all. Hence, beyond both its shimmering opportunities for easy shopping contra its potential wreaking of the Apocalypse – as reflected in the different utopian and dystopian modes of reception discussed earlier – Amazon One must be analysed against the deep background of ableist hegemonic automation, reliant on eugenic hauntings. If there is anything "beastly" at work here, it is in fact the mark of the insensitive and insensible – and even senseless – practices of default metrics, that reproduce the dangers of discriminatory datafication. Here, the media history of measuring and thereby normalising certain bodies while reducing others to lesser worth by pathologising deviance and disability, is massively recalled. The medium of palm recognition thus points to the future by reawakening hauntological dispositions of the past.

It is the instrumental forms of making and tinkering and a techno-logic of measuring and overcoming limits and weaknesses, that dominate the current socio-technical imaginary and by consequence, shape our relationship with emergent technologies. As has already been suggested, this is achieved by means of producing an existential chasm, and by giving short shrift to the existential body. But faced with the bleak picture of the hands of the future that we have ourselves purported – and which was offered also by Naomi Klein, Byung Chul-Han and Vilém Flusser – we are called upon

to offer alternatives. Two classic phenomenological interventions show the initial way. For Merleau-Ponty, importantly, a different world is possible through embracing and rediscovering that other body which we have called the existential body: "But by thus *remaking contact with the body and with the world,* we shall also rediscover ourself, since, perceiving as we do with our body, the body is a natural self and, as it were, the subject of perception" (1946 [2011]: 239). Beyond finding a richer form of subjectivity, this rediscovery also entails for us a move toward crafting more diverse imaginaries of bodies, selves, technologies and worlds. Following Merleau-Ponty, the post-phenomenologist Don Ihde stresses that "We are our bodies—but in that very basic notion one also discovers that our bodies have an amazing plasticity and polymorphism that is often brought out precisely in our relations with technologies" (2002:138). In Ihde's classic assessment of the human experience of technology, in terms of what he coined "human-machine relationality" (1974:267ff), he described experiences with machines as diverse and irreducible to a single principle. He further conceived of technologies as all-pervasive in our world, but also argued that the relation is essentially an *existential relation* that implicates our fate and destiny, but in an ambiguous way. This makes it essentially immune to the threats of an *absolute* mode of technocratic existence. He thus opens up for a possibility of a multiplicity of ways of living with technologies – and today we might add, with AI – in the world, and of conceiving of our future.

As we hope to have demonstrated in this article, an existential perspective in conversation with crip technoscience can take this one step further, while also invigorating sociological theories of the body. Simultaneously it may provide new forms of criticality infused with existential sensibility, for the field of critical data studies. Highlighting vulnerability as a lived, singular–plural experience rather than reducing it to a social construction, holds pathways to grasp cultural inscriptions on bodies in plurality, but also, to point the finger in the wound in order to reinform them. Embodiment is not a solipsistic project, but a locus of the sociomaterial world (Rogg 2024). To experience and change the world, we have to perceive it; a haptic capacity to care, comprehend, query and make a difference. Theorising *with* the body, and the disabled, impaired and vulnerable body in particular, offers crucial ways to critically intervene into a world which is overreliant on disembodied data and increasingly also on touch-free devices.

This means to reclaim the embodied and existential self, by shaping a sobering, more alive and discerning tale about the limits and offerings of biometric AI. Here hands are both recognised through the existential sensibilities of their sensing fingers, caring touch and perceptive skin, and as potentially differently constituted, or not there at all. Cripping the senseless machine ultimately means allowing the abjected hand to mess up and rip the hegemonic construct to pieces. From the vantage point of variously situated existential bodies, the tech is far from "smart" as in "making sense". From the position of crip sensibilities the "smart technology" is indeed a *senseless machine*. The senseless machine has no ability to make sense of life, yet it creates a divide between a domain of intelligible bodies, and what exists beyond it; the excluded and illegible domain of unthinkable and unlivable bodies that occupy its constitutive outside. It shrouds the injustices subtending that "accessible" tech world of value (Fritsch 2016),

and last but not least: it obfuscates the irreducibly messy and fleshy nature of human existence altogether. The chasm is not innocent but instrumental for these developments – and biometrics depends upon, breeds and incites it anew. Tying identities to bodies as data averages relies on effectively sequestering the depths and diversities of the phenomenologically experienced body. Palm recognition does away with the handling as well as the caring and hurting hand. This very neglect allows for opening floodgates of instrumentarian politics with eugenic genealogies, of measuring and nailing humans and their value. Its spurious correlations and contorted matchings of body data to particular features and futures, is devoid of deep relationalities, diversities and disruptions within existence.

In closing, touch-free systems like Amazon One need to be subjected to new forms of criticality, capable of reinventing also those powerful if ambivalent sociotechnical imaginaries that profoundly shape our day and age. Crip technoscience here resonates with the existential stress on limits and the refusal to comply with demands to fix, eliminate or cure disability. The task is to relentlessly keep pointing to the dangers of the eugenic and biometric marks on the body in digital existence, and to their reliance on the annulment of touch which brings about what has here been termed the existential–phenomenological chasm. A future for crips as well as for touch is the very foundation of any ethical and resonant future at all – with or without "intelligent" machines. Safeguarding the immeasurable value of the existential body and bringing it back from the chasm in its precious and honoured diversity, is therefore how to articulate a technological future – *with sense*.

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Author presentations

Amanda Lagerkvist is Professor of Media and Communication Studies, PI of the Uppsala Hub for Digital Existence and researcher at the the Centre for Multidisciplinary Research on Religion and Society (CRS) at Uppsala University.
Contact: amanda.lagerkvist@crs.uu.se

Jenny Eriksson Lundström is Senior Lecturer and Associate Professor (docent) in Information Systems at the Department of Informatics and Media at Uppsala University.

Maria Rogg is a WASP-HS PhD candidate in Media and Communication Studies in the School of Arts and Communication (K3), at Malmö University.

FRANCIS LEE

Reassembling Agency

Epistemic Practices in the Age of Artificial Intelligence

Abstract
This article reflects on how sociology can analyse the role of artificial intelligence (AI) in scientific practice without buying into the current AI hype. Drawing on sensibilities developed in actor-network theory (ANT) it introduces the concept of *agencing* (agency as a verb) which refers to how scientists debate and configure the human and machine agency. It suggests that we can come to a more nuanced understanding of the effects of AI in science by attending to actors' *agencing* practices. By discussing three ideal types of agencing, the article argues that AI should not be regarded as a rupture in the tooling and practices of science, but rather as a continuation of long-standing patterns of practice. That is, agency, and the space for action and judgement, is organised differently in the AI-driven laboratory; however, this is not a new configuration of epistemic agency. Rather we might understand these changes as building on statistical epistemic configurations going back to the birth of statistics in sociology in the 1700s and 1800s.

Keywords: agencing, machine agency, practice, epistemic configurations

TODAY, SCIENCE IS producing ever larger amounts of data. New digital tools, methods and infrastructures create a growing flood of 'big data' that science wants to benefit from and analyse. In order to analyse this immense amount of data, many researchers in the sciences are turning to computational methods based on algorithmic processing and machine learning – what is often referred to as artificial intelligence (AI).[1] This flood of data and the use of AI seems to promise a whole new way of producing knowledge about the world. But what are the consequences of introducing data-driven and AI-analyses for knowledge production? What happens to science when human judgement and the traditional scientific method are supplemented with, and sometimes replaced by, AI and the analysis of large amounts of data?

This article explores these questions from the point of view of agency and human judgement, and asks: What happens to human agency and judgement in scientific experiments with the introduction of AI? By drawing on recent theoretical developments in actor-network theory (ANT) and valuation studies, the article discusses (1) how we can analyse and understand actors' different styles of configuring agency in practice, what I here call *styles of agencing*, and (2) how we can analyse and understand how

1 Although this term in fairness is way too unspecific. See for instance (Suchman 2023).

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actors in the sciences value these different configurations of judgement and agency in practice (cf. Lee & Helgesson 2020).[2] This approach allows discussion of the configuration of agency as an empirical phenomenon, and to understand how actors in the sciences struggle with configuring agency in practice. The larger purpose is to nuance how we can understand the role and consequences of AI in scientific practices – by focusing on actors' work to configure and value agency in the laboratory.

In asking these questions, the article aims to create an analytical distance from the hype around data-driven and AI techniques and situate them in relation to other ways of organising and valuing agency in scientific practice (cf. Ziewitz 2016). One of the key take-aways is that we cannot understand the ongoing data and AI revolution as a clean break from previous practices, but rather, we must attend to how agency and judgement are reconfigured in many different ways in the scientific laboratory – some that have very long histories.

Empirically, the article builds on previous and ongoing fieldwork on the algorithmic practices of the biosciences – broadly construed to include both laboratory work and epidemiology – that has been ongoing for more than a decade (Lee 2015, 2016, 2021, 2023; Lee & Helgesson 2020; Lee, Boman & Ostrowska 2021). This polymorphous engagement with the algorithms, data, and the biosciences has entailed laboratory observations, interviews, and document analysis (cf. Marcus 1998). Drawing on this long-term engagement with the practices of knowledge production in the biosciences, this article identifies and discusses three ideal types of configuring and valuing agency that are used in the biosciences: "concentrated assemblages", "panoramic assemblages", and "emergent assemblages." Each ideal type foregrounds certain epistemic virtues and vices – and backgrounds others (cf. Daston 1995; Lee & Helgesson 2020). This empirical entanglement with the biosciences serves as a foil through which I think about different agential configurations – and how scientific actors relate to them.

The biosciences are a nebulous area of research which can include a diversity of research directions ranging from small scale biological experiments, via analyses of genetics and proteomics, to medicine, epidemiology, or even ecological systems. The label bioscience is difficult to define but is used both to direct scientific policy and funding and defines an area of research centred on life and the living. Wikipedia for example lists 46 different basic research areas in the biosciences, ranging from biology to zoology. In this article I use my fieldwork in various parts of the biosciences as an empirical foil for discussing agency in scientific knowledge production. More on this below.

2 These sensibilities, rooted in actor-network theory (ANT), draw on assemblage-based theories such as Deleuze & Guattarí's (1987) notion of the rhizome (cf. also Latour 1999). However, my introduction of the concept of *agencing* differs from the concept of *agencement*, which denotes the rhizome or assemblage. With the concept of *agencing* – agency as a verb – I aim to emphasise actors' work in negotiating and creating spaces for agency within these assemblages of humans and more-than-human entities.

Analysing Agency in a Technologically Mediated World

> Could non-humans ever be agents? […] Sometimes it seems that there are all sorts of non-human entities, such as cyborgs, intelligent machines. genes, and demons loose in the world. Along with ozone holes, market forces, discourses, the sub-conscious, and the unnameable Other. And, or so many claim, such non-human actors seem to be multiplying. For if angels and demons are on the decline in the relatively secularized West, then perhaps robocops and hidden psychological agendas-not to mention unnameable Others-are on the increase. (Callon & Law 1995:481)

One consequence of the use of technologies in science – and more specifically in the biosciences – is that the space for agency and choice is moved around (cf. Mol 1999). By importing an algorithm, a dataset, or a pretrained AI model from another lab or company, you also import choices made elsewhere to your laboratory (cf. Lee 2021); sometimes in a different part of the same laboratory, sometimes in a different laboratory, sometimes outside of the laboratory altogether – in a hospital wing or in a technology development firm. Choices that are made in other times and places shape the choices that can be made in the here and now. Technology reconfigures agency in the laboratory.

How can we then understand and analyse agency in scientific practice in an increasingly technologically mediated world, where the number of machines and technologies seem to be steadily increasing?

This question is one of the key topics in actor-network theory (ANT):[3] A key argument in ANT is that scientific practice can be understood by analysing the relations between humans and machines in practice, through attending to what ANT calls assemblages or networks of human and non-human actors (Callon 1984; Latour & Woolgar 1986; Latour 1987; Callon & Law 1995). As a result of this relational and practice oriented analytical stance, ANT conceptualises agency as an emergent effect that results from the interaction between both human and non-human actors (Callon 1984; Callon & Law 1995; Latour 2005). This conceptualisation of agency in ANT means that agency becomes available for empirical study in scientific practice. It becomes possible to observe and map how facts, ideas, technologies stabilise locally in practice, sometimes in multiple ways (Latour & Woolgar 1986; Latour 1987; Law 2002a; Mol 2002). It also means that it becomes possible to empirically analyse how agency is distributed between humans, machines, and scientific instruments in practice.

3 ANT, like for instance Karl Marx's (1992) sociological analysis takes an interest in how machinery and technological innovations affect how humans organise society. While Marx's main interest was labour, workers, and capital, ANT was first developed out of an interest in scientific knowledge production but has subsequently been applied to a multitude of fields. ANT is sometimes described as eschewing purely social explanations (Callon and Latour 1992), but just like Marx's analysis of machinery and capital it is interested in the organization of society (Strum and Latour 1987).

However, this does not mean that ANT makes no distinctions between different types of actors in empirical work: research building on ANT often makes descriptions of how different types of actors – be they human or non-human – shape the direction of the collective (cf. Callon 1984; Lee 2021; Mol 2002). The point is not that every actor is the same, but rather that the analyst must not pre-establish which types of actors shape the collective. That is, the analyst must remain empirically open as to which actors – human or non-human – are influencing its direction. Agency thus becomes formulated as an empirical question, not a matter of theory or first principles – the overarching goal of the analysis being to understand how the direction of the collective is shaped: be it by human, machine, animal, nature, or culture (Law 2002b; Mol 2002; Latour 2005).

Later theoretical developments in what is referred to as post-ANT (cf. Law & Hassard 1999) have focused on how the configuration of the network shapes the spaces for agency, choice, and action for different actors in different locations – attempting to nuance early ANT studies' focus on strong actors (cf. Star 1990; Mol 1999, 2002; Callon & Muniesa 2005; Cochoy 2008; Lee 2021). For instance, Cochoy (2008) has analysed how the space for calculative agency is shaped by the physical attributes of a grocery store. The architecture of the store and the pricing technologies place the consumer at a considerably calculative disadvantage. Thus, by analysing the configurations of agency in practice, a sociologist can create an understanding of where there is large room for choice in practice, and which actors have the biggest degrees of freedom. We can analyse where choices are made – and where they are possible to make – in practice (cf. Mol 1999).

Agencing: Actors' work to configure and value agency

However, actors in science aren't cultural, or agential, dopes (cf. Garfinkel 1967; Lynch 2012). They live with, and very well understand, the consequences of these hybrid collectives and configurations. In their everyday work, scientists often have lively debates and disagreements about what is the best way to configure agency in their laboratory, the best way to agence – agency as a verb – their laboratory. They debate about particular ways to tool the laboratory, which tools and ways of organising the laboratory constitute good scientific practice, and which is the best road to follow (Lee 2015; cf. also Thevenot 2002; Lee & Helgesson 2020).

Thus, if ANT's sensibilities opened up for tracing and understanding how agency clusters and disperses in practice, I argue that we can also productively observe actors' discussions, debates, and battles over the agencing of scientific work (cf. Lee & Helgesson 2020). My argument is that in attending to actors' debates about agency we can also observe different styles of agencing of the laboratory. This opens up the possibility for study of how scientists configure agency – as well as how they value different configurations of agency. This means that we can study how different scientists organise, value, trust, and prefer certain ways to agence the laboratory, as well as the yardsticks that they use for valuing a particular mode of agencing the world (cf. Dussauge,

Helgesson, Lee, *et al.* 2015). An important point is that what a specific tool does in a specific situation is not pre-determined, or what a good tool should do, or how actors should value the tools of the laboratory.

This way of understanding the agency (as noun) and agencing (as verb) in the laboratory opens up for analysing the tooling of the laboratory – algorithms, AI models, and data work – through actors' debates, practices, and valuations. What actors at one juncture might see as the logical and best way to tool the laboratory might at another juncture be seen as completely irrational. At certain points actors might have a goal of efficiency, at other points precision might be the yardstick of excellence (cf. Lee 2015).

A reflection on ideal types, actors, agency, and agencing

Below I discuss and outline three ideal typical styles of agencing the laboratory – of configuring and valuing agency in the biosciences. The first two of these styles of agencing – "concentrated" and "panoramic" – I have identified in empirical work I have published elsewhere (Lee & Helgesson 2020), while the last style – "emergent" – builds on empirical work I am currently undertaking in the project "Big Data and AI in the Biosciences: A Scientific Revolution?" Concretely, identification of these styles of agencing is based on interviews and ethnographic observations of scientists in biomedical laboratories that have been done over several years, starting in 2011 and continuing off and on until today. Thus, this article builds on observations of a bioscientific laboratory working with large-scale datasets – that must remain anonymous – as well as interviews, and document studies of various actors in the life sciences that have been ongoing for more than a decade. As ideal types, these styles highlight certain key features of how actors configure and value agency – how they work to agence the laboratory. These styles are not mutually exclusive in practice, but elements of all three styles are represented in bioscientific laboratories (cf. Lee & Helgesson 2020). The point of this exercise is to identify some of the tendencies and differences that exist between these different styles of agencing in the biosciences. The overarching aim is to discuss "Big Data" and "AI" not as a radical break from other laboratory practices, but as part of a continuum.

Agencing Concentrated Assemblages: Know Your Specimen

> Imagine a group of scientists working with biological experiments on animals. Their goal is to find the mechanisms of limb regeneration. The dream – it seems far off, probably not achievable in their lifetime – is to be able to find a way to regenerate human limbs. Their method is to run experiments with a few animals, and to understand the process of limb generation in excruciating biological detail. Each animal is studied with painstaking attention. Animals are anesthetized and limbs are amputated so that the regeneration process can start. Some of the animals are bathed in a fluorescent solution that makes it possible to study various

> parts of their cells under the microscope. Over several weeks the regeneration process is photographed daily. Computed tomography scans are done to create 3D images of the regeneration process, and 3D models are constructed. Techniques to assess DNA changes and protein activation in the cells are done. Which cells are active? What is happening in the cells? Each animal seems to open up a universe of regeneration in itself. Many hours, and many resources are poured into a few animals to understand – with elaborate precision – how limbs are regenerated.[4]

In the ideal type of concentrated agencing the focus of work is often on the individual specimen – a test tube with body fluids, an animal, a cell under a microscope, a plant of corn. The hybrid collective in this ideal type is centred around one specimen, a particular experiment, or a particular scientific apparatus. Imagine a researcher toiling away at their workbench, trying to understand the minutiae of their specimen. Human judgement and assessment are seen as central by the actors. By working closely with individual specimens or data points, researchers describe how they build trust in the data. Observations made on what actors sometimes describe as "raw data" are valued over massive amounts of data (cf. Lee & Helgesson 2020).[5]

An ideal typical example of this type of hybrid collective and this style of agencing the laboratory is described in Evelyn Fox Keller's book *A Feeling for the Organism* where she documents the Nobel Prize winner Barbara McClintock's work in genetics. In her work, Keller documents how McClintock developed intimate knowledge about individual biological specimens – plants of corn. By knowing her corn plants intimately McClintock developed her genetic theories that would eventually earn her the Nobel Prize (Keller 1984).

However, like any mediated human action, this style of agencing the world also draws on hybrid collectives of human technology – collectives of humans and non-humans (Strum & Latour 1987). As the vignette makes clear, in small-scale biology, artefacts and machines abound: Microscopes, sample handling robots, DNA sequencers, test tubes, and so on. In small scale physics, vacuum chambers and particle toolboxes might be in use. In the small-scale psychological laboratory, there might exist behavioural machines to test human or animal behaviour. Even qualitative social research is deeply dependent on technology: papers, pens, computers, printers, databases.

Agency is moved around by all these devices. Choices that were made in the construction of the DNA sequencers, the SPSS software, and vacuum chamber – shape what kinds of analyses can be done. Thus, in any laboratory agency is moved around by hybrid collectives of machines and humans.

However, just like McClintock, in the concentrated ideal type, the actors that I have studied seem to centre the agencing of the laboratory on building hybrid collectives with large possibilities for human assessment and judgement – tied to ideas about knowing the

4 Vignette based on a published paper from an anonymous researcher whom I have interviewed. To preserve anonymity, species and specific techniques are described in a general manner.

5 Although the concept "raw data" is an interesting oxymoron in itself (Gitelman 2013).

specimen and the "raw" data. In these small data settings, the actors' biggest fears seem to centre around not knowing the specimen or data intimately enough. It is a fear about data that has been collected at other times and places (Lee 2016; cf. also Edwards, Mayernik, Batcheller, *et al.* 2011; Amelang & Bauer 2019). It is a fear tied to how algorithms could destroy the data by massaging it too much (Lee & Helgesson 2020).

This style of agencing – this style of configuring and valuing agency in the hybrid collective – is however not constrained to concentrated assemblages alone; the importance of human judgement is often stressed in different situations. In sum, in this ideally typical style of agencing human judgement, assessment and action are highly valued.

Panoramic Agencing: Handling the Multitude

> We are in an anonymous high throughput laboratory somewhere in Europe. I am discussing the use of algorithms for data processing in high throughput bioscience with an informant. He explains that comparing biological samples is not a straightforward thing. That there is just too much data to be able to understand each sample intimately. The details of each sample fade into the fog of quantities and multitudes. But nevertheless, the samples vary in amplitude, and the machines that are used to analyse them can introduce noise. There seems to exist complexity in quantity. My informant explains how they handle these complexities of quantity. He describes how they use algorithms to process the data to remove potential noise introduced by the machinery of the laboratory, and how the dynamic range of each sample is adjusted so they can be compared and analysed for patterns. The questions we are discussing are difficult: What is data and what is noise are not questions that the data scientist can give straightforward answers to – in principle. But the whole laboratory is premised on the possibility of constructing a workable algorithmic solution to the problem. The high throughput nature of the work demands practical solutions – and data processing algorithms provide a workable way out of the data conundrum. Algorithms are imported from other laboratories and adjusted to the local laboratory. But what are sources of noise in the machinery? How can they remove them? How can the samples be made comparable?[6]

What I here refer to as a "panoramic" style of agencing is different from "concentrated" agencing. In this ideally typical style of agencing the virtues of automation and algorithmic action are prized by the actors I have observed and interviewed. In this mode of configuring and valuing agency it is the promise of data-driven inquiry that is valued. The advantages of algorithmic data processing, through automatic cleaning

6 Interview and vignette constructed based on fieldwork in a high throughput laboratory in Europe.

and normalisation, are prized. The epistemic promise of processing massive amounts of data to find patterns and correlations is highly sought after. An ideal type of this style of agencing might be the push towards Data-Driven Life Science that is ongoing (cf. 'Data-Driven Life Science (DDLS)', n. d.), where it is argued that "The concept of data-driven springs from the modern technological advances that continue to bring about mountains of systematic, comprehensive, and deep data" ("DDLS What is data-driven life science?" n. d.).

In a panoramic style of agencing, certain types of machines and technologies are central. The statistical massaging of data, databases, algorithms, and computation are essential components of this style of agencing the laboratory. In panoramic science, technology is deeply entrenched in a specific type of scientific practice. By amassing huge amounts of data – ecological, biological or other data – it is hoped that we could unlock secrets to biological, social, and natural facts. Here what is centred is not human action but rather *algorithmic action* on wide arrays of data. In this style of agencing human judgement is not the centre of attention. It is the configuration and assembling of a certain type of machine agency that is at the actors' centre of attention.

In this ideal type the focus of actors seems to be on building hybrid collectives with the right types of machines and machine-like judgement. "Raw data" is not sought after to know intimately but the variability of different data points is seen as a challenge to be computationally solved – so that large-scale algorithmic comparisons can be made. The complexity of quantity is seen as a challenge that only algorithms and computational techniques can solve in practice. The biggest fear isn't being close enough to the data but rather to use computation to clean the data from biases, confounders, and noise.

This style of agencing – this style of valuing different configurations of the hybrid collective – is not constrained to big data settings. The importance of data and the statistical cleaning of data is stressed in many epistemic locations. We can recognise these ways of understanding science from a multitude of locations. Social science, biology, psychology, and sociology are increasingly turning to the panoramic styles of agencing epistemic work.

Emergent Agencing: Find Your Function

> "Approximately 85% of machine learning work is data work. I'm exaggerating a little. But that is the legend in the field." I am having coffee with a computer scientist who has been working with artificial intelligence for 30 years. He has been working with medical and biological data for much of that time. We are discussing the changes brought about by machine learning. He is describing how he can adapt machine learning models to local situations by retraining them on a local dataset, and how different metrics of success can be used to evaluate the model. He is fascinated by the power of the machine learner to find patterns that he has not told it to look for: The image recognition AI – used to detect

> depression in mothers' faces – not only sees different emotional expressions, but also groups the data on actors' faces. It seems magical. But the initial statement highlights that the power of machine learning is premised on making a good data world, selecting and curating the data that the machine learner is both trained and retrained on. It is also premised on finding metrics of success – to evaluate if the machine learner is good at what it does. What is good data for the machine learner, and how can we measure its success?[7]

Our third style of agencing science pertains to work using AI and machine learning. In this ideally typical style machine learners are valued for their "magical" power to find statistical links where humans cannot (Campolo & Crawford 2020). This style of agencing stresses the power of machine learning to find the right function that can generalise from a massively multidimensional dataset (Mackenzie 2015). Thus, the machine learner generalises through function finding, and humans test the performance of models on sets of data – so-called "ground truth" datasets (Jaton 2017). While the panoramic style focuses on pattern finding across large datasets, the emergent style prioritises predictive modelling and function generalisation through machine learning.

In this style of agencing, working with data is not mainly tied to working with specific data points or to a specific specimen like in the concentrated style of agencing. Nor does it seem to be about removing noise or finding confounders like in the panoramic ideal type. Instead, in the emergent style, worries are centred around making the data tractable for the machine learner; to incorporate data into data standards so they can be used to train a machine learning model; and removing outliers that make the machine learner less adept at prediction. The function that describes the dataset's characteristics shouldn't be too close or too loose, or the machine learner loses predictive capacity.

A common practice is to assess a machine learning model based on performance metrics grounded in evaluations against a particular dataset – what is often called a ground truth dataset (a term borrowed from meteorology) (Krig 2014a; Jato 2017, 2021). Ground truth datasets are sometimes described as the true measurements of what you want to predict. Sometimes these ground truth datasets are made publicly available for others to use in other settings (Krig 2014b). Sometimes the dataset is divided so the machine learner is trained on one part of the sample, and assessed on the other part (Lee 2021).

In training machine learners, it seems that actors' focus on creating suitable configurations of agency is shifted even more away from individual samples. In constructing machine learners, actors focus their energies on creating a good hybrid collective for the machine learner. The actors' focus lies on massaging data, transforming the data into vectors (a mathematical representation that is amenable for machine learning), choosing the right clustering algorithms for the particular aims and datasets, and

7 This vignette is a composite of multiple interviews and conversations about how machine learning is used in the practices of the biosciences.

sometimes dividing the data into suitable periods so that the machine learner does not apply an old analysis to a new dataset (cf. Lee 2024).

The challenges that actors bring to the fore in the emergent ideal type seem to focus on the needs of the machine learner to predict, classify, and decide about the world. Here the style of agencing becomes centred around valuation of the predictive power of the machine learner. Human action is taken to order the world for the machine learner to be able to predict. There is a constant oscillation between human tinkering with data and evaluation of the machine learners' predictive outcomes.

In the emergent style of agencing it is not the treatment of individual data points that is central, nor is it tinkering with the parameters of the algorithm that is central, but tinkering with data that is used to train the model, and different ways of evaluating what is the right function that describes high dimensional datasets.

Agential Reconfigurations of the Sciences: Overestimations and Underestimations

How then is agency reconfigured in scientific investigations in a science driven by AI? What is seen as a good way to configure agency and judgement with the introduction of AI in the biosciences? Is there a wholesale change of culture of bioscience with the introduction of AI? These are large and complex questions that do not have a singular answer. It is easy to both overestimate and underestimate the changes brought about with the introduction of AI into the biosciences. There are as many ways of organising laboratories as there are laboratories, and the cultural forms of scientific investigation vary between laboratories, but also in the same laboratories (Knorr Cetina 1999; Lee & Helgesson 2020).

Underestimations: It would be a mistake to treat the ongoing introduction of AI technologies into the biosciences and other scientific fields as more of the same or business as usual. The retooling of scientific laboratories often changes how we can know and what we can know, leading to new scientific discoveries and ways of understanding the world. For instance, new technologies such as X-rays have allowed us to see inside living bodies leading to new understandings of the body and how it works (Jülich 2002). Some biologists lament the ongoing introduction of AI, criticising the AI revolution for giving up on understanding the causes and biological basis of phenomena in favour of statistical correlations (cf. Fujimura & Chou 1994). There is a change going on in the scientific culture and organisation of biosciences.

One such change is that the agencing of laboratories is different in a small-scale wet lab from in a big data oriented bioscientific laboratory using AI technologies. Just as Knorr Cetina (1999) observed the differing epistemic cultures of high energy physics and biology, the content and tooling of work in the bioscientific laboratory is changing the cultures of research. Agency, and the space for action and judgement, is organised differently in a big data- or AI-driven laboratory, from in a traditional biological wet lab. New ways of putting together the hybrid collectives of science emerge. New spaces for agency and choice are created and old ones are destroyed. For example the

intimate knowledge of the specimen that is espoused in traditional wet labs is made more difficult in a big data setting – especially when data collection is done by other actors in other settings and locations – perhaps decades and continents away – and thus produce different patterns of calculative agency (cf. Callon & Muniesa 2005; Amelang & Bauer 2019).

Another change in the epistemic culture of the biosciences is that the traditional tinkering with specimens in the wet lab is replaced with tinkering with AI models in certain laboratories, offices, and situations. If concerns associated with traditional wet lab work are related to tinkering with biological samples, the big data laboratory adds fears about the dangers of "raw data", while the AI lab adds concern for the machine learning model and its predictive capacities (Lee & Helgesson 2020). These concerns are additive, not exclusive. But the concerns surface in different locations, situations, and places.

Consequently, we are witnessing a reconfiguration of the hybrid collectives – the agencing – of the life sciences. The division of labour between different actors – seen for example in the advent of the field of bioinformatics and in the birth of professional data stewards – is changing. Spaces for making judgement calls and for making choices are changed when the life sciences start working with data-driven methods and applying machine learning to datasets.

Overestimations: However, AI and big data do not change everything about the biosciences, nor about science more broadly construed. It would be a mistake to treat science as undergoing a wholesale change because of the introduction of new technological tools for investigation. Some scientists still worry about individual samples and data points. There is a lively discussion about applying AI to scientific work and the need for collaborations between AI experts and so-called domain experts (read life-scientists) that can help interpret and understand the data that AI experts, with the help of machine learning technologies set out to analyse (Lee, Boman & Ostrowska 2021). The varied, detailed, and intimate knowledge about the biological world that underlies the interpretations of the data that we feed learning machines seems still to be valued and necessary in the bioscientific laboratory.

Furthermore, agencing the AI-driven research laboratory is still dependent on biological samples translated into data points, which are then harnessed to train AI models that are used to predict or classify other data points. However, care for the individual biological sample in the AI style of doing research is often handled in one situation – where data collection happens (sometimes in a completely different part of the world) – while AI analysis of the data happens in another situation – in a computationally driven analysis of the characteristics of the world; the *world-as-specimen* and the *world-as-data*. However, this division between the *world-as-specimen* and the *world-as-data* does not differ much from epidemiology, quantitative sociology, or other quantitatively oriented fields of inquiry. Just as quantitative fields of any kind rely on data collection work done elsewhere, AI analyses of biology depend on data collection work done in other settings.

Thus, the biosciences seem to be going through a technological and cultural change,

but it would be a mistake to understand this as a completely new configuration of epistemic agency. We might even understand this configuration of agency in the AI laboratory as building on statistical epistemic configurations going as far back as the birth of statistics in sociology in the 1700s and 1800s (Gigerenzer *et al.* 1989).

Scientists Have always Been Hybrid: Three Styles of Agencing the Laboratory

What happens with human judgement in science, when we retool our epistemic endeavours? In this article I have explored this question from the point of view of the concept hybrid agency which was developed in ANT. I have paid particular attention to different styles of agencing (agency as verb) science and the AI laboratory. I have discussed how agency clusters and disperses depending on different technological configurations of laboratory work, and tentatively sketched three ideal typical styles of agencing laboratories in the life sciences: in concentrated assemblages, in panoramic assemblages, and in emergent assemblages, using machine learning.

Theoretically, the article contributes in two ways: First, by developing a sensibility to the actors' work of agencing (agency as a verb), which suggests that we can analyse different configurations of agency, and how actors value it. This concept builds on ANT's insight that agency can be analysed as an empirical phenomenon but refocuses our analytical attention on how actors construct different configurations of agency in practice. This analytical approach allows us to construct empirically sensitive accounts that allow us to describe how different technologies reshape scientific practices. Second, the article highlights that agency is not only an emergent phenomenon, but is also contested by the actors who actively debate which hybrid collectives should count as good science (Lee 2015, 2016). Actors are not agential dopes, but actively work to shape the hybrid collective (cf. Garfinkel 1967).

This way of approaching agency in knowledge production could also help actors in biomedicine – or in knowledge production more broadly – reflect on how they tool their laboratories. Different ways of agencing the laboratory shape how and what we can know – and today, with rapid technological developments in AI, there is a crucial need for critical reflection on how different ways of configuring agency in the laboratory shape expertise, the space for judgement and choice, and ultimately our possibility to produce knowledge.

Analytically, I have argued that there are both underestimates as well as overestimates of the epistemic changes that AI brings about. On the one hand there are huge changes in how agency, judgement, and the possibility of choice is distributed in an AI laboratory. The traditional focus on specimens in the laboratory is complemented with increasing focus on the predictive capacities of the model. On the other hand, it is easy to overestimate the differences that the sciences are undergoing in the push towards data-driven and AI methods. Extensive expertise is still required in the specific domains where AI is applied, both to train the models effectively and to understand how to manage and interpret the data. And the epistemic culture of data-focused

knowledge production is at least as old as the birth of sociological statistics in the 1700s and 1800s.

In sum, the article has argued that AI and big data should not be regarded as a sweeping rupture in the tooling and practices of science – but rather as a continuation of long-standing patterns of practice. By analysing the agencing of the laboratory as part of a historical continuum, rather than buying into an ongoing "AI revolution" as a wholesale package, this article offers a critical and analytical lens that attends to ongoing and historically situated practices of doing science (cf. Ziewitz 2016). In conclusion, the idea that data-driven science and AI are replacing the scientific method seems vastly overstated. Agency, judgement, and choice are crucial for science with AI to work. Agency is reconfigured with technology. But we are not seeing a wholesale reconfiguration of the biosciences yet.

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Author presentation

Francis Lee is associate professor of technology and social change. He works as a lecturer at the Department of Media Technology at Södertörn University, Stockholm and senior researcher at the Department of Science, Technology & Society at Chalmers University of Technology, Gothenburg.
Contact: https://francislee.org.

KATARINA WINTER & KLARA HERMANSSON

(Dis)affordances and abandonment

Understanding everyday user engagement with security apps

Abstract
In recent decades, numerous security technologies have emerged with the aim of fostering secure communities and providing people with the tools to bolster their everyday safety. Focusing specifically on security apps, this article explores how apps addressing security in public and semi-public spaces constitute preconditions for everyday user engagement, and vice versa, how users actively respond to these preconditions. Through identifying the (dis)affordances involved in such processes, we investigate co-production of user engagement with security apps. Drawing on observations and interviews with producers and users of apps, we explore the landscape of security apps as pervaded by processes of intended and actual (dis)affordances, sometimes also leading to abandonment of both use and users. A key finding is the divergence between the intended purposes of these apps – often framed around broad security ambitions – and their actual use, which frequently intertwines with mundane routines and logistical needs. This divergence paradoxically legitimizes broader securitisation discourses, even as the apps' "successful use" often reflects a relatively privileged everyday life distant from tangible threats, highlighting the complex interplay between market forces, user practices, and the normalisation of surveillance.

Keywords: Security technologies, mobile applications, (dis)affordances, user engagement, securitisation

THE PRESENT ARTICLE examines mobile applications as a case study of security technologies aimed at enhancing everyday public safety. Along with a development where digitalisation has increasingly influenced various aspects of welfare (Andreassen, Kaun & Nikunen 2021), the notions of safety and security[1] have evolved, shifting emphasis from conventional welfare issues to concerns related to (fear of) crime (Hermansson 2018; Sahlin Lilja 2018; Stanko 2000). Numerous security technologies, ranging from CCTV to sensors and mobile applications (hereafter apps) have emerged to foster secure communities and provide societies and individuals with the tools to bolster everyday security. At least that is how such technologies are introduced to their potential users in the increasingly growing security market. Focusing specifically on apps, this study explores how apps addressing security in public and semi-public spaces create

1 The Swedish concept of "trygghet" encompasses both safety and security, while its counterpart "otrygghet" (insecurity) refers to people's fear of crime, general insecurities, and the material risk of being subjected to crime. In this article, safety and security are used interchangeably.

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preconditions for user engagement, and, conversely, how users actively respond to these preconditions.

Apps are entrenched in our mundane routines and everyday life (Morris & Elkins 2015; Dieter et al. 2018), and scholars have engaged in app studies on various topics, such as health, shopping, and dating. However, security's broader and more nuanced societal implications remain understudied from perspectives involving apps (Wood, Ross & Johns 2022: 1093). These implications include increased societal insecurity due to technological changes (Zuboff 2019), security's role in contemporary responsibility (White & McMillan 2020) or inequality perspectives (Costanza-Chock 2020) and shifts in mundane communication patterns (Ling & Lai 2016). This gap can partly be explained by the slow appification of crime prevention, "the creation of apps designed to prevent crime through a variety of measures", which has primarily focused on law enforcement, surveillance, and correctional treatment (Wood, Ross & Johns 2022: 1094).

Empirical insights into the everyday routines of security apps can contribute to understanding how societal and political shifts brought about by digitalisation and the expansion of securitisation (Neocleous 2008; Ferguson 2017) intersect with everyday life. The 11 September 2001 attacks marked a significant turning point in global security policies, making threat discourses central in international relations. By framing discourses as existential threats, extraordinary measures such as new laws and policies that prioritise security over other societal needs are justified. This article provides an analysis of some of the often-neglected everyday technologies that emanate from such expansion of securitisation, specifically focusing on security apps.

Acknowledging the call to "move from content to practices" (Dieter et al. 2018: 13), we examine how apps addressing security in public and semi-public spaces interact with everyday activities. This approach necessitates sensitivity to the complexities of user engagement, not only because much happens between producers and users of apps, but also because users actively engage with apps in diverse ways. We combine the concept of (dis)affordances (Costanza-Chock 2020) – the possibilities and hindrances for engagement that apps offer their users – with an approach that considers users' active and mundane (e.g. practical and emotional) use to explore how they collectively participate in co-producing user engagement.

Security apps in context

International research has identified the increased importance attached to security and fear of crime in western criminal policy in recent decades (Stanko 2000; Bauman 2006; Hermansson 2023). When "fear of crime" first emerged as a public and political concern in the 1980s, it was understood as being closely connected to the risk of victimisation (Garland 2001). Today, insecurity and fear of crime have been established as concerns in their own right (Young 1996; Hermansson 2018). Through the discourse on insecurity, we are all constituted as "potential fearers" according to Young (1996), and crime becomes a problem concerning us all (Andersson 2010; Hermansson 2018).

The normalisation of (in)security as an everyday local and global concern has been discussed by various scholars in securitisation, surveillance, and policing studies (e.g. Hope & Sparks 2000; Massumi 2005; Franko, Gundhus & Lomell 2008; Low 2008; Fawaz & Bou Akar 2012; Fassin 2014; Riddell 2023). This normalisation legitimises the expansion of control in general, and digital technologies in particular, to protect the public (e.g. Maguire, Frois, & Zurawski 2014; Masco 2014). Scholars have raised concerns about how securitisation can be counterproductive, leading to increased feelings of insecurity (Flyghed & Hörnqvist 2003; Low 2008), and moreover, how responsibility for crime prevention has become individualised as well as privatised (Garland 2001; Aas 2006; Winter 2025).

Security apps lie at the intersection of these processes. Their societal establishment can be viewed as a manifestation of responsibilisation processes, where private companies actively seek to participate in (and position themselves as solutions to) crime prevention and safety enhancement. Simultaneously, the use of apps could potentially reinforce the individualisation and privatisation of responsibility for crime prevention, shifting focus from collective, societal approaches to personal, smartphone-based initiatives.

Researchers have examined mobile apps and their social implications across various disciplines, including Criminology, Sociology, Science and Technology Studies (STS), and Critical Data Studies. While security aspects have received some attention, much of the research has focused on apps in other areas of life. As apps constitute a significant part of contemporary everyday life, user perspectives have been explored in studies of health (e.g. Pink et al. 2017; Lupton 2012; 2014) and dating-related (see, e.g. McVeigh-Schultz & Baym 2015; Broeker 2023) apps. Continuing on user perspectives, research has also investigated users in algorithmic imaginaries (Bucher 2016), users' understanding of data collection and datafication (Lai & Flensburg 2020b), discrepancies between users' opinions and actions (Barth & de Jong 2017), new coalitions such as the "produser", "prosumer", and "produsage" (Michael & Lupton 2016), and how users become commodified through app data production and use in commercial as well as functional ways (Flensburg & Lai 2022).

App studies using a CDS approach have mainly emphasised perspectives on data, ownership, and privacy. Studies have, for example, examined the surveillance ecology and infrastructures involved in communication control, collection and distribution of data through apps, and how market actors navigate power (Lai & Flensburg 2020a, 2020b; Flensburg & Lai 2022).

Studies on apps in relation to security and crime prevention reflect the public debate on how new technologies, in general, often present a polarised view, either celebrating techno-utopian success or highlighting failures and risks (Costanza-Chock 2020). While some studies emphasise crime preventive apps' various functions and potential (Cumiskey & Brewster 2012; Chand et al. 2015; Viswanath & Basu 2015), others warn about risks associated with the use of new digital tools. Such risks relate to, for example, increased vulnerability (Wood, Ross & Johns 2022), undermining of victims of crime (White & McMillan 2020), or exacerbation of racism and structural violence

(Kennedy & Coelho 2022). Research has shown that apps can create an illusion of control (Maxwell et al. 2020; Kettrey et al. 2024) and reproduction of fear (Simpson 2014). Other risks include negative consequences for tracked children (Malone 2007; Oostveen et al. 2014; Simpson 2014) and increased possibilities for stalking (Fraser et al. 2010; Chatterjee et al. 2018; Messing et al. 2020). Studies have also explored tensions between "good" and "bad" effects, for example, discussing how apps bring both safety and anxiety, surveillance (surveillance from above) and sousveillance (surveillance from below) (Riddel 2023), how responsibilisation is transcoded into the apps themselves (Wood, Ross & Johns 2022: 1105), and that users in high income areas are more likely to use these apps (Ceccato 2019). In addition, although not a phenomenon exclusive to security apps, societal enthusiasm over apps as exemplified by media and political narratives is hardly supported by research or evaluation. Apps lack evidence; systematic evaluations of crime prevention apps or studies on their efficacy in reducing victimisation are rare (Wood, Ross & Johns 2022, their evaluation is an exception).

Security apps in relation to user perspectives are particularly understudied. Given the ethical complexities surrounding security technologies and app use (e.g. data collection on citizens, location-sharing and tracking, normalisation of surveillance, etc.), and moreover, that security apps are both broadly and specifically motivated by arguments on public engagement for public safety, it is crucial to increase knowledge on users of security apps and how their engagement intersects with broader social processes. For example, security apps bring new and old actors and interests for public engagement and responsibilisation. In relation to this, existing studies have emphasised the need to scrutinise how neoliberal rhetoric of empowerment and self-reliance is reinforced through digital security consumption, promoting new forms of public engagement tailored to markets and private interests rather than to the needs of individual citizens (Kennedy & Coelho 2022).

Previous research has stressed the need to explore mundane data – data generated in everyday situations without people noticing or acknowledging – to theorise change and to contextualise the massive amount of digital data used to explain and predict future developments in contemporary society (Pink et al. 2017). We explore users' everyday routines with apps as a meaning-making enterprise that legitimises the continuous generating of mundane data. Users are engaged both as producers of and content in data through their everyday use of mobiles (Michael & Lupton 2016), and they are ascribed responsibilities for their own and others' security. Apps reshape the landscape of public engagement, presenting both hindrances and opportunities in addressing new and old societal problems either as caring and responsible citizens or as potential victims of crime.

Methodological-analytical framework

To comprehend user engagement with security apps, it is crucial to consider both producers[2] and users (Bucchi & Trench 2014). This study draws on a broad empirical base, combining an overview of the security app field with interviews with and observations of both producers and users.

Data collection spanned from spring 2023 to spring 2024. Initially, we mapped all available apps, documenting how purposes, functions, users, and use were formulated within each initiative. This mapping, continuously updated, currently includes 48 apps. Case studies involving interviews and observations were selected, drawing inspiration from Wood, Ross & Johns's (2022) evaluation of crime prevention apps. While their identification of six app types – self-surveillance apps, decision aid apps, child-tracking apps, educational apps, crime-mapping/alert apps, and crime reporting apps – is largely mirrored by our mapping, Swedish apps tend to be more hybrid, often combining multiple functions. For instance, apps include alerting *and* reporting, or self-surveillance *and* child tracking. The apps are often initiated by coalitions of different private and public actors such as influencers, entrepreneurs, academics, and professionals/practitioners.

We analysed app descriptions user reviews from app stores and additional material from web pages and advertising campaigns (information on products, publicly available interviews with company CEO's as well as users, etc.). Two overarching framings emerged: *increased security* and *community building for prevention and safety*. Through our mapping, five primary app functions were identified: obtaining information, enabling communication (with specific community members or users in general), alerting (community, alarm central or private guards), sharing data/location, and reporting (crime, and/or activities of in/securities). Three broader user categories were found: apps for the general public, for organisations responsible for public safety (e.g. schools, municipalities, universities, etc.), and for specific publics (e.g. parents, neighbourhood specific users). We selected one case from each category for detailed analysis.

Producers were contacted via email, while users were reached through official contacts (such as school principals) and thereafter snowballing, or through social media calls. Interviews were conducted through individual physical meetings (three producer interviews and six user interviews), digital individual interviews (ten user interviews), and physical participant observations (two full-day workshop observations). Producer interviews focused on app framings and expectations, while user interviews explored everyday processes related to app use (or lack of use). All interviewees were pseudonymised and quotes were translated from Swedish to English, preserving original meanings as closely as possible.

The material was coded using Nvivo software. We applied an open coding strategy

2 While it is also important who gets to develop apps, we are here focusing on who gets to use them, and how. Therefore, producers are examined only in the way they create preconditions for user engagement.

inspired by Charmaz's (2006) grounded theory approach, initially treating each case as a separate unit to identify similarities and differences. Subsequently, focused coding grouped codes based on intended and actual use. This process identified variations, contradictions, and coherence in how apps, use, and users were ascribed to and infused in overarching discourses and practices of security on the one hand and everyday life on the other. This work was iterative, maintaining focus on empirical data while remaining sensitive to potential theoretical insights.

To analyse the forms of use that apps require and/or provide, we employed the concept of (dis)affordances. Affordances is a widely used notion of "action possibilities" (Gibson 1966, 1979). Later introduced to various fields including Design Studies (Norman 1988), Sociology, and Science and Technology Studies (STS) (Hutchby 2001) this concept has sparked various debates regarding its relevance and usefulness (see e.g. Woolgar 2002; Hutchby 2003; Rappert 2003; Bloomfield, Latham & Vurdubakis 2010).[3] Our approach draws on two key claims acknowledging the complexity of this debate.

Firstly, engaging with affordances necessitates exploring not only *what* an affordance is, but also *when*, for *whom* (Engestrom 1990; Bloomfield, Latham & Vurdubakis 2010), and, we argue, *where* it occurs. This aligns with Costanza-Chock's (2020) emphasis on examining affordances from perspectives of inequalities in availability and perceptibility. Costanza-Chock (2020) illustrates how technological objects, through their disaffordances, can reproduce inequalities and lead to exclusion, even when inclusionary intentions exist. This occurs because structures are hard-coded into technologies through unintentional mechanisms such as assumptions about end users and biases in data sets.[4] Consequently, we attend to the intended and actual use and users of these apps, as well as the temporal and spatial context in which they operate.

Secondly, we approach affordances as a subject for analysis rather than explanation (Rappert 2003), engaging with affordances as a process of co-production between ac-

3 Affordances is a concept coined by American psychologist James Gibson (1966, 1979) and early adopted and further introduced by design scholar Donald Norman (1988) and others to explain "the characteristics or properties of an object that suggest how it can be used. It shows a user that an object can be interacted with" (Interaction Design Foundation 2024). Since its introduction into Sociology and Science and Technology Studies (STS) by Ian Hutchby (2001) as well as its significant impact and/or transition into other fields, it has been a concept of dispute (see e.g. Woolgar 2002; Hutchby 2003; Rappert 2003; Bloomfield, Latham and Vurdubakis 2010). Whether the use of affordances can solve the determinism/constructivism divide in STS (Hutchby 2001) is not our focus here. We are also humbly aware of the potentials of other closely related concepts such as scripts (Akrich and Latour 1992). Our analysis was primarily empirically grounded, and Costanza-Chock's (2020) approach on (dis)affordances turned out to be particularly useful for attending to the empirical insights made, especially regarding the inequalities built into the expectations and practices of security app use.

4 According to Costanza-Chock (2020: 57), researchers must "denormalize the universal user" and engage with how "design reproduces a matrix of domination". The matrix of domination (originally a term from sociologist Patricia Hill Collins) refers to race, class and gender as intersecting systems of oppression, and is thereby linked to intersectionality. Such structures are "hard-coded into designed objects and systems" because of unintentional mechanisms such as assumptions about end users and bias in data sets. Although we do not engage fully with the domination matrix concept, it is indeed useful to illuminate what kind of user that the apps are encouraging and intending.

tors, discourses and practices. This approach recognises the interplay between intended and actual everyday app use. Following Michael (2000), we view affordances, users, and use as *co-present* with other people, objects, discourses, spaces, and temporalities. As argued by Bloomfield, Latham & Vurdubakis (2010: 428), affordances can be "catalysed by or interfered with" by co-presence. For instance, the co-presence of different temporalities – such as potential future threats perceived as rational concerns to address in the present, or future intentions to discontinue app usage (e.g. ceasing to track a child as they enter adolescence and require more privacy) – effectively legitimises the app's use, thereby catalysing its affordances.

Costanza-Chock differentiates between disaffordances – actively blocking certain users from use (e.g. stairs preventing wheelchair users from entering a building) – and dysaffordances – allowing use but forcing users into discriminating compromises (e.g. binary choices for non-binary individuals). While these examples illuminate inequalities related to affordances, our analysis reveals examples that exist between the "dis" and "dys" of affordances. For the sake of simplicity, we will use the term "disaffordances" throughout the study. Furthermore, to emphasise the co-producing aspects of "non-use", we introduce the concept of abandonment. While disaffordances refer to processes stemming from the apps or their producers, processes of abandonment may originate from users themselves or from inherent disaffordances within the technologies.

This framework allows for a comprehensive examination of security apps, exploring how they create preconditions for user engagement and how users respond to these preconditions. It considers engagement as an act of co-production of producer intentions and user experiences within the broader contexts of security discourses and everyday practices.

Results

This article addresses user engagement as processes of co-production, where producers of security apps frame their initiatives and create preconditions for user engagement, and users actively respond to these preconditions. Both producers' intentions and users' actual engagement with security apps are ongoing negotiations, produced at the intersection of discourses and practices associated with the apps. We analyse affordances as well as disaffordances associated with the apps in relation to both producers and users.

Intended affordances: Producers' perspectives

The framing of security apps, as found in marketing campaigns, news articles, and app store descriptions, draws on overarching securitisation discourses. These portrayals depict a negative societal development concerning crime and (in)security, coupled with solutions offered by the app. While the "security" addressed by these apps is broad in scope, the problems they target are often narrower, frequently linked to threats of violence in public spaces and perceived dangers of the stranger or unknown. The following quotation from a security app company's web page, illustrates this framing as the producer positions their initiative in the context of a society described as increasingly unsafe:

> Safety for everyone. Society has changed. Today, 28% of all Swedes between 18-65 years old feel unsafe in their own residential areas, and we want to change that. We are a security-enhancing company with a mission – to make people feel safer. Our first initiative has been to develop a service that most people can afford. We are Sweden's first mobile alarm. If you feel unsafe, just release the button and we'll send a security guard to your location. (Producer N, security app directed to the public)

The statement reflects a negative societal narrative about increased insecurity among Swedes and highlights the need for reliable solutions to address this issue. The company positions itself as a security-enhancing entity striving to make people feel safer while promising "safety for everyone" and affordability for "most people" to act to enhance their safety. Several apps employ similar rhetoric regarding an increasingly unsafe society, addressing insecurities related to walking home late at night or rising incidents of lethal violence. Although the target groups for these apps may differ, there is a consistent focus on securing oneself and others, while presenting the apps as reliable solutions to imagined threats.

To further understand the intended use and users of security apps, we examine their built-in functions. As touched upon above, common functions include alerting and reporting. Other main functions are communication tools, data sharing, location tracking capabilities, and obtainment of information. Thus, intended users are conceptualised as individuals who need or desire these functions – those seeking alarm capabilities, wanting to communicate with other users or specific community members, seeking to report activities, obtain information, or having needs related to the possibility of sharing their location.

While various uses for these functions can be envisioned, they often reflect singular and homogenous problems and possibilities. For instance, accurate information combined with efficient communication is fundamental to many apps. The apps claim to provide users with insights related to crime and security. However, as mentioned earlier, this information predominantly pertains to public spaces – how safe individuals perceive different areas, the inconveniences associated with these spaces, as well as to be informed by others or by the app about such activities in public space. Additionally, these apps aim to facilitate effective communication among community members to enhance overall feelings of security and establish efficient communication routes during emergencies and threats. While these motives appear broad and flexible at first glance, communication, as well as the other functions, are secondary to, and serve, an overarching security logic:

> In recent years, Sweden and other European countries have witnessed a troubling increase in school attacks and critical incidents, underscoring the urgent need for reliable school safety solutions. Schools must be prepared to respond rapidly — communicate effectively and ensure compliance with established action plans for any emergency or everyday incident. (Producer K, security app for organisations and workplaces)

This quote from an app's promotional material exemplifies the typical framing of security apps discussed earlier, specifically regarding communication functions. Intended affordances are framed as conditional upon perceived security threats such as school attacks. The recurrent reinforcement of stereotypical fear scenarios alongside enthusiasm for app features designed to mitigate such security concerns is prevalent throughout the material. Alternating between micro and macro, the big and the small, the dramatic threats of terror attacks and the everyday insecurities related to our neighbourhoods might suggest broad affordances. However, these seemingly separate aspects of security technologies are deliberately intertwined, or, in Michael's (2000) words, co-present. Although we may not consciously acknowledge all these aspects, rejecting tools purportedly designed to protect our loved ones, colleagues, students, or those under our care, requires considerable confidence. Apps operationalise moral imperatives around security by transforming responsibilities for our own or our peers' safety into practices like location sharing and various forms of communication. For instance, child tracking apps often emphasise features like geolocation to reassure parents about their children's safety:

> Our parental app gives you full control, and you receive immediate notifications about your child's activities and location. Create "safe zones" for added security and peace of mind. (Producer M, security app for parents and children)

The affordances embedded in these apps tie users' moral obligations to control over their children's security. Securitisation discourses are thus challenging for most individuals to resist since they resonate with core societal values. This normalisation of fear of crime positions users in a perpetual state of vulnerability or potential victimhood – a state often associated with passivity (Hermansson 2018). However, in this context, vulnerability manifests as an obligatory claim regarding users' roles in approving these narratives, thereby evolving into active engagement.

This shift from passive vulnerability to active engagement aligns closely with the principles of situational crime prevention. Situational crime prevention emphasises reducing criminal opportunities by altering the immediate environment in which crimes occur and empowering individuals and communities. Security apps manifest this approach by enabling users to actively engage in their own and their communities' safety. The apps thereby transform everyday realities and individuals into agents of crime prevention and security enhancement. Society – particularly in public spaces – is portrayed as a reservoir of suspicious activities and people, yet there exists hope. If users are sufficiently encouraged to utilise the apps, they can contribute positively towards creating safer communities. For instance, functions such as alert security guards or peers, or reporting inadequate lighting or "unsafe activities" in public spaces aim to address public space deficiencies.

Notably, one app initiative with the explicit aim of fostering community and sustainability differs from typical securitisation discourses. While it shares functions with other security apps and acknowledges and shares the idea (and the delimitation) that

public space has the prioritised potential to influence our sense of security, its framing is more positive, encouraging users to report "safe" rather than unsafe activities.

The formulation of expected needs, users, and usage remains an ongoing process. Producers' initial ambitions might prove difficult or unrealistic to attain over time. Producers either choose or find themselves compelled to abandon initial ideas and target groups. The establishment of security apps depends on market dynamics, where demand – and potential profitability – shapes how successfully an app can thrive. In light of such factors surrounding demand and profit margins, producers may reframe their initial aims or target groups, or deliberately or unintentionally delimit for whom the app is accessible or suitable. Several factors can explain shift in ambitions at the producer level. One plausible explanation suggests that targeting "the general public" may prove challenging both in terms of engagement and profitability potential – as one producer notes:

> We understood quite early on that if we were to create a commercial solution out of this endeavor, we would have to clarify our users – those who possess both a need and a willingness and ability to pay. (Producer L, security app for neighborhoods)

Initially conceived as a neighbourhood app for all residents within a specific geographical area, the company aimed at fostering active community engagement. Due to lack of resources, they later shifted focus towards more specific users whose interests and abilities aligned predictably with payment capabilities. Such user groups may include general or specific workplaces or organisations possessing varying levels of security responsibilities. Similarly, other initiatives originally aimed at activating general public engagement have undergone rebranding efforts transitioning towards either new or more narrowly defined users and needs. For example, very specific threats – often serious in nature – may necessitate handling through tailored routines and measures. However, focusing solely on such threats risks user rejection. Users might consider these apps irrelevant and/or difficult to relate to since they fail to address prominent issues within their lives. While this presents significant challenges when attempting to engage individuals from the broader general public, employers conversely bear obligations to prevent several specific risks making them more receptive towards utilising technologies effectively meeting those requirements. Municipalities – and by extension also schools – are particularly relevant contexts given recent legislative changes mandating Swedish municipalities to work actively to prevent crime (SFS 2023:196). This responsibilisation of local actors – such as schools, municipalities, and housing companies – reflects what Garland (2001) terms a strategy of adaptation where societies accept risk (such as crime) and risk avoidance as an inevitable part of everyday life. Security app companies are also an expression of such development. Unlike municipalities however, app companies are not legally obligated to prevent crime, granting them freedom and flexibility to pivot focus based on market demands. As illustrated by Producer L above, this adaptability allows them to navigate between addressing

broad societal safety concerns, specific user groups, and profitability. Security apps draw on the ideal of active and responsible citizens, yet responsibilisation of citizens might be hampered by market logics as these individuals are, at times, difficult to engage, leading to a shift from a focus on the general to the particular public, or from the public to professionals.

Although security technologies are framed as inclusive and broad in scope, not everyone has equal access to these technologies. As Costanza-Chock (2020) emphasises, technologies are rarely equally available or perceptible across all societal groups. These apps assume, as previously discussed, that insecurity is tied to specific locations that can be avoided or improved through app use. However, structural disadvantages and lived experiences of insecurity are often silenced or rendered insignificant. Furthermore, security measures such as alarm functions or the presence of security guards do not benefit everyone equally; whether security guards evoke feelings of safety or fear largely depends on one's social position. We interpret these exclusionary dimensions as a result of how certain apps disafford some of their potential users.

"Non-use", however, is a result of a reciprocal process in which abandonment occurs at both the producer level and in the everyday lives of potential users. Disaffordances and exclusionary dimensions are built into security apps, but producers also struggle to engage users. In the following section, we will explore users' actual engagement with security apps, alongside an analysis of the challenges and disaffordances associated with this engagement, all while considering the lens of producers' intended affordances.

User engagement: (dis)affordances and abandonment in everyday life

The previous section outlined the intended users and uses of these apps, essentially describing their potential feasibility. This section continues by examining user engagement from the users' perspectives, addressing how they interact with the possibilities offered by these apps. Our examples are drawn from apps targeting both the general public and workplaces, with a particular focus on child tracking apps. These apps are illustrative as they are marketed to protect a particularly vulnerable group – children – from potential dangers, while their use occurs within highly mundane contexts.

Needless to say, user engagement is key for the producers of security apps. There is an evident struggle related to user engagement, as many apps remain unused. Some apps disappear from the market entirely, while others linger in app stores without software updates, accurate information, or engagement in terms of user reviews. A "successful" app can thus be defined as one that is used. To achieve this, apps must solve problems and meet needs. Users often reproduce securitisation discourses and reaffirm the intended needs articulated in the previous section, but they also express specific needs that vary among different users. For individuals, such as parents or neighbourhood residents, apps must add tangible value to their everyday lives. For organisations like municipalities or workplaces, apps must fulfil previously unmet functions. For example, one user described how their workplace implemented a security app:

> We saw the opportunity to actually signal to each other and warn about different types of events, which schools perhaps haven't had the same opportunity to do for some time. So, we saw it as a good opportunity to increase safety for students and staff. (User H, security app for workplace and organisations)

This example illustrates how introducing a security app in the workplace is perceived as a means of taking responsibility for the safety of both staff and students. The need arises from these actors' obligations to proactively manage risks, even unlikely ones, such as ongoing lethal violence. These organisational responsibilities, along with the use of security apps to meet such responsibilities, contribute in reinforcing perceptions of risks and insecurities in mundane life. When existing systems or procedures are deemed flawed or insufficient in addressing such risks, new technologies appear to provide solutions – even if the respective risk they target are minimal. Communication capabilities enabled by these apps are often highlighted as critical. The intended use of the communication functions as articulated by the producers is thus emphasised. At the same time, users also report challenges in the new communication functions such as accidental alarms or important information being overlooked amidst overwhelming communication flows.

Abandonment, imagined scenarios, and mundane surveillance

As discussed earlier in the section on intended affordances and producer perspectives, producers frequently reframe their apps, sometimes abandoning users or objectives. Conversely, other apps have broadened their scope in terms of both functions and target audiences. For instance, apps initially designed for narrow crime prevention purposes – often targeting specific threats – have been adapted to address other risks as well. One employer at an educational workplace highlighted how the app referred to above was implemented because of employer responsibility to work proactively to handle risks that could be addressed by alarm functions. Originally developed to handle ongoing lethal violence, the function to alarm turned out to be useful for broader critical events, such as fires. The producer responded to this demand, illustrating the ongoing co-production of affordances between producer and users. It also shows how new forms of use can challenge previously potentially exclusionary objectives, such as using alarms to notify hard-of-hearing staff during emergencies.

Similar to users from organisations, users from the general public draw on, and in a sense reproduce, overarching securitisation discourses. They engage with apps both through imagined scenarios and functions, and with the functions themselves. Imagined scenarios refer to how users, through their imagination of a security threat scenario, engage in "almost use". Users of individual security apps mention things like feeling safe walking home while "almost pushing the alarm button", while users of child tracking apps mention how they think of potential risks such as terror attacks "that can happen", which motivates them using the apps:

> Interviewee: Yes, I think it's that I feel the app gives me a sense of security, being able to see where the children are if I can't reach them, if something happens. So, yes ...
> Researcher: Are there any specific problems? If something happens, are there any specific situations you have in mind?
> Interviewee: Not that I constantly worry, but yes, like my oldest son, he can go into the city sometimes on weekends. But a lot of things happen. And the terror attack on Drottninggatan or whatever it might be. I mean, you know things can happen even if the risk is small, but things can still happen, and then I think it's a bit comforting, a security to be able to see, and also just in everyday situations when they travel by public transport by themselves and so on. (User A, security app for specific publics)

The interviewee connects the use of the app to serious events like terrorist attacks, compounded by the fear of losing track of their children. The potential threats in such engagement are sometimes outspoken (fear of shootings, terrorist attacks or abductions of one's child), but as often they are merely built on vague descriptions. Imagination is required when it comes to need (security threat), function (alarm or information) as well as actual use. The fear of certain events, coupled with a responsibility to keep children safe, contribute to abstract motivations for one's use of the technology as well as to concrete engagement with the app. The interviewee then moves on to more mundane situations, like public transportation and examples of logistics and traffic, and to an uncertainty if the child will manage to navigate in public transport or find their way in new areas. Tracking the phones of children in situations where they are to travel by public transport far from home or late in the evening are activities which are motivated by an attempt to keep children safe. But in these examples, the risk does not merely translate into a dramatic external threat; risk is also linked to logistics and traffic, and to an uncertainty if the child will manage to navigate in public transport or find their way in new areas.

App use is thus motivated to handle fear of catastrophic events, offering reassurance and ease when locating children. However, many parents recognise that the sense of security provided by the tracking app, is, to some extent, illusory. Knowing a child's location does not reveal their actual activities or behaviour, and the app in itself cannot protect children from unpredictable dangerous events. While the primary motivation for using the app is ostensibly to ensure children's safety, its primary function appears to be influencing the parents' emotional state rather than directly safeguarding the child.

For many users, apps serve logistical purposes such as checking if a child has left school or ensuring dinner preparation aligns with their return home. Undramatic everyday puzzles seem to play just as prominent a role for their actual use of apps. Related to that, apps also provide another, maybe just as important, function: obtaining information about the children's location, and in that to be reassured, without having to bother them by texting or calling. This mundane use thereby often replaces direct communication:

> I think the app is convenient, but I can also realise that if I feel a little, just a little bit worried, or if I know my eldest son is in the city with some friends and I want to keep an eye on things ... I would feel much more like a nagging mom if I kept calling and texting, but now I can calm myself a bit by looking at the app without him knowing that I have ... He doesn't need to actively know that I checked tonight to see where he was, you know. So, I think that's an advantage of the app. I can use it without him knowing that I'm doing it at that moment, even though he knows I have it. (User B, security app for specific publics)

Although there are examples where children and parents communicate frequently as a result of the app – such as children requesting rides from their parents after checking their location – the main use seems to be one-way. One of the explicit goals of using the app is to avoid being perceived as a "nagging mom", which is achieved through a form of silent, "mundane surveillance" that allows parents to gather information without directly engaging with or bothering their children. This mundane use of and reliance on technology for information is also often motivated by a combination of curiosity and a desire for information about the children's whereabouts. Parents describe using the apps to gain insight into their children's everyday lives, such as during school trips, or, for separated parents, when the children are spending time with their other parent. In this context, the information retrieved through the app replaces traditional forms of obtaining information through communication. The app affords a way for parents to care for their children "at a distance", allowing them to monitor their children's activities without the need for direct dialogue.

Though many security apps are promoted as tools to enhance communication between people, in this case, they appear to render communication superfluous. The app functions as a substitute for the communication gaps experienced by some parents, allowing them to feel connected without the need for verbal exchanges. This purpose of use becomes particularly evident when parents describe how they use tracking technology to make everyday life convenient. For instance, they check the app to confirm whether their child has left school, finished training, or is at a friend's house, ensuring that everything is proceeding smoothly. Beyond mere curiosity, the interviewees also express that knowing how far their child is from home helps them plan daily activities, such as when to start preparing dinner. In these everyday scenarios, the app transcends its role as a security tool, it becomes a means to facilitate the smooth functioning of everyday life without interrupting their children with phone calls or messages.

Disaffordances and Inequalities

As we have seen, engagement with parental apps is motivated by imagined threats as well as logistic problem solving related to mundane situations. Most of the interviewees emphasise that the apps provide a sense of reassurance and tranquillity by allowing parents to know their children's whereabouts. Despite their perceived benefits for parents, security apps are not without limitations. The sense of peace and comfort these apps provide depends on whether or not the information about the child's location

and movement pattern aligns with expectations and ordinary routines. Several parents describe their children as calm and well-behaved, leading to few unexpected alerts from the app. Some interviewees question their actual need for such digital solutions since their children do not appear to be "at risk". Nevertheless, the app's effectiveness at providing reassurance depends on the predictability of the child's behaviour, suggesting that the apps' affordances are regarded as more to ease parental anxiety than to directly ensure child safety. Moreover, this requirement reveals some disaffordances and inequalities associated with the app. Parents of children with risk-taking behaviour or specific vulnerabilities may find these apps less useful or even problematic. Locating a child in such cases might not result in feelings of ease but rather heightened anxiety. Moreover, one interviewee shared information that although they experienced a concrete need and wish to use the app, it would be impossible to do so, because their child would not approve it. Furthermore, they described how the prerequisite for app usage – owning a smartphone – per se, increased the child's risk-taking behaviour in terms of online communication patterns. For this family, the app was both impractical and associated with harm more than with ease.

App use, particularly in the case of child-tracking apps, relies on an implicit requirement: engagement with the technology presupposes a collective agreement between children and parents to collaborate in the shared goal of safety. This project of keeping children safe is thus constituted as a joint interest. Several interviewees describe discussing the app with their children, who reportedly appreciate the reassurance it provides. However, this collaboration often turns out to be a chimera, where parents use the app to monitor their children without being noticed by them and without their active involvement. Some interviewees note that their teenage children are granted more freedom, such as staying out later or traveling farther from home, but this freedom is contingent on accepting surveillance. Parents argue that the apps also benefit their children by allowing them to avoid frequent calls or messages. Yet this arrangement reveals a form of conditional autonomy – surveillance is the price of independence.

Power relations inherent in these technologies, as noted by Costanza-Chock (2020), extend not only into family structures but also to society at large. The disaffordances of security apps also stem from societal inequalities, where both the availability and the perceptibility (Costanza-Chock 2020) of these technologies are unequally distributed. Financial conditions, for instance, determine whether persons can afford subscriptions to apps and the necessary smart phone(s). Related to this, is the issue of place (Wacquant 2010; Bauman 2011). The social and economic conditions structuring different physical sites – as well as app producers' approach to said differences – create unequal availabilities to some apps. In addition, imaginaries and emotions invested in and connected to different places structure both the availability and perceptibility of apps. We will exemplify this abandonment of use and users through what we understand as "aspirant users", persons who proclaim an interest in security apps and their functions, but whose use is – in one way or another – made ineligible as the geographical coverage of apps results in exclusions and unequal access to the app functions. A user review highlights this:

> Was close to buying a subscription, but unfortunately saw that the entire Järva area in Stockholm is completely marked in red on the coverage map. So, I checked other cities, and it seems to be the same in other suburban areas. Please bring this up somewhere; it is obviously a deliberate choice.
> Response from company: Great to hear that you like the service. As you mentioned, we are not available in some areas in Järva, among others. We can only operate in locations where we have good access to security guards. Unfortunately, there are places both inside and outside cities where the service cannot be used, and we are constantly working to reduce those areas. (User F review and response, security app for general public)

In the quote above, an aspiring user criticises the app for insufficient coverage, and for excluding poor suburban areas. The app company's response attributes this exclusion to a lack of infrastructure, such as security guards, in specific areas. The review above was written in 2021. Despite promises to expand coverage, the producer responds that they are "constantly working" on expanding into new geographical areas; three years later, these areas remain excluded. The areas are often socially and economically disadvantaged, so called "vulnerable areas" which overlap with neighbourhoods affected by crime or by heightened insecurity.

As a result, those who might benefit most from these technologies are excluded, highlighting a bias favouring privileged over marginalised regions. As we do not know whether the apps actually work or not, rather than advocating for broader geographical coverage, this example underscores how market-driven assumptions about user need create disaffordances that exclude potential users. Disaffordances, such as exclusion of certain geographical areas, bring abandonment of users. Aspirant users are thus not only stalled from use, they are also stalled from being a user.

Place-based imaginaries also shape the emotional affordances security apps. Parents interviewed in this study indicated that the reassurance offered by tracking apps depends on the perceived safety of the child's location. If the child frequents areas deemed hazardous, the app may fail to provide emotional comfort. Consequently, these apps reproduce and reinforce a hierarchical perception of place, embedding existing inequalities into their use.

Security apps often integrate seamlessly into daily routines, yet producers frequently struggle to sustain user engagement. Reluctance to engage with these apps arises from various factors: perceived lack of risk or danger; insufficient functionality; and ethical concerns about surveillance. There is also a lack of need for specific technological solutions addressing safety, when communications channels and neighbourhood communities already exist. In addition, apps designed to manage rare but severe risks face abandonment when such events do not occur. The use of apps enabling alarm and communication at workplaces during serious events can easily be motivated for organisations and workplaces, since employers are responsible for preventing certain risks. Given that even unusual risks are "enough" reasons to motivate the app's existence, the apps do not need to succeed in taking part in everyday routines. However, if the

use is not routinised, they risk being forgotten or deemed irrelevant, as argued by one employee: "well we do have the app, but nothing happens" (Interviewee G).

Similarly, child tracking apps are used in a mundane context to streamline family routines and to make everyday life convenient. However, users of such technologies also express that these technologies should be approached cautiously. Several parents express concerns about "over-consuming" the apps, describing their use as potentially invasive or "a bit shady". Thus, there is a reluctance to becoming "too engaged" and to use the technology too much or in an irresponsible manner. This reflects the continuous reciprocal relationship between engagement and abandonment. Producers and users collectively shape the apps' affordances and limitations. While routinised use normalises these technologies, it also raises ethical questions about their broader societal impact. Thus, disaffordances and inequalities not only affect who can access these technologies but also influence how they are used and perceived.

Concluding discussion

This article examines user engagement with security apps, focusing on the preconditions for user engagement provided by producers, and users' active responses to these preconditions. By employing the concept of (dis)affordances as co-produced through the interplay of security discourses, technology, everyday life, and its actors, our analysis reveals the reciprocal relationship between the intended affordances created by app producers, the actual user engagement or disengagement, and the (dis) affordances resulting from ongoing negotiation between intentions generated within the security market and the everyday practices and routines of users. Our study contributes a nuanced understanding of the relationships between intended and actual use, highlighting how user engagement often extends beyond the specific purposes envisioned by producers. Tensions between intentions and mundane practices are for instance illustrated by the discrepancies between the envisioned communication goals of the apps and the everyday communication practices that can bring confusion or alternative logics, motives, and consequences. For example, while the apps aim to enhance communication, increased efficiency can sometimes produce the opposite effect. This phenomenon is evident in some organisational contexts where important information is overlooked amid overwhelming communication flows, as well as in the example where parents may cease direct communication with their children, instead checking their location on the app. While Ling and Lai (2016) have explored how apps have transformed communication from dyadic to group-based interaction, our findings reveal a move away from direct communication altogether in favour of mundane surveillance.

Furthermore, communication as well as other functions of security apps are secondary to overarching securitisation discourses. However, in the context of securitisation as well as the techno-utopian versus techno-dystopian debate surrounding digital technology, our findings emphasise the significance of the everyday. Rather than categorising the impact of technology as inherently good or bad, we argue that

both utopian and dystopian approaches rely on everyday practices, feeding into them in contradictive ways. The issue of securitisation serves as a prime example. Both producers and users draw upon overarching securitisation discourses; producers use them to legitimise their apps, while users invoke them to justify their usage, thereby also indirectly validating the app's existence.

It is fully understandable and rational for companies to utilise threat discourses to market their products, especially considering the contemporary insecurity and fear of crime debate in Sweden and the broader Global North. Similarly, it is reasonable for users to engage with these discourses when discussing and legitimising their app use. A fine line exists between perceived and actual needs among users of security apps, with perceived needs frequently overshadowing requirements related to fear of crime and insecurity (at least as framed by the producers). The ideal user recognises and engages with securitisation discourses, perceiving threats sufficiently to justify app use, even in absence of necessity. Consequently, motivation for app use may align more closely with constructed fears than with tangible risks. This phenomenon underscores the complex interplay between user behaviour and prevailing security narratives, suggesting that while individual experiences may vary, overarching security discourses remain largely unchallenged.

However, it is crucial to recognise that these discourses diverge significantly from the everyday contexts in which users engage with these apps. While users may reference security narratives, their actual practices are predominantly shaped by their mundane realities. To fully comprehend app use, it is essential to acknowledge that everyday user practices often occur far away from the threats these apps purport to address. Although mundane reasons for using apps could challenge securitisation discourses, this does not appear to be the case. Future research on security apps should recognise this gap between discourse and practice. Use of these apps often reflects relatively privileged and convenient everyday lives, where users find them useful for mundane logistical issues. This observation does not conflict with securitisation discourses; rather, these discourses are either reproduced as justifications for app use or remain unspoken. We contend that this should be a point of contention, emphasising that this is not an issue of (in)security. Rather, it reflects mundane routines of everyday life, and should not be conflated with reproducing or legitimising these apps as security-enhancing technologies for the broader issues of insecurity and fear of crime articulated in campaigns and advertising.

Importantly, the "successful use" of apps, as illustrated by our finding that these apps foster calmness for certain users, often diverges from producers' intended problem-solving goals. Instead, app usage frequently intertwines with mundane routines such as family logistics or specific work-related responsibilities, distancing itself from actual or perceived threats. The micro-context of everyday use should not be interpreted in isolation, as the proliferation of these apps relies on their integration into daily routines. Paradoxically, security apps employed for mundane purposes, which are distant from securitisation discourses, simultaneously legitimise these very discourses. This necessitates a nuanced debate that acknowledges the discrepancies between the enhancement

of perceived threats or concrete crime policy matters and the often-superficial solutions provided by the market and state actors.

Furthermore, our analysis reveals that security apps embody a duality of inclusion and exclusion, manifested through disaffordances and abandonment. Disaffordances emerge as barriers that prevent certain users from engaging with the apps due to their geographical location or similar factors, leading to abandonment of certain aspiring users. Abandonment also occurs when users reject the perceived need for or functions offered by the apps, resulting in either the disappearance of certain apps or a shift in focus regarding functions or user groups. For example, apps may shift their focus from the general public to specific professional user groups. Notably, our findings indicate that those with the most pressing security needs are not necessarily the primary users of these apps, reflecting market-driven adaptions rather than need-based solutions addressing the most pressing security concerns in society. Engagement and abandonment emerge as reciprocal processes with both producers and users influencing which affordances are available. The ambivalent nature of these technologies – not necessarily a moral imperative, but also potentially morally suspicious – might hinder public engagement. However, as app use becomes routine, it also becomes normalised, often overshadowing intentions as well as practices.

Technical limitations in so called "vulnerable areas" and the reluctance of more "risk-taking" children to participate in tracking apps, highlight some of the challenges faced in these contexts. While the apps aim to provide reassurance and ease anxiety for parents, such outcomes are contingent upon users' ability to predict the implications of the information provided. Previous studies have suggested that the use of security technologies risks reinforcing people's sense of insecurity and fear, despite the goal being the opposite (Simpson 2014). Our study builds on this literature by demonstrating that while apps can offer reassurance, certain conditions must be met for these positive emotional outcomes to materialise. Notably, our findings suggest that parents with substantial reasons for concern may not necessarily experience the intended emotional benefits of the app, underscoring the complexity of the relationship between need and use.

Users who express insecurity regarding their neighbourhoods, children, or other topics often do not represent the ideal target groups for security apps. In essence, apps are convenient when there is no friction between location and actual risk. Consequently, these apps reproduce imaginaries of place, thereby reinforcing the hierarchical order of place and location (Wacquant 2010). The power relations and disaffordances inherent in these technologies, as noted by Costanza-Chock (2020), also extend to place. Previous research has indicated that security apps are more prevalent in high-income areas (Ceccato 2019). The anxiety relief – or lack thereof – offered by these applications clearly reflects the inequalities identified in other research on discrimination and insecurity (see e.g. Mulinari 2022, 2024). Abandonment encompasses various aspects of use and user engagement. For example, producers may abandon their initial target groups and respectively, users may abandon the intended use of apps. Overall, there is a lack of engagement and a lack of interest in apps with narrow crime preventive focus,

as well as a lack of interest from the producers in the (broader) public, uncovering the non-profitability of certain user groups. The concept of abandonment emphasises the co-producing aspects of "non-use", suggesting that it is not solely as a result of technology disaffording the user.

Moreover, disaffordances extend beyond the public domain into family structures. Since this study did not include interviews with children, we cannot determine how children perceive the affordances and disaffordances of security apps, or how they negotiate concepts of surveillance, safety, and freedom. While some previous studies have indicated negative consequences for tracked children (Malone 2007; Oostveen et al. 2014; Simpson 2014), there are also intriguing perspectives on children's creative interpretations of surveillance, moving beyond static notions of morality and control and arguing that children are vital actors from whom we can learn about surveillance (Kaufmann 2021).

Many producers advocate apps that address broad ambitions, such as enhancing overall security. At the same time, the use offered by these applications is often highly structured and formalised through quite narrow options and functions, focusing one-sidedly on certain aspects of crime and (in)security while obscuring others. Although, and maybe just because apps may not be at the forefront of the increasing digitalisation of crime policy, scholars examining security matters should not overlook the role of everyday security technologies in disseminating, reproducing, and legitimising overarching discourses that justify surveillance and control in the name of security. Our study contributes to the growing body of research on the preoccupation with safety and security within criminal policy (Hope & Sparks 2000; Hermansson 2018; Sahlin Lilja 2018). The apps explored here both arise from and contribute to this broader societal concern, reproducing imageries of danger in public spaces and reinforcing feelings of vulnerability and fear while promoting the ideal of responsible citizenship.

Moreover, although not the main focus of this study, the dynamics explored also highlight a lack of control over the data collected and shared by the apps, raising ethical considerations regarding public oversight of data. Previous research has shown that new technologies are often welcomed with great enthusiasm. While some apps have successfully integrated into the daily life of families (for instance), the parents we have interviewed demonstrate a nuanced and hesitant attitude towards the technology, stressing the importance of responsible and prudent use. This reflects an ambivalent relationship with the apps, which can also be linked to prior research on the expansion of control, suggesting that this phenomenon may represent an extension of control over young individuals. However, this expansion is not without its uncertainties.

In conclusion, while security apps signify a growing trend in crime prevention and security enhancement, as we have discussed, our study underscores the divergence between their intended purposes and actual use of apps. Our approach has not been devoted to whether the apps are effective or not. Instead, we aim to address the "everydaying" processes of their use, highlighting how these technologies' co-presence (Michael 2000) with users' futures (e.g. of potential threats drawn from securitisation discourses) and presents (e.g. of mundane practices in everyday life) legitimise their

use. Future research should continue to explore the mundane context of these technologies. By focusing on the everyday and its actors we can avoid simplistic dichotomies that predetermine for us what to know and think about the dissemination of such technologies, the reproduction of securitisation discourses, and their potential and actual effects on morality, surveillance, and responsibilities. Because, as this study has demonstrated, user engagement with security apps can bring many different outcomes. From easing of (perceived) anxiety to fostering abandonment, from intention to action, and from affordances to disaffordances and disengagement. These dynamics, along with the interplay between market profits and mundane routines, contribute to how our societies engage with these technologies.

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Author presentations

Katarina Winter is Doctor in Sociology and Senior Lecturer in Criminology at the Department of Criminology, Stockholm University.
Contact: katarina.winter@criminology.su.se

Klara Hermansson is Doctor and Senior Lecturer in Criminology at the Department of Social Work, Criminology and Public Health Sciences, University of Gävle.
Contact: klara.hermansson@hig.se

CHARLOTTE HÖGBERG

"This ground truth is muddy anyway"

Ground Truth Data Assemblages for Medical AI Development

Abstract
This article explores assemblages of ground truth datasets for the development of medical artificial intelligence (AI). By drawing from interviews and observations, I examine how AI experts developing medical AI relate to the referential truth basis of their work, their ground truths, as an epistemic concern. By addressing how datasets are assembled from different sources, and produced, augmented and synthesised, this study shows how ground truths are valued based on humanness, quality of medical expert judgements, temporality and technical qualities. Moreover, this article analyses truth practices as productive moments in AI development, the role of human expertise and the perceived strengths and limits of expert-based annotations. The valuations of ground truths shatter the image of medical classifications, and AI models, as stable neutral entities. Moreover, this article shows how valuations of ground truths encompass more than alignment with standardised expertise. To better understand the possibilities for medical AI to live up to ideals of accuracy, fairness, trustworthiness and transparency, we need more knowledge on assumptions, negotiations and epistemic concerns upon which medical AI is built.

Keywords: artificial intelligence, data, ground truth, medicine, epistemology

TWO MAIN QUESTIONS to consider with regards to the development of an artificial intelligence (AI) model is: On *the basis of what* does the algorithm "learn" the correct classification? And *what* is used to measure whether the algorithm's prediction is accurate? What both of these questions amount to is, to a large extent, what choices have been made in the construction of the algorithm's "ground truth"? (Jaton 2017). This article attends to ground truths as an epistemic concept, and the practices and value negotiations by which these truths are assembled as performative and productive moments in AI development. Through this, assumptions in AI development become visible, enabling an increased understanding of the conditions that are shaping AI's possibilities to reach ideals such as accuracy, fairness, transparency and trustworthiness.

The term ground truth is used by AI developers and researchers to describe the referential datasets perceived as holding the "true" values of the phenomena that are computationally modelled for (e.g. Kang 2023). For example, a dataset that contains x-ray images and corresponding labels, describing whether there is a malign tumour present in the image, can be used as a ground truth for a cancer detection algorithm.

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However, as Jaton (2017) argues, these perceived truths do not pre-exist but have to be constructed as datasets made to fit the task of the algorithm. This is in line with work in the social studies of science that emphasise data as inescapably local (Timmermans and Berg 1997; Loukissas 2019), and never actually raw (Gitelman 2013), as shaped by factors such as the place, organisation, time and means of collection and generation. Hence, digital data are not neutral mirrors of a natural world. Yet, as computational models to an increasing extent learn by examples and not by rules (e.g. Campolo and Schwerzmann 2023), data are used to make generalisations about complex phenomena.

This study intends to shed light upon how AI researchers deal with "ground truths" in the specific context of AI development for medical research and healthcare purposes. Within critical data studies and science and technology studies (STS), research has stressed matters such as the paradoxes, work and politics of data-driven healthcare (Hoeyer 2023; Avlona and Shklovski 2024; Bertelsen et al. 2024), the inheritance and historicity of digital medical data (Green and Svendsen 2021) and the role of algorithms in epidemiology such as in the case of enacting the zika pandemic (Lee 2021). Yet, research into the data related work of developers of medical AI remains scarce (Bertelsen et al. 2024).

With regards to the recent years' spurt of machine learning applications in medicine, and the hope that it will result in immense progress (Rajpurkar et al. 2022), there is a continuous need for insights into what assumptions are embedded in datasets and model constructions. While there is a growing body of literature concerned with the statistical content of large benchmark datasets for machine learning and issues such as a lack of representation, there is still relatively little social research that focuses on modes of construction of machine learning datasets and their function as informational infrastructures (Denton et al. 2021). This field, conceptualised by Thylstrup (2022) as critical dataset studies, is yet emerging within the broader scope of research on how data assemblages do work in the world (Kitchin and Lauriault 2018).

However, we need more empirical knowledge about ideas and practices concerning "ground truths" as a particular performative concept in AI development (Jaton 2023). Increased critical consideration can elucidate ground truth negotiations as a certain way of understanding AI models and their relation to medical phenomena, how knowledge-making is shaped by this process, and the sociology of truth in which people, artefacts and practices are involved (Jaton 2017; Henriksen and Bechmann 2020; Lebovitz, Levina & Lifshitz-Assaf 2021; Kang 2023; Zając et al. 2023). By drawing from qualitative empirical work, the aim of this article is thus to increase the knowledge of how researchers developing medical AI relate to the referential truth basis of their work, their ground truth, in terms of truth practices and valuations. In addition, it analyses ground truth as an epistemic concern in medical AI.

With an ambition to make visible the reasoning and practices around data, and specifically ground truth datasets in medical AI, this study shows how data are treated as a workable concern that has to be navigated by AI researchers. In this way, it analyses the role of: expert-based labelling; augmented and synthetic data; generalisation; and brittleness in the assemblage of ground truths for medical AI. Moreover, it brings

ground truths to the fore as an emic concept, as well as shows how the valuation of ground truth qualities goes beyond the alignment with standardised expertise. The contribution of this article is both empirical, showing AI experts' reasoning and practices in relation to medical ground truths, and theoretical, by furthering the conceptual understanding of ground truth practices, negotiations and valuations, as performative elements in AI development. By this, I aim to contribute to STS, critical data studies and sociological perspectives on AI and information.

This article is structured as follows. First, I provide a background to the concept of ground truths and previous social research on ground truthing, followed by an introduction of the conceptual framework. Subsequently, I present the method used and the empirical findings. Lastly, the concluding discussion offers further analysis of the findings and this article's contribution.

Background

The concept of a "ground truth" has long been used in the fields of geology and meteorology, referring to the perceived reality of meteorological conditions by observed and registered measurements. In an ethnography of meteorological forecasters, Fine argues that they describe the search for ground truth as "focused on deciding 'what is real', given organisational demands to produce useful information" (Fine 2006:7). The concept is also used as a verb, ground truthing, accentuating the practised aspect of how ground truths are not given but are generated or assembled, and put into action. The concept of ground truths has been adopted by computer scientists and in the machine learning context. Also here, it is used as a referent to the "true values" of the modelled phenomena (Kang 2023), or in conjunction with a certain "mode of truth telling" pertaining to the ground truth "from which the algorithm generates its model of the world" (Amoore 2020:136). It can be describes as the repository from where machine learning models derive; as Kang (2023:3) argues: "it is literally where the truth and possibility of an algorithm are grounded."

The perceived ground truth availability, the choice of method to make algorithms "learn", and the quality of the deriving models are seen as highly interdependent elements of machine learning (Siebert et al. 2020). In the context of medicine and healthcare, the ground truth datasets used for AI development generally can be described as containing knowledge objects in the form of representations of health statuses or other characteristics, by for example tabular data or images, paired with expert annotations and labels describing such matters as whether the image is depicting a tumour or not, or whether that specific individual suffered from a brain aneurysm or heart attack.

With regards to truth, a rich body of literature has contributed to our understanding of how scientific facts become stabilised and considered as truthful (e.g. Pinch and Bijker 1984; Latour 1987; MacKenzie 1990; Knorr-Cetina 1999; Daston and Gailson 2007). This literature has uncovered the social construction of technology and scientific facts, showing how they are shaped by actors, contexts and epistemic

cultures (Knorr-Cetina 1999). Moreover, ideas about truth and objectivity have been problematised in previous research. Shapin (1994) argues that the basis for why scholarly claims are regarded as truths has changed over time. Scientific practices were in seventeenth-century England performed as part of genteel conduct, by which the word of a scientist was considered trustworthy based on ideas about a certain gentleman character seen as incapable of lying. Trust emerges as an important component of knowledge-making and what are considered as scientific truths about the natural world, and credibility of scientific facts, is now more closely tied to the credibility of the organisation that the scientist represents (Shapin 1994).

The role of the scientific experiment – the witnessing of it, the deriving data and reports – has also been examined as a practice that produces trust in scientific claims and justification of knowledge (Shapin & Schaffer 1985). Yet, ideas about truths are also tied to objectivity as an epistemic ideal. Daston & Gailson (2007) show how this ideal emerged as an epistemic virtue during the mid-nineteenth century and has been evolving, contingent on cultural and social ideas about accuracy and scientific community practices. Moreover, STS research has troubled the idealised distinction of science between dealing with the discovery of truth and technology and dealing with the application of truths, showing their intricate relationship within knowledge production (Pinch and Bijker 1984:402) and specifically in early variants of AI in terms of expert systems (Collins 1990; Forsythe 2001) and matters such as the politics and "truthiness" in risk prediction modelling (Amoore 2013; Weinkle and Pielke 2016). In addition, research has discussed the ideals of evidence-based medicine and shown the contingency and locality of medical standardisations, as constantly adapted to local needs (Timmermans and Berg 1997, 2003; Mackenzie et al. 2013), by which data is also collected and now increasingly used for statistical analysis and prediction purposes.

Previous social science studies of ground truthing emphasise it as the problematisation that is shaping algorithms, defining both their inputs and outputs (Jaton 2017), and suggests that internal and external factors impact the creation of ground truth schemas within the medical domain, through regulatory restrictions, commercial and operational pressure and epistemic differences (Zając et al. 2023). In a case study of a ground truthing project for personalised cancer immunotherapy, Jaton (2023) found that what it established came to be a contestable reference, rather than a undisputable "truth" due to non-stabilised measurement protocols. However, he argues that ground truths are a necessary condition to enable AI technologies in personalised medicine.

Earlier research also stresses the uncertainties pertaining to what expert knowledge is embedded in ground truths of AI. In a review of five machine learning (ML) tools prior to clincal implementation, Lebovitz, Levina & Lifshitz-Assaf (2021) depict how hospital managers questioned why the tools did not work as desired, leading managers from reviewing accuracy scores and ground truth labels, to evaluating the human experts' daily work of dealing with uncertainty and producing high-quality judegments. What they found was a disconnect where ML tools' ground truths incorporated expert know-what, but not the expert know-how that was important in clinical practice; yet, also how a focus on dissecting ground truths enabled ways to make sense of medical

AI and better understand the reason for unsatisfactory performance. This emphasises the need to increase our knowledge about reasoning and practices of ground truth data assemblages to better understand the implications of medical AI solutions. Previous work also shows how "truth practices" shape the making of AI for healthcare and work to reinvent truths and medical practices to elevate prevalent logics of decisions about patients, rather than discovering new truths through AI (Henriksen and Bechmann 2020). In this article, I aim to draw from and add to this empirical body of knowledge, but also consider how to conceptually analyse ground truth negotiations, narrations and practices of AI experts.

Conceptual framework

Machine learning and truth practices

In this article, the concept of ground truths is treated in an emic manner, based on how it is used by the AI and ML experts themselves, in their reasoning and practices. In line with the distinction made by Jaton (2021), I regard the researchers' ML practices and assembling of ground truths as sociological practices. Drawing also from Mackenzie (2017), ML is considered a practice that involves both humans and machines. This entails a focus on the social construction of technology and the sociotechnical entanglement between humans and technology (Latour 2005). In that sense, medical AI is in this study understood as a technology made out of assemblages of human and non-human entities, since "algorithms are not autonomous technical objects, but complex sociotechnical systems" (Seaver 2018:378). Moreover, Seaver (2017) argues that we should regard algorithms *as* culture rather than *in* culture. In the context of medicine and AI research, the status of scientific facts is understood as formed within certain epistemic cultures and their material and discursive "epistemic machinery" (Knorr-Cetina 1999).

Based on these theoretical underpinnings, scientific facts and epistemic cultures are understood as co-constructed along with technologies. One part of this, and of relevance to ground truthing in medical AI development, is how it presents a way to make both scientific and engineering problems *doable* in practice (Fujimura 1987). More specifically in this article, the relayed and observed work of AI experts is approached as truth practices, which Henriksen and Bechmann (2020) outline as a type of multimodal, and multilevel, performance of truth, involving several actors, including engineers and medical specialists, with the use of different methods and sources of knowledge. In sum, truth is "performed within a network of different actors along with data, machines, and ML models" (Henriksen and Bechmann 2020:812).

(Un)stable classifications and valuations

From a sociological perspective, what most medical algorithms aim to perform is some sort of classification of health and (risk of) disease (although the tasks are not necessarily always conceptualised as classification by the narrower computer science

terminology). In the case of medical AI, this includes the ontologies of a given disease, meaning that one has to decide which data and variables provide a basis for what the disease is and how it can be recognised. Mol argues for attending to the multiple ontologies that are assembled into diagnoses as a "coexistence of multiple entities that go by the same name" (Mol 2002:151). Mol's work shows that a medical condition can be construed as one phenomenon, while still being enacted as multiple: as a patient's level of pain when walking, a general practitioner's medical examination and anamnesis, the radiologist's interpretation of images, and the pathologist's analysis of the veins on the surgical table. This sensibility towards ontologies, in the shape of data, can be used as an analytical device to understand how medical conditions are turned into models and algorithms. This entails paying attention to the (in)stability of medical classifications (Bowker and Star 1999). It moreover acknowledges the ontological power (Mol 1999) that algorithms encompass as they perform worldling capacities with datasets as "classification engines" (Crawford 2021). In line with Mol's reasoning of multiple ontologies of medical conditions, Seaver (2017) emphasises algorithms as unstable multiples in themselves.

The different possibilities to shape ontology furthermore speaks to how data, sources, and expert judgements are valued in different ways. Valuation studies have offered a collection of lenses to make visible how and what values are ascribed to matters such as technology in practices and discourse. For example, Lee and Helgesson (2019) find a multivalence of algorithms in practice in biomedicine, different styles of valuation of algorithms and what configurations of algorithms and humans are considered as providing "good" bioscience and a good distribution of human versus technological agency. Styles in this conceptualisation centre on matters such as actors' articulations of problems, solutions and configurations, as analytical tools to examine the ambiguous role of algorithms (Lee and Helgesson 2019). Using these concepts, we can attend to how ground truths are valued in the development of medical AI, what is considered a "good ground truth" and how it is considered to contribute to "good" medicine and healthcare practice.

In sum, this study attends to truth and valuation practices in which ground truths are made as sociotechnical assemblages, built upon and performing medical classifications.

Method

One way to research algorithms and their role in society is to interview coders or conduct ethnography to uncover "the story behind the production of an algorithm and to interrogate its purpose and assumptions" (Kitchin 2017). This study focuses on a particular part of the "production" by attending to the reasoning and practices concerning ground truths for medical AI development. However, it does not extensively follow one specific algorithm but rather the views and practices of a group of experts in AI and ML as applied to medical research or healthcare. An "expert" is here defined as someone with institutional authority to construct reality, with knowledge

that can be seen as having the potential to be hegemonial in organisations and fields of practice (Meuser and Nagel 2009:18–19). Thus, the expert is also identified by their professional role as a researcher, while expertise is still relational, acquired in practice, sociocultural conditioned and under negotiation (Meuser and Nagel 2009:18–19; Grundmann 2017).

This article draws from qualitative empirical work in the form of interviews and observations. In-depth, semi-structured, interviews were conducted with 15 researchers and doctoral students, in Denmark, Sweden and the Netherlands. Informants comprise a range from full professors to doctoral candidates and were identified through purposive sampling and snowball sampling. Most worked within publicly or privately funded research organisations, mainly AI centres at universities. However, two informants worked in research roles at commercial medical AI companies and four had shared research positions between universities and AI/engineering roles in hospitals or in commercial AI companies. This is in line with how engineering in academia collaborates with industry and domains of application. As the use of ML methods is becoming more widespread, disciplinary boundaries of those developing medical AI become more blurred. While most of my informants were active in the field of computer science, they had somewhat differing backgrounds. Some came from the fields of mathematics or epidemiology into AI research, or resided in more applied areas at universities, such as biomedical engineering, medical physics departments or in pathology. Due to the area of application, the informants in general published their research in both engineering and medical science journals.

In terms of AI technologies, most informants had experiences of working with several different technologies, such as convolutional neural nets, natural language processing; and with various types of data, including medical images (of brains, breasts, foetuses, hearts), sensor, tabular, and register data, and with aims such as disease/anomaly detection and prediction. All of them worked on AI solutions for medical applications and thereby share an epistemology mainly deriving from computer science, with much focus on developing or refining computational methods. For example, several were involved in improving computational anomaly or object detection, regardless of whether they were currently training an algorithm to detect tumours, pathology stains or cerebral infarcts in the images. Yet, to have medicine as the domains of application presents certain particularities at the borders between computer science methodologies and medical knowledge. They had a shared epistemological concern in how AI can be used to gain medical (and clinically useful) knowledge, and also strategic concern in how AI can be accepted and contribute to improved patient outcomes.

Six of the interviews were conducted online through a video conferencing tool, and one was conducted in person in a café at the premises of a medical university. Those remaining were conducted in person at the informants' place of work. In six cases, the interview was paired with short-term observations and demonstrations of the work conducted at the informant's lab. Multi-sited observations were also conducted at scholarly and intersectoral seminars and conferences focusing on AI in medicine and healthcare. While short-term ethnography has limitations in comparison to long-term

onsite fieldwork, it can offer valuable insights into common practices (Pink and Morgan 2013). Transcripts and field notes were analysed by a grounded theory approach and thematically coded. Themes were identified by inductive analysis of reoccurring, contradicting or particular topics and narratives in the material (Ryan and Bernard 2003). When presenting the findings, pseudonyms are used to protect the integrity of informants. For this article, I focus a subset of the empirical results, where matters of ground truths became visible or articulated.

Truth becomings, limits and valuations

In this section I explore the question of how AI experts relate to their ground truths in medical AI development by a selection of empirical cases illustrating truth and valuation practices. The findings are presented in line with the identified themes but also have a processual meaning, starting from the acts of bringing ground truth datasets together, to the limits of certain characteristics of ground truths and the perils and hopes of acting without ground truths. Subsequently, I address the augmenting and synthesising of ground truths and how different qualities of ground truths are valued. As I attend to ground truth as an emic concept, this is also how I use the word *truth*, for example in the thematic sectioning, stressing both its emic flexibility and potential as analytical provocation. Moreover, when using the term "expert-based" in the context of medical AI, it refers to the judgement of the medical experts and not the AI experts. Yet, to begin with, ground truth datasets have to be assembled.

Bringing truths together

There is much that could be gained from early detection of anomalies in sonograms of human organs. Potentially, it can enable treatment, hinder adverse events and save lives. But sometimes sonographers miss signs on the screen, or there are not enough trained sonographers to consult. At an AI research centre, Johan is training algorithms to be able to detect anomalies in sonograms, by using convolutional neural networks for image analysis and object recognition. For this to be possible, the team needs to have a reference set of images that they can treat as depicting, versus not depicting, anomalies. In this case, it derives from data found in a medical register containing images and corresponding medical expert annotations. This judgement is what the team has to rely on, even if it is not without doubts:

> In terms of the anomalies … that is always the question of whether it was documented properly. Just because something is not there, doesn't mean that it wasn't discovered. It is always really hard to make this sort of assumption[s]. And it is still assumptions you need to make; to say, this is my ground truth.

In his statement, Johan shows how the establishment of a ground truth is a pragmatic positioning for the AI developer. Ground truths play a prominent role in the problematisation of medical AI, making medical problems doable (Fujimura 1987) for

AI development, by limiting what "my ground truth" is and what is to be found in the images, as well as when the algorithm succeeds or fails in the detection task. By bringing a dataset together and saying that these data hold the true values that we are modelling for, AI experts can use it in different ways. Sometimes it is seen as a separate dataset for testing and validating the algorithm's performance (how well it responds to "true" values) solely. Yet, ground truth can also be regarded as the whole dataset which you split into the parts needed for model development, one larger part that the algorithms can be trained on and smaller parts for testing and validation.

The pragmatic positioning is what makes Johan speak of the *assumptions* you need to make, regardless of potential flaws or incompleteness. He has to assume that the labels that have been assigned to the images in the database by medical experts hold true, if he wants to use the labels for training in supervised or semi-supervised learning and for validating the performance of his creation. One particularity of the ground truths assembled for medical AI development is their enactment of how to measure and diagnose medical phenomena by the inclusion and exclusion of different types of data, and methodological choices, which steers how AI can be used to detect, predict or treat medical conditions.

In another room, Christian is going through painted segments of slices of a brain on his screen. Next to the images, he has a window open where he sees the lines of code. As he puts it, he is an expert in training algorithms, not in the anatomy of the human brain. He describes the laborious process of recruiting neurologists and having them sit and literally paint all areas of the brain upon each imaged slice, a process by which the sociomaterial aspects of ground truth assemblage becomes evident. The aim of this is to construct a dataset by which the algorithm can learn brain segmentation and to subsequently make it possible to evaluate whether the algorithm is identifying and demarcating the right area of the brain. This can, inevitably, have severe effects. To complete the painting of one brain could take a neurologist a whole day of work. It is a time consuming and expensive set-up, Christian complains, but he argues that it is worth it to achieve a ground truth dataset that is as trustworthy and accurate as possible.

These are two examples of how datasets with human medical expert labels work as ground truths for the AI expert. The assemblages of ground truths also show how they are the products of a co-constitutive shaping of truths, through data collection, generation and the medical expert's labelling, combined with the AI developers' reinforcement of it as truth claims, used by models and in validation by organisations.

The limits of expert-based ground truths

On the top floor of an AI research centre, we are sitting in a room talking about Aksel's visionary project to use natural language processing (NLP) on a wide range of data, from demographic and health registers, medical records and so forth, to identify risk factors for disease. For their computer models to be able to learn about characteristics that could be risk factors, they need longitudinal data that describes which individuals, with what characteristics, developed a certain condition. In that regard, they have to rely on the diagnosis labels assigned by clinicians, working as their ground truth for

model training and evaluation.

> [W]e are working a lot with diagnosis codes, and even there, most doctors ... so there are thousands of diagnoses. And the doctors they use maybe one hundred of them … […] we know with the ground truths that some of the diagnoses are inaccurate … because they are created by humans.

The humanness of expert-based labelling that Aksel refers to is depicted as an aspect that makes ground truths more trustworthy, yet it is also something considered as making AI vulnerable to flawed judgements. The complexity of assembling data for AI development emerges in these instances. Those developing AI models have to make assumptions about whether data and labels are valid referents to the real world. Informants show the ways in which human labelling is principal, and whilst they point to the precarity of having to depend on human expertise in terms of for example potential uneven quality, insufficient documentation and expertise, it is what they have to work with to have a real-world comparison.

At a university, Lars works within biomedical technologies, developing algorithms that can interpret data (signals) and make health predictions, but also algorithms that have a more technical purpose, for example removing noise to improve algorithmic interpretation of heart signals and "get rid of diagnostic interferences". When in his office, we discuss where data come from to make these health predictions, and how expert judgements are particularly essential for medical ground truths, in comparison with many other domains where it is easier for the AI developer or laymen to annotate, or review annotations, of ground truth data. What the doctor says is what is treated as truth:

> It has long been like that, for some signal or some images or something that yes, the ground truth is what the doctor has said about this image, then whether it is a sufficiently detailed description or whether it was a rough sorting or something like that, but it is that. It's been a ground truth, but it's also the case that as long as it's the ground truth, the machine can't be better than what the doctor was then, and maybe they're not doing it 100% right ... And somewhere, so if you're talking to a computer engineer here, maybe they're looking for a better truth, that is, where you can kind of say yes, but then we want to know more.

The argument behind this reasoning is that, by sticking to expert judgements as ground truths, you cannot find what is not labelled. This sets a clear limitation when using them for knowledge discovery. There is an idea of AI as being able to surpass human abilities, but allowing this to its full extent could mean that expert-based ground truths would not be considered enough for training and evaluating AI. As Lars expresses it, they will no longer do:

> We have lived in a time where the ground truth has been that here we have, in our industry then, measured things and here we have someone who looked at it. But, but that … I think the machines will gain up on that. It won't do to train on, you have to train on something else which is better than it because otherwise you learn to do the same mistakes we had before.

Some AI developments are described as having no ground truth and to be acting in the absence of truth. If no labelled data are available, are too hard to access, or present too great a risk to collect, there are still different ways to approach developing medical AI for these phenomena. One option is to use unsupervised learning, in which the algorithm learns without guidance by pre-assigned labels. This is the case in some exploratory research lead by the hope of AI discovering something that the medical experts cannot see. Still, without a ground truth, the question is how to validate AI performance.

Aksel describes how they in his project try to "filter out noise" rather than deciding what is important for the task of the model. One reason for this is the aim of discovering new risk factors for disease and "all these hidden things". This leads Aksel to suggest that they operate without a "strictly defined" ground truth, as he says: "we are building a model without knowing the truth, just trying to get a good representation." But what is a *good* representation?

Generating truths

It is argued that also augmented, or even synthetic, data can form a ground truth by plausibly representing the statistical properties of a real-world phenomenon, without corresponding with actual real-world referents. In some regards, simulation studies are seen as having the perfect "known" truth as fully constructed data, made with the aim of its being a total representation without any potentially false negatives. To some degree, a synthesised ground truth introduces validity, especially technically, yet in other ways, it introduces new uncertainties. One informant argues that it is useful with synthetic data in some scenarios, to enlarge datasets or get more samples of specific subgroups. Still, to review all correlation matrices and output for all potential variables would be impossible, he argues, concluding: "I think in me there would always be a doubt that okay, maybe by data, the synthetic data reflects these and these variables in the real data really well. But I'm not sure how well it reflects the other ones."

Based on the informants' reasoning and practices, they seem to find inevitable limitations in having to rely upon expert-made ground truths, one being the limitation on knowledge discovery if models are based on, or evaluated against, what is already known about for example the risk factors or early signs of a disease. Yet, synthetic data are seen as inheriting this limitation, as Johan expresses it:

> [S]o the problem is with augmented or synthetic data, you're not getting anything that you don't already have, that makes sense. So, if there's one sort of anomaly in the brain that you just don't know about, you're not going to get that through data augmentation or through some sort of generated models or something, but on the other hand is really useful to just take what you have and make it more diverse.

As becomes visible from this quote, augmenting or synthesising data is not perceived as solving the limitations of expert-based ground truths. However, it could potentially serve other functions. In Aksel's NLP work, he sees synthetic data as something that would solve many issues. The datasets would be "proper" and big enough, possible to share and work on with any computer, but also offer a ground truth that is *realistic enough*:

> … cause in the end we are not trying to predict on a single person, we are trying to make a model that works on a larger population. So, there synthetic data works quite well since we don't … like this ground truth is muddy anyway, so with synthetic data we can generate something that is shareable and there might be some flaws but we don't really care cause on a bigger scale it is realistic, that is all we care about, right?

The statement that the ground truth is "muddy anyway" should not be regarded as a dismissal of the validity of the research and model development, but rather in line with what Jaton (2017) and Kang (2023) stress as the pragmatic perspective that developers have towards what they conceptualise as their ground truth. This means that it is not actually considered as an absolute factual truth but as a way of finding a workable truth basis. However, it does point to what several of the informants express or imply in their work, that not all ground truths are considered equally valid or valuable. Here the valuation practices of ground truthing for medical AI emerge.

Valuations of brittle truths

In the previous quote by Lars, he referred to engineers looking for a *better* truth. When ground truths for medical AI are assembled, the researchers perform valuations of what are the most accurate and trustworthy data sources and human experts. For example, one of the informants stress how they consider the pathologists' judgement as a more reliable data source than the radiologists' reading of images from the same case.

In some of the empirical encounters, the ground truth was perceived as a non-issue, solely taken as a given, as "the facts". In general, when it was generated by data collection conducted by the researchers themselves, as for example sensor data by devices, it was seen as unproblematic. The expert-based ground truths, however, often presented the potential issue of interobserver and intraobserver variability, meaning that the medical assessment (as in cancer versus not cancer) can vary between different observers or in repeated assessments by the same observer. The risk of flawed expert judgements, or experts with different levels of accuracy, is hard to control for. In their establishments of ground truths, the informants perform valuations of data by which

some hospitals or expert groups are deemed as providing more reliable diagnoses or assessments than others, enabling the creation of models the developers perceive as more trustworthy.

In his work to make multimodal prediction models of breast cancer risk, Niclas describes how they value data sources against each other in the quest for establishing the best ground truth. As they rely on hospital data, he argues that their models only get as good as hospitals perform. He refers to studies showing that one hospital could be four times as accurate in their judgement in comparison to another facility, in extreme cases.

> So that's something that we're working a lot on trying to understand, which ones are the better hospitals? As it is often elite hospitals, like university hospitals, that provide the best quality, we try to select them because it is more likely that there is better ground truth with them, so to speak, and so we train the model on that and so on. But there is no really effective way to get around that [problem], so everything goes via the hospital quality that is available at the time, so it's always … it's a challenge.

One aspect subjected to valuations of ground truths is that of temporality, which is sometimes a challenge when assembling medical ground truths for AI. In the case of breast cancer prediction, when considering image data from mammography screening exams, Niclas and his team are not valuing the ground truth at the point of screening as highly as the outcome five years later. This is as the algorithm is supposed to detect early signs of cancer in the images, and hopefully even earlier than the radiologists are able to detect it. To know whether the algorithm missed something in the image, it has to be evaluated against a later ground truth. This is to some extent the case for all risk prediction and with regards to medicine and health, where many of the conditions of the human body that the algorithms are supposed to grapple with are not static entities but evolving biological processes. This suggests another issue with expert-based medical expert ground truths from for example medical records or one-point human annotation: they are one event and one judgement, fixed in time. Growing cancers that need to be detected as early as possible, and risks that need to be mitigated, encompass predictions with a long arch of time series, multiple events and complexities. In these cases, it also shows how AI developers sometimes have to deal with multiple ontologies, by which medical conditions are enacted in several different ways by expert judgement datapoints, multimodality, and yet is identified by other ontological limits which have been turned into numbers for analysis by computational models. For them, cancer can be a range of pixel values. Epistemic uncertainties emerge when AI experts master computational methods but not how to, by themselves, visually review for example medical images for disease detection.

Aside from valuations in terms of better or worse sources, the incompleteness of ground truths is by some depicted as a constant worry. One of these worries is the incomplete patient trajectory. In most cases, the ground truth is one snapshot of events

or one time series, without all the parallel (documented or undocumented) timelines of events that have an impact on people's health. As Johan stated earlier, just because something is not in the data, it does not mean it was not discovered, as this is a matter of both proper documentation and access to all relevant data sources:

> And a lot of times you don't get ground truth at all, like for example with the brain anomalies. So, usually like the only ground truth you have is, you have an examination and then later on you have another examination. You can basically test that our hypothesis holds up so. That same patient, how did that patient develop? In reality, we only have these sort of data points that we get from whatever medical records we have.

Valuations of ground truths also take into account technical traits, such as size and representation of technical properties (for example images from different imaging equipment). There is however a factor or perceived brittleness or robustness of documentation, absences of (correct) labels, but also the multiple ontologies of medical classifications. In other words, ground truths could be *leaky*. The concept of data leakage is used in ML to describe when ground truth data unintentionally leaks into the training set so that the algorithm is trained on the exact same data on which it is later evaluated, a statistical *faux pas*. Yet, the ground truths could be argued to be also leaky in terms of omitting accurate representations. Still, the risk of this posing a problem is perceived as different for different diagnoses. As one of the informants gave as an example, a heart attack might potentially be hard to miss to register in the medical records, but if someone has unmedicated type 2 diabetes it is much more likely to go undocumented. What the brittleness of truths put into question is also to what extent the truth of one (dataset) can be the truth of many?

Can the truth be generalised?

I am sitting next to Hanna in her office. We are looking through a set of images, and their corresponding data annotations, coming from the local hospital with which her project collaborates. The task for the model she is developing is to detect cancerous tumours in the images, guided by expert labelling. As she has worked in several projects concerning medical images and disease detection models, she says that it is not really ideal only having data from one hospital for training and evaluation. The hospital in this case uses one specific imaging equipment, and images from different vendors could have somewhat different technical qualities. The risk is that the algorithm will learn to separate diseased from healthy samples only in images from one particular vendor. Yet, there are possible workarounds to decrease that risk. To make models that can work on data from all hospitals or manufacturers, the informants consider it necessary to augment data, add noise to, or synthesise data in order to build a referential dataset seen as a better representation of the phenomena modelled. The initial ground truth dataset is not perceived as able to speak the truth for all cases. The truth as it is already known has to be expanded or else it will be hard to argue for its clinical validity.

When Lars discusses the disease prediction models that he works on, he emphasises that in the end, they are statistical tools that can work statistically well at group level, but when you come down to the level of one individual, it is "just one data point" and the prediction might not hold true anymore. He says "and then somewhere it's the journey of life", describing it as documented in quality registers or medical records.

> … that now I got this thing, and now I got this and now I have this medicine like that, but it's also very complex because this data, it won't be ... It won't be such homogeneous groups because everyone gets different medications and then everyone stresses differently and eats different things and takes different risks and thus, so it's very, very difficult to get clean databases here. You probably have to admit that.

This complexity of life raises issues in predicting health outcomes, as in Lars's work. They need to make algorithms and models that can work on data from all hospitals or manufacturer and on all unseen patients, hence to build a truth that is as generalisable as possible. This speaks both for the situatedness of data, and the work of constructing ground truths that are perceived as valid, representative and capable of enabling the learning of AI tools across contexts. As such, it shows the complexity and value negotiations in the truth practices of AI experts.

Discussion

In this study, the truth practices and the valuations of ground truths emerge as performative, productive acts in medical AI development, by the reasoning and practices of the AI experts. When ground truths are brought together, this article shows how the AI experts have to rely on expert-based judgements to enable AI development, even when these require much work or when doubting its completeness. The humanness of expert-based ground truths emerges as somewhat of a double-edged sword. It is seen as an aspect that makes technical solutions more trustworthy, by not being solely computational but based on the knowledge of medical experts. Yet, this is also perceived as setting technical and epistemic limitations on development when aiming for AI to surpass human capabilities. As ground truths are already, in some aspects, seen as "muddy", there is a hope among some informants that synthetic data can work equally well or better than more traditional sources of ground truths, while introducing uncertainties of how deriving models should be validated. Yet, synthetic data are not perceived as solving the limitations on knowledge discovery, as these are seen as being inherited when data is synthesised.

In this study, the styles of valuation (Lee and Helgesson 2019) of ground truths are performed with regards to at least four identified aspects of quality. First, *humanness*, which is instilling trust by its closeness to trained, accepted medical judgement and clinical practice while also being devalued in relation to the other identified aspects. Second, *quality of human medical expertise*, as elite data sources are believed to encom-

pass the best medical knowledge and hence provide the most accurate labels. Third, *temporality*, as enabling prediction capabilities in models, but also in, fourth, *technical qualities*, much due to their ability to support generalisation of ground truths across cases, contexts and equipment. These aspects are in line with other research about how certain organisations and characteristics are indicative of trusted truths (Shapin 1994) or as representing objective factual knowledge (Daston and Gailson 2007), now in the form of elite hospitals, the quality of human judgement and technical specifications.

The importance ascribed to ground truths as *the facts* can furthermore be regarded as part of what Campolo and Schwerzmann (2023) call "artificial naturalism", in which the example-based authority is established between data and (in this case, medical) norms. To a large extent, it is the ground truth that enacts (Mol 2002) the medical condition in the development of medical AI, by limiting what counts as the reality of the disease. Moreover, ground truthing can be understood as articulation work (Fujimura 1987), pulling the production of datasets, training and evaluation strategies together to make medical problems *doable* for AI development. Human expert labels are seen as able to instil trust and provide measurement for comparison, and by this reasoning, ground truth also works as a scientific credibility device in epistemic cultures (Knorr-Cetina 1999) of AI development in medicine. If the ground truth is not seen as good enough, it is harder to get the application clinically implemented and accepted in the clinic. However, a "good" ground truth from a development perspective is not necessariy what a good ground truth looks like for hospital managers or other stakeholders (Lebovitz, Levina & Lifshitz-Assaf 2021). This is as a fully "known" ground truth, such as by computational simulation, offer perhaps the greatest technical possibilities (Siebert et al. 2020), but from other perspectives, what is most highly valued by some of the informants and their collaborators are data deriving as closely as possible from medical expertise and the clinical floor. In this regard, different valuations and truth practices make visible the tension between the trust in expert judgements and the value of increased generalisability and technological advancement, especially considering the goal of surpassing human experts' performance. Among informants, there are differences in terms of their valuation of synthetic data's ability or potential to function as a ground truth for medical AI. The idea that AI experts are looking for a truth that is better than expert-based labels, to be able to surpass them, corresponds with Henriksen and Bechmann's (2020:804) findings that "labels born out of the practical assessment of patients are not regarded as usable targets for model training when the goal is to leverage the existing classification logic that healthcare practitioners use".

Ground truths play a prominent role in the making of AI, but by that also in the computational making of the medical phenomenon AI is aiming to grasp. By Mol's (2002) conceptualisation, the ground truthing enacts the disease in a certain way in how data and labels are assembling ontologies into a model of the medical phenomena. Through a focus on ground truths, we can further the discussion of what ontologies are, and are not, included in the medical ground truths for AI development, and what the impact of these inclusions and exclusions could be. The focus on evidence-

based medicine and clinical data as a gold standard for reviewing medical knowledge (Timmermans and Berg 2003) moreover suggests a need for more discussion about what expertise is included in medical AI models (Lebovitz, Levina & Lifshitz-Assaf 2021). In Jaton's (2023) case of the construction of a medical ground truth, it was found to constitute a contested reference set due to the lack of a standardised basis for measurements, yet regardless of that, it continued to be used since it managed to reach certain quality standards and robustness for the making of specific AI technologies. This also suggests that the valuation of ground truth qualities encompasses more than alignment with standard expertise.

The reflexivity of the informants, with regards to the ability to enable generalisation, suggests a need to attend to notions about data inheritance (Green and Svendsen 2021), which suggests that historical medical data is representative of future populations and individuals previously "unseen" by the algorithm. This data dependency instils a normative order (Campolo and Schwerzmann 2023), still there are other normative orders that are posed by the algorithms but also normativities enacted in ground truth practices (Lee and Björklund Larsen 2019). Moreover, ground truthing plays a great part in the worldling capacity of algorithms, while never escaping the instability of medical categories. In that sense, the perceived brittleness of ground truths shatter the perception of medical standards and classifications, as well as medical AI tools, as stable neutral entities (Bowker and Star 1999). By this understanding, we need to acknowledge ground truths as sociotechnical entanglements and as inevitably limited in some sense. As Jaton argues:

> These ground-truthing processes engage people, efforts, and resources. Yet, in principle, the products of these processes (i.e. ground-truth datasets) remain limited, arbitrary, and socio-culturally oriented. Consequently, algorithms—as devices that approximate relationships among ground-truth datasets—*are* also limited, arbitrary and socio-culturally oriented. (Jaton 2023:803)

This resonates with the notion that a ground truth never should be taken as an absolute quantification or datafication of a phenomenon residing in the "real-world"; as emphasised by Kang, it implies "not necessarily a representation of 'reality,' but rather the translatability of a problem of interest, which allows it to be legible to and expressed in the language of mathematics" (Kang 2023:3–4). Or as suggested by Fine (2006), ground truthing is an organisational practice of crafted measures and verification, including the production of predictive claims and strategies for measuring them.

Truth practices also seem to work as a way for AI experts to grapple with the medical condition that their model's tasks involve. Epistemic differences can impact the creation of ground truth schemas (Zając et al. 2023), a finding also echoed by this study. The informants are experts in training algorithms, and not in medical assessment of sonograms or brain segmentations. In the border between medical and AI knowledge, informants speak of expertise at large in terms of divisions into different domains (Ribes et al. 2019). AI experts mostly can be regarded as what D'Ignazio and Klein (2020)

call "strangers in the dataset". They have to make sense of, or arrange for, the labelling of medical conditions to teach models to grasp structures and learn to generalise, while they themselves are usually "outsiders" to the clinical practice. Instances of critical reflexivity regarding the conditioning of their ground truths show how AI experts have to work pragmatically from a place of uncertainty to find ways to best represent the medical phenomenon and make models that can be utilised across contexts.

These truth practices can to some extent be construed as foremost reinventing truths and elevating already prevalent logics in healthcare through the modelling of AI (Henriksen and Bechmann 2020). Yet, I would suggest that several informants of this study express reflexive negotiations in relation to their ground truths. To some extent, the AI experts are held hostage by external demands and conditions, in the same regard as Fine's forecasters, by having to rely on medical expert judgements, hospitals, data infrastructures, medical classifications and equipment, while at the same time having to argue for the validity and accuracy of their own models. Fine (2006) argues that the forecasters of his study are almost hostage to mechanical claims beyond their control, and part of organisational practices and ideals that can also represent tensions:

> Facts, seemingly objective, become claims that are locally produced through organizational choice, but by being seemingly objective, they serve to create a hegemonic zone, preventing questioning. It is surely unfair to suggest that all that exists is a patina of truth, but adherence to the mechanical claims constitute a bureaucratic strategy, evident when the otherwise taken-for-granted mechanically produced truth is challenged by lived experience. (Fine 2006:7)

In a similar manner, and with regards to AI, Jaton argues that we get the algorithms of our ground truths and the "*ground truths of our organizations and metrological equipment*" (Jaton 2023:803). I would suggest that ground truths encompass even more, involving an array of people, organisations, equipment, standards and expertise.

Conclusions

This study shows how ground truths are productive epistemic enactments necessary for the development of medical AI, and something that the developers have to carefully navigate. Bates (2018) stresses data friction as something to foster rather than overcome. In this study, the making, reasoning about, and valuation of ground truth data shows a high reflexivity and awareness amongst the informants about the limits and pragmatic positioning they have to adopt towards their ground truths. These articulations are in need of more attention and consideration, to better understand the impact of new technologies. As argued by Lee and Helgesson (2019:680) "if we fail to acknowledge the divergent valuations of technology in situated settings, we risk becoming blind to actors' struggles to work with automation and algorithms".

In the empirical instances of dealing with ground truth assemblages, I show how they are shaped by matters such as medical classification, information and data in-

frastructures in terms of for example medical registers; moreover, how they are enabled and constrained by organisational as well as technological and scientific ideals. This suggests that we need to pay attention to ground truth assemblages as practices, narratives, artefacts and devices in knowledge production. Through the reasoning and practices of those developing AI, this article shows how datasets are assembled from different sources, and produced, augmented and synthesised. This addresses the role of human expertise, perceived strengths and limits of expert-based annotations, (in)stability of medical classifications, and sometimes, data friction.

These results can inform how developer practices fit together with grand calls for action, such as that medical AI should be fair, trustworthy or transparent. To be able to distinguish the possibilities of making such matters doable in practice, we need more knowledge on the processes going into the making of AI and the perspectives of those that are developing the technologies. What is perceived as a *good* ground truth? And what challenges or tensions are there in the practices in pursuit of that truth? We can continue the troubling of algorithms as stable, transparency as binary, and fairness as residing only in the algorithm (Lee 2021), by paying greater attention to assemblages of ground truths, and how they are valued and put to work in the development of AI.

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Author presentation

Charlotte Högberg is a PhD Student in Technology and Society at Lund University, Sweden.
Contact: charlotte.hogberg@lth.lu.se

BAKI CAKICI & ALENA THIEL

Addressability

Identification and Communicative Positions in Critical Sociological Perspective

Abstract
In this article we develop the concept of addressability to help us unpack processes of identification. We start from a foundational sociological account of addressing as laid out by Simmel, and use Luhmann's systems theory to identify tensions in the overlap between different systems. The dual character of addressing as reductive (in meaning) and constructive (of communicative positions) helps us understand a mode of knowledge production that generates its own recipients. By concentrating on the moment of addressing in this manner and developing the concept of addressability to explain its complexity, we seek to build an analytic concept that is useful for scholars who are interested in unpacking the construction of communicative positions in identification. We demonstrate the potential of this concept with an analysis of two moments of addressability in action that involve personal identification numbers. We conclude that the intersection and mutual challenge of these two approaches can help us connect different addressing moments while also moving beyond questions of surveillance and entitlement that routinely seek to capture the problem of identification.

Keywords: addressability, identification, identification numbers, systems theory, surveillance

OVER THE LAST two decades, critical debates around identification have come to centre predominantly on questions of surveillance (Lyon 2003; Bennett and Lyon 2008; Breckenridge 2014; Jacobsen 2021); exclusion (Ajana 2013; Hammar 2018; Hunter 2019; Chaudhuri 2020; Pelizza 2020; Banégas & Dalberto 2021; Manby 2021; Singh & Jackson 2021); and even denationalization (Salem 2021; Hayes 2022). While the politics of identification at the heart of these debates certainly represent a major contemporary concern and deserve continued academic attention, in this article we argue that they can eclipse important questions around "material participations" in identification encounters (Marres 2012).

The aim of this article is to develop the concept of addressability to help us further unpack processes of identification. We start from a foundational sociological account of the notion of addressing as laid out by Simmel (1997 [1908]), who identifies a tension between the use of names and numbers; we connect it to issues of state-driven organisational schemes (Scott 1998); and we use Luhmann's systems theory (drawing on a discussion of addressability by Fuchs 2005) to identify the cause of tension as the

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overlap between two systems. Finally, we demonstrate the potential of this concept with a brief analysis of addressability in the application of identification technologies.

The motivation behind developing the notion of addressability is to shape a concept that is more granular than identification, but one that remains just as useful in analysing human-to-human interactions as it is in machine-to-human or even machine-to-machine interactions. Our concerns are in line with sociologists and scholars of surveillance in trying to understand what identification does in practice, but we focus our inquiry on the significance of the moment of address. As we argue further in the article, the dual character of addressing as reductive (in meaning) and constructive (of communicative positions) helps us understand a mode of knowledge production that generates its own recipients. By concentrating on the moment of addressing in this manner and developing the concept of addressability to explain its complexity, we seek to build an analytic concept that is useful for scholars who are interested in unpacking the construction of communicative positions in identification.

To this end, we start with Simmel's account of addressing which highlights how the intricate and shifting arrangements of positionings in society are rendered countable through layered grids of abstraction. We then turn to Luhmann's system theoretical approach to explain the nature of the social address not as a pre-existing entity, but as the result of an autopoietic – that is, self-generating – communicative process.

We juxtapose these two strands of theory to argue that the term *addressability* manifests in the tension between identification emerging from the social lifeworld and its capture in numbered, standardised frames of reference. We thereby move beyond the by now seminal argument put forward by political scientist James Scott (1998) about state knowledge production and the practice of *metis* by attending to the microprocesses that bring social positions into existence (rather than simply capturing them in standardised modes of state vision). In other words, we extend beyond representational notions of identification (i.e. hollow inclusion profiles in which individuals are merely sorted) and discuss how state registration systems themselves participate in the communicative process that brings about the social address in the first place.

Addressability and Critical Data Studies

Scholars from a wide variety of disciplines have contributed to critical data studies with analyses of the reproduction of inequality and marginalisation through data as a medium (c.f. O'Neil 2016; Eubanks 2018). Sometimes these outcomes are a result of biases that creep into systems through unintended consequences of using complex data sets (Kitchin 2014), and sometimes they are direct representations of unequal or unfair bureaucratic systems being translated to digital domains (Benjamin 2019). Issues such as the availability of very large data sets for wealthy organisations, and the potential problems of unequal access that follow from them were detailed by boyd and Crawford (2012) in the early days of the field, while other scholars have also highlighted similar issues in policy-making and regulation (Rieder and Simon 2016), as well as in the complex networks of accountability formed by these systems (Reddy, Cakici, and Ballestero 2019).

A shared notion among works cited here is that the power of data arises from two important features: how it travels across different domains with ease when compared to other knowledge practices; and how (digital) data refers to, represents, or addresses its (physical) object. The former has been the focus of much attention outside of scholarly domains, with the most prominent example being the General Data Protection Regulation (GDPR) which limits or prohibits the transfer of certain types of data. The latter feature, however, has remained under-explored in scholarship in critical data studies and surveillance studies (with notable exceptions, like Beauchamp 2019; Amaro 2022). This is particularly relevant in contexts of excesses of addressability where addresses are created solely for addressing's sake, that is, for purposes of surveillance. The arguments presented by Simmel and Luhmann – that addressability points to a profoundly social communicative and normative process of inclusion within a social address space – serve as an anchor for our critique. In view of the continued failure of the emancipatory promise of identification technologies to include marginalised populations (Buolamwini & Gebru 2018; Benjamin 2019), we hope that our discussion can help us shift our gaze towards processes of "technicising" personhood (Blumenberg 2015) and their coupling to the construction of addresses already worthy of recognition.

Moreover, a focus on addressability allows us to emphasise that the intersecting of human activity with the systemic ways of ordering things according to an overriding singular principle (Scott 1998) represents a site of intervention in and for itself. In this light, addressability can help us move beyond questions of surveillance and entitlement that routinely seek to capture the problem of identification and its technologies. As a liminal concept that bridges identification in terms of its anchoring in numerical representation and the lifeworld alike, addressability potentially lends itself to new forms of critique.

Theoretical Framework: Addressability and Autopoiesis

In "The Sociology of Space" (1997 [1908]), Georg Simmel discusses two examples of the tension between naming things and numbering things. In the first example, he describes how houses with numbered addresses differ from houses that bear unique names, and he states that the named house "must give its inhabitants a feeling of spatial individuality, of belonging to a *qualitatively* fixed point in space" (ibid.:149). In other words, there is a qualitative difference between named houses and numbered houses; naming instead of numbering grants houses "unmistakability and personality of existence" (ibid.), but also introduces a trade-off: Names are only meaningful for locating things if people know about them, otherwise they are nearly useless as descriptions of how to find a place.

In contrast, numbers come as part of a larger structure that helps locate a point in space when houses and streets are systematically numbered. Unlike names which carry meaning because of their presence in language directly, numbers acquire meaning only in reference to a set of rigid structural rules larger than themselves which is then communicated in language. This can be as simple as an increment/decrement relation

where street number five is located next to street number six, or the mapping of odd and even numbers to different sides of a road to make it easier to locate individual houses.

The other example that Simmel points to is the designation of hotel guests according to their room number: The inhabitant itself becomes the number in the eyes of the organisation, for example as seen in the statement "number three checked out earlier today", because as far as the management of the facility is concerned, the name is temporary and ever-changing while the room number is permanent. The number is the more meaningful construct for management as taking care of the rooms is their responsibility regardless of who resides in them. This does not make it any less jarring for guests staying in the room when they overhear themselves referred to as a number, e.g. when the resident of room eight overhears the statement "number eight has left for the day but left their suitcase."

In these examples, when a number is substituted for the name, there is a qualitative change: The signifier carries significantly less meaning for the inhabitants of the house or the hotel room, although the same transformation can make it more meaningful for other groups such as city planners or hotel management. Simmel uses these two examples to set up a tension between names and numbers in relation to the sociological position of the person. He argues that as lives of individuals differ greatly from one another, any attempt at organising people into a numbered space encounters immediate resistance.

This analysis is in line with James Scott's argument that high-modernist projects were all designed for "standardized citizens" (Scott 1998:346), generic people who resembled one another, needed similar things, and had no opinions or histories. They were entirely free of "particular, situated, and contextual attributes". In the projects that Scott analyses, these individuals are considered less-than-human and remain undifferentiated, in contrast to the elites whom these projects consider as possessing unique and individual attributes. Scott identifies the "resolute singularity" of high-modernist projects, that is, their tendency to focus on one and only one process (e.g. growing wood, delivering shelter, providing medical services) as the primary reason for this reductionism. However, any site can be put to multiple uses because that is how space and humans interact, and the singular focus eventually brings down such projects. Scott also identifies how such projects can succeed with the backing of authoritarian states, and he argues that such expressions of force are always damaging and come at a human cost. Both Simmel and Scott grapple with the consequences of intersecting highly variable human activity with the regular and systemic ways of ordering things according to an overriding singular principle.

This is where another strand of sociological thought, Luhmann's system theoretical approach, helps us further the investigation. For Luhmann, communication precedes any communicative position and instead autopoietically, out of itself creates its own constructions (Luhmann 2002 [1992]:155–168). Radically speaking, the social address is the result of communicative acts and hence cannot precede any form of social interaction (Fuchs 2005:41). In Fuchs's analysis of Luhmann's core concept of addressability,

then, it is *not* the subject that attracts certain expectations generated and arranged by other subjects, based on which communication can then subsequently unfold. Instead, the social world is itself constructed through communication's core function of selectively identifying distinct recipients or entities in the world, which as a prerequisite need to be able to distinguish between self and other, and hence can be conceived of as producers of communication (i.e., entailing self-referentiality rather than mere information, i.e., merely being thematised) (Fuchs 2005:44, 53; cf. Søe & Mai 2022).

Luhmann's basic sociological concept of addressability is central to our argument as it points us to identification's existential foundations in the lifeworld. As Fuchs notes "the social address is a matter of survival" (Fuchs 2005:41, *our translation*) as there can be no consciousness of either the self or of the other in the absence of addressability (ibid.:43). In the contemporary context of complex, diversified social systems, addressability as a communicative process coalesces into multiple "condensation points" where communicative positions are assigned and enacted (ibid.:43, *our translation*), are subsequently amplified through repeated communicative acts and thus enhanced in their definition (ibid.:48). The result, following Fuchs, is the arrangement of complex inclusion and exclusion profiles, or of "who or what can be thought of as address of a specific communicative act" (ibid.:44, *our translation*). In other words, the functional differentiation of the social world generates the need for the construction of partially coded social addresses with limited self-referentiality (e.g., in the economic system, social addresses are devised that enable the formation of contracts and the facilitation of payments; Fuchs 2005:52,55). From this perspective, by providing the foil for complex arrangements of social positions, addressability generates the very social facts that make up our social world and only subsequently lend themselves to various forms of capture (ibid.:43).

At this point, we return to the question of how the complex, and necessarily fluid "social" map of communicative positions is captured in Simmel's grid of numbered address spaces. In our view, the tension between the numbered space and the sociological position of a person manifests as a resistance because the former is discrete and fixed while the latter is relational and ever-changing within specific constellations of partial addresses. Moreover, finding a place in the numbered space for a person to occupy is reductive because it replaces the relational, communicative constitution of the person with the ordered relations of the number, which come with assumptions about hierarchy which function at the level of metaphors of size and of order; one is smaller than two, one comes after two, etc. (whereas the "pluricontextual" and fluid addressability of Luhmann is generally non-hierarchical [Fuchs 2005:52]).

In other words, we can reinterpret Simmel's example of named houses versus numbered houses as situations belonging to two different systems: Named houses communicate locally not only their location but also their history and heritage, whereas numbered houses communicate the way all houses in a street, a district, or a city have been organised into a coherent whole. As such, the shift is not merely a change in signifier, these are the products of different systems which happen to intersect; or in systems theory terms, they are structurally coupled to one another although

they necessarily remain operationally closed. The administrative system where local authorities make sense of a city is coupled to the social system in which residents go about their everyday life.

Following Simmel, addressability is an admission that, reductive as it may be, a sociological position can be translated into a numbered space. Individuals are addressable because it is possible to come up with ways to reduce the complexity of the sociological position by discarding nearly everything that makes the person a person. According to Luhmann (and Fuchs), addressability is not merely representational but emerges out of the functional differentiation of society and its associated forms of inclusion/exclusion into partial addresses.

It is worth nothing that our conceptualisations, as well as those of Simmel and Luhmann, rely on either the notion of the individual human for the former and or the individual communicative position for the latter. These are necessarily products of a historically and culturally specific mode of thought. Other ways of conceptualising units and groups have also been documented. For example, Roy Wagner's account of a concept he observes among some Melanesians that he terms the fractal person, where the part/whole distinction does not apply as fractality "prevents the differentiation of part from whole" (Wagner 1991:171), expresses a different conceptualisation. The fractal person exists at different scales but always preserves its own one-ness or wholeness. Working with such a conceptualisation would of course question the very possibility of self-contained and discrete communicative positions communicating, as fractality is the existence of parts at different scales without ever forming a whole, or alternatively, always forming a whole of their own. While we have treated communicative positions as distinct and discrete yet pluricontextually constituted, Wagner's contribution reminds us that this analysis can only follow from our assumptions of the basic units of interaction.

The two facets of addressability help us in explaining contemporary concerns surrounding identity, surveillance, and data. We consider addressability to be simultaneously reductive and generative, and in line with the above two definitions, we conceptualise identities as being both a simplification of the social world, and an expansion of the communicative position to technological domains where communicative acts occur not only over vast distances but also between humans and other digital technologies. In later sections we analyse two moments of addressing where we unpack this issue further.

Material

In this article, we combine perspectives from sociology, anthropology, and science and technology studies (STS) to discuss the potential of a conceptual shift from identity/identification as a formatted data practice to the foundational notion of addressability. The contribution of this article is rooted in our long-term ethnographic observations and archival as well as documentary studies of highly diverse population data systems in Scandinavia, the UK, and Ghana. While the scope of this article does not allow us to

explore empirical material from each case in depth, our understanding of addressability has been shaped by the variety of forms of interactions with identification technologies in our respective fields.

While Europe's largely consolidated population data systems help us understand the power of Simmel's system of abstracting social addresses into a numerical grid of distinct address spaces, not yet consolidated systems of population registration such as Ghana's can be insightful for foregrounding the complex interplay of social and technical forms of addressing individuals, and how these systems co-constitute each other. This is not to say that African societies such as Ghana are in any way closer to "the social" than "the technical". On the contrary, contemporary techno-enthusiasm and optimistic investment in population data infrastructuring and other "trust infrastructures" across the continent (e.g. in digital finance, Breckenridge 2021; Breckenridge & James 2021) allow us to observe the fluidity and dynamic arrangements of abstract notions of personhood as they are writ through material devices deployed to discipline populations. Again, we propose to mobilise the notion of addressability to connect the two mechanisms and make sense of their mutual co-constitution.

In the next section, we analyse two moments of addressability involving personal identification numbers. We begin by defining the kinds of numbers used in the Nordic countries. We then highlight the dual character of addressability – as the reductive translation (Simmel) and the act that both constructs and inhabits a communicative position (Luhmann via Fuchs) – in two moments where such numbers are assigned to newborns shortly after birth in Denmark.

Analysis: Addressability in Action

In Nordic countries, personal identification numbers are administered at the national level. They are assigned to all citizens at birth, and to other residents when they declare their resident status in the country. These numbers are often invoked in interactions with state institutions in charge of healthcare, taxation, and education, among others, and accessing such services without a number can be challenging or sometimes even impossible.

In comparison to random strings used as unique identifiers to link registers in any register-based system, the Nordic numbers have some distinguishing features (Cakici 2024). The most prominent is that the date of birth of the person is included in the number. As the age of the person is possible to determine for the identifier, this can cause issues; sometimes it amounts only to a socially awkward moment where the person has to unwillingly reveal their age to another or to a group of others in a crowded room, and at the other end of the spectrum it can lead to age-based discrimination, for example in the case of a job application where the applicants are asked to provide CVs which include their identification numbers. In some Nordic countries the number also includes the legal gender of the person at birth, which can have similar discriminatory consequences. In the Swedish *personnummer*, it was also possible to distinguish whether the person was born in the country or migrated later in life, and although this practice

was stopped in late 1990 (SCB 2016), traces of it remain in the numbers assigned prior to the change. In short, as unique identifiers assigned to people, Nordic identification numbers differ from random strings in that they communicate information about individual people.

As Simmel's reading shows, any attempt at understanding the role of "the number" in isolation is futile; numbers carry little meaning when considered independently of their position in a sequence. This is not only the case for addressing; the same goes when we indicate quantity. That is to say, what use is it knowing eight somethings when we have no reference for what one of that 'thing' might entail? Each element in the series points to the one that came before and the one that follows, after. In short, numbers are rarely meaningful as individual entities. To make sense of them we always need to know about other numbers in relation to the first, whether they indicate a quantity or form a sequence, and in those relations the tensions of inference are made clear. Moreover, as Verran's study of numbering practices teaches us, the enumeration itself can involve an oscillation between unity and plurality (Verran 2001:92–119).

The power of numbers is in their capacity for generating a space that addresses many elements. There are many other unique identifiers that link registers made up of random combinations of letters and numbers, and there are also other types of identification numbers used for more narrow purposes (e.g. numbers assigned to students in schools or universities). For addressing people, however, some features of numbers make them highly useful, especially in connection to the state-sanctioned calendar through the date of birth. Personal identification using the date of birth of the individual creates a constant that does not change throughout the lives of citizens, unlike other identifying information such as the name or place of residence (Thiel 2024).

Turning to how individuals are assigned unique identification numbers, the concept of addressability allows us to open up this process of numbering. Using these numbers, state subjects are requested not only to pay taxes, to receive welfare benefits, or to vote in elections, but the potential of addressing individual subjects also allows for other interventions to be imagined and other power relations to be constructed. These interventions often draw on logics of care and control simultaneously and exist in tension as they set out to serve heterogeneous populations with standardised solutions (Zakharova, Jarke, and Kaun 2024).

What makes the interventions interesting from the Luhmann/Fuchs perspective that we have laid out is that the communicative position constructed by addressability is also a site of intervention available to other systems. This is the issue we want to highlight in reference to a moment relayed to us during an interview that Baki Cakici conducted in 2019 in Copenhagen with a midwife educator (whom we will refer to as DH). We were told that personal identification numbers ("*CPR-nummer"*) are often delivered by midwives, who obtain them either directly from an online system, or via the medical secretaries employed by the hospital. DH told us that when it is time to get the number, sometimes the parents would ask for a "good number". She interpreted this as a number that is easy to remember, but regardless, there is no way for the midwives to pick among a list of numbers as the system, in her words, "spits out one". While

the wish for a good number might sound curious to those who are not familiar with Nordic identification numbers, those who were assigned at birth might recognise the strange attachment that one forms with their identification number throughout life.

The quality of goodness that the parents seek with their request serves as a suitable example for extending Simmel's point on addressing. Addressability in this case indicates not only the loss of meaning in a solely reductive transformation, but also the potential for holding other kinds of meaning for others. In this case, the aesthetics of a number or the convenience of memorising it are foregrounded. At the same time, this act of addressing imbues the receiver with another meaning in the form of a communicative position. For example, when the newborn subject is addressed by the state in a bureaucratic encounter issued by the tax office, or when the parents log on to an online system on behalf of the newborn, the communicative position is also the site of intervention. While the action is taken by the communicative position (reading, logging in, etc.), the meaning of the activity is in the act of addressing that specific state subject. This structural logic of addressability holds independent of the medium: Both the official piece of paper and the digital identification app follow the same logic of addressability, and hold at different scales, e.g. whether it is built to address a country of one million people or a country of one billion people.

While addressability constructs the communicative position, the power relation underlying an act of identification remains unequal: One position has access to the mechanism that establishes the suitable answer to the question "who are you?", while the other position, referred to as "you" in the question, cannot make claim to a singular mechanism of establishing truth. What it does have is myriad paths which may all lead to an acceptable response: Providing a name, producing a document, uttering a number, or reaching for a biometric scanner all produce their own answers. Regardless, the final arbiter is the position that poses the question: the border guard, the police, the tax official, the ticket controller, etc.

Incidentally, this is precisely why identification over the internet is occasionally unnerving. Login pages have the absolute power to determine the truth of the responses they receive, and when the truth of the system does not match the truth of those who answer it, there are few ways to contest the result. "Forgot password?" buttons provide a way of out the conundrum for most mundane tasks, but each defers the establishing of truth to another venue where the same exchange repeats. A communicative act of identification involving two humans can always have a parallel negotiation where the economic system might provide an answer (e.g. when a corrupt bureaucrat accepts a bribe), identification involving a non-human interlocutor leaves no space for this kind of negotiation as the non-human is not a part of that economic system; instead the systems involved count how many login attempts are allowed in a given time, or whether another identification technology can be used to provide an acceptable response.

Our final example also draws from the same interview, where DH described an exchange that occurs occasionally between midwives and parents of newborn babies in the labour ward. Once the number has been assigned to a newborn, the attending midwife or another nurse might ask the parents for the personal identification number

of the baby. In some cases, the parents do not immediately recall the number and end up checking the bracelet worn by their newborn child for the number. During this exchange, parents sometimes voice discomfort and even shame, because they feel that there is an expectation to immediately know the number assigned to their child. According to DH, the pressure that the parents feel is understandable, but also surprising in that it would be unreasonable for anyone to memorise a number that quickly.

As noted, Nordic identification numbers carry information about the receiver, and because of their widespread use, those who receive them at birth tend to memorise them at an early age. Their parents, however, might have experienced a version of the above story. What we see in this moment is the beginnings of a shift from the name to the number. For the parents, both have equal value as they refer to the same newborn child, but while the name is already meaningful the number has not yet become meaningful aside from its immediate utility in accessing care within the labour ward.

Once again, this echoes Simmel's example of named houses. For example, if we take the name "the Daston house", Simmel's reading casts is as a meaningful label as it carries traces of the relationship between the name and the location. Daston might be the name of an ancestor, or a significant person who visited the house in the past; the point is that it denotes a relationship between the location and its history. In contrast, numbers used as addresses do not denote such histories, and they repeat; countless streets have houses numbered one, two, three, etc. What draws Simmel to this moment is how the internal link between the name and the location are broken, and how individuals – humans in the case of Simmel and communicative positions when seen from systems theory – with their inherent social complexity resist this reductive moment. Meaning is no longer derived solely from the relationship between the signifier and the signified, as it now exists in reference to a different system. The houses do not lose their uniqueness, but they do gain a new relationship to each other, which as we explained earlier, might be of use for groups other than the residents.

Conclusion

In this article, we drew on foundational sociological discussions of addressing by Simmel and Luhmann to define a more granular notion for unpacking the construction of communicative positions in identification, which we termed addressability. We defined addressability as having a dual character: A reductive transformation that breaks chains of meaning, and a potential for communication that in the same act constructs the communicative position. In Simmel, we saw the reductive transformation of the sociological position into numbered spaces, and in Luhmann a generative transformation of the communicative position into a recognised recipient. We demonstrated how our concept can be deployed analytically by concentrating on two instances of addressing involving the use of Nordic personal identification numbers.

While addressability is at its most salient when a communicative position is placed in a relation with a formalised state identification system, it resists being reduced to an act of administrative capture as it points to a more foundational act of constructing

meaning in others. This is critical, not least in view of the contemporary proliferation of identification technologies outside of the state bureaucracy. With many other actors participating in the construction of communicative positions, we are hopeful that our proposed lens of addressability allows us to paint a more granular picture of identification in its layered effects on human-to-human as well as machine-to-human interactions. As a critical intervention, the intersection and mutual challenge of the two approaches to addressability presented here can help us connect differing addressing moments while also moving beyond questions of surveillance and entitlement that routinely seek to capture the problem of identification.

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Author presentations

Baki Cakici is associate professor in the Technologies in Practice section at the IT University of Copenhagen.
Contact: bakc@itu.dk

Alena Thiel is Marie Skłodowska-Curie fellow at IT University of Copenhagen, Technologies in Practice section.
Contact: thie@itu.dk

MATILDA TUDOR

The Truth and Nothing but the Truth

Media Discourses on Body Data in Medical Age Assessments

Abstract
This article analyses the discursive power of the datafied body, using the example of medical age assessments on unaccompanied minors in Sweden from 2017. Focusing on mainstream media discourses, it aims to raise critical attention to the truth-effect of body data, and the impact of media discourse on how it is transmitted to the broader public. This becomes particularly striking in relation to a case where such data were being miscalculated and misused, in a human rights scandal Sweden has yet to deal with. Ultimately, I argue that this machinery, while turning bodies into data, carries the logic of a lie detector of sorts, wiping out self-attesting truth, and undermining relationality and trust. Through the articulation and amplification of such logics, media discourse helped confirm and legitimise the power abuse of a nation state towards a particularly vulnerable group in search of protection. Hence, I maintain that the overreliance on body data in the current migration regime must be critically discussed in relation to ethical sensibilities and the growing dehumanisation of displaced populations.

Keywords: body data, biometrics, migration, media discourse, medical age assessments

IN THE DIGITAL information society, the body is imagined as the locus of an individuals' true self; possible to read, scan, measure or count, and through this abstraction be transformed into data. While personality, singularity and judgement are increasingly described as nothing but predetermined code and mechanical operations, we are all readily available to be decrypted, with only the right technology at hand. Throughout society, machine learning technologies are thus implemented on all levels, specialised in calculating, i.e. face geometries, palm patterns and health data, in order to create knowledge about everything from attention spans, emotional stability and stress levels to credit worthiness. Still, while body data among majority populations in the democratic world is primarily used (at least at surface level) to increase the smoothness of everyday operations such as boarding an airplane or locking up a smartphone, they tend to have more far-reaching consequences for those most vulnerable, such as the poor, the marginalised or more generally, those who "have to prove their eligibility to certain social rights" (Fassin & d'Halluin 2005:597).

This is indeed the case when it comes to individuals in forced displacement claiming their right to protection within the bureaucratic machinery of international mobility, where we in recent years have seen a paradigmatic shift towards the body (e.g. Ajana

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2010, 2013, 2015, 2021; Broeders & Dijstelbloem 2016; van der Ploeg & Pridmore 2016; FRA 2018; Chouliaraki & Gergiou 2019; Fog Olwig et al. 2020; Pfiefer 2021; Nalbandian 2022; Nalbandian & Dreher 2022; Helander 2023). Ever since the 1990s, digital representations of bodily characteristics, including DNA, fingerprints, voice, body temperature, bones and much more, are used to identify, verify, categorise, monetise and discipline migrants throughout the displacement cycle (Fog Olwig et al. 2020). Further, these biometric procedures are promoted by both industry and authorities as scientifically exact and neutral, and thus imagined to work in the best interests of both the system and the individual migrant. But, as we know, biometric technologies, due to data bias and uncritical implementation, may also serve as a means for automating inequalities across for example race, class and gender (e.g. Magnet 2011; O'Neil 2016; Eubanks 2018; Noble 2018; Benjamin 2019). Even when no such clear misuses are to be found, body data undeniably presents a highly simplified and flat version of the complex and multifaceted human being and their life. Critical data scholar Btihaj Ajana (2010:239) states with reference to colleague Kelly Gates, that biometric technologies in general:

> are underpinned by scientific discourses and practices that tend to convert the subjective, and in many ways, profound dimensions of identity into hyper-empirical and objective programmatic Boolean operations of true/false, positive/negative. Their overarching aim is to purify, so to speak, the articulations of identity from ambivalence and instability while rendering them immune to the problems associated with "human fallibility".

Ajana (2010:239) thus argues that one of the main tasks of the recent enforcement of biometric technologies within migration policy is this very "simplification of the meaning and function of identity".

The discursive power of body data further comes from its imagined separation from the subjects themselves, in a kind of inverted Cartesian dualism, where the body is no longer regarded as the container of the soul, but the objective truth of the soul, independent of consciousness (Ajana 2010: 243–244). Body data is imagined to tap untainted information about human nature, possible to decode only by neutral laboratory- and/or machine-learning technologies. It thus, seemingly, bypasses the need for experts and professional judgement, as well as the self-attesting testimony of the individual. In consequence, if the biographical story was for long the main means by which to assess asylum cases, the shift towards biometric technologies has simultaneously implied a *turn away* from the life narrative (Ajana 2010). Within the operations of biometric technology, the discursive truth-effect of the body is combined with the powerful sociotechnical imaginaries about scientific, more-than-human agency, and the subject is deemed their deceitful opposite. This has certainly fed into the climate of scepticism against the asylum seeking subject, or what is commonly referred to as a "culture of disbelief", embedded in the current asylum system in Europe and beyond (e.g. Hedlund 2016). Thus, as I will be arguing in this article, the informatisation of

the migrant body must be viewed in relation to the massive objectification of displaced populations so prominently featuring in contemporary European migration discourse. As more and more reliance is placed on automated and seemingly objective methods of identification, that essence of *being*, which inevitably escapes the datafied body, seems to be disappearing out of the picture together with relational and ethical sensibilities. Further, this discursive shift not only affects the internal workings of the migration system, but has broader implications on public attitudes, as these biometric operations are spread, interpreted and translated into media discourse.

Hence, within this article, I will focus on media discourse produced in Sweden between 2015 and 2017, when medical age assessments (MAAs) were being discussed, and eventually implemented, in the handling of unaccompanied minors' asylum cases. Relying on body data such as x-rays and MRI-scanning of joints and teeth, medical exams produced values that could be fed into a matrix estimating the probability of an individual being above or under 18 years. These estimates were then to have pivotal influence on the decisions made about thousands of young applicants' destinies. I ask, *how was the pervasiveness of body datafication and scientific instrumentalisation – commonly assumed to settle uncertainty and provide more-than-human objectivity – represented by news media in these particular cases?* Using a Discursive-Historical Approach (Reisigl 2017) in search of underlying assumptions about truth, validity and righteousness, the overarching ambition of the article is to understand *how MAAs, as biometric technologies feeding on body data, are discursively represented to a larger public*. This article thus focuses on media discourse in context, as the events initially unfolded, in order to understand the larger ethical and political landscape. Though much has been written about these events even since 2017, due to the scandals that were gradually revealed, the limitation in search period is aimed at capturing discursive logics surrounding body data while the methods were still on the level of "something to come", and just recently implemented. In that way, the ambition has been to seize both inherent connotations of body data as proof of identity in competition with other means of identification, and its discursive forcefulness as a political tool in the new migration regime that would follow.

Drawing on Hannah Arendt's writing about the loss of human rights for stateless and displaced populations and its interconnections with fascism, this article stresses the indispensable need for broader discussions about the ethical implications of "automated othering". Focusing on discursive formations of the datafied body, I argue that these ways of promoting certainty (while in fact often flawed) serve to accomplish administrative goals in line with new anti-migration sentiments, and solidify imaginaries about deservingness in migration discourse. By focusing more specifically on the Swedish context, the article further aims to contribute with regional perspectives on the specificities of datafication, and the ways in which it can be understood as part of the puzzle in the major ideological changes the country has gone through over the past decade.

An ethical limit

It is hence difficult to ignore the exposure of displaced individuals to methods of datafication, in a system where migration is increasingly becoming "a transaction requiring migrants to exchange biometric and biographic data for access to resources or a jurisdiction" (Nalbandian 2022:2). However, it is *not* the ambition of this text to turn those displaced into objects of pity, but rather to, inspired by Ned Curthoys's (2020:47) reading of Hannah Arendt, regard displacement as a theoretical perspective. Arendt warns about what forces might be set in motion by the very power nations states assume over stateless people and refugees, and it thus seems timely to recall her troubling meditation over modern mass statelessness in her essay "The Decline of the Nation State and the End of the Rights of Man" (1962). Here, she argues that the origin of WWII totalitarianism, and ultimately the persecution of the European Jewish population and other "unwanted groups", lies within the logic of the modern nation state itself. Since human rights have become so intimately tied to citizenship, she says, those no longer belonging to such a community are no longer recognised as subjects of rights at all. "Only with a completely organized humanity" according to Arendt, "could the loss of home and political status become identical with expulsion from humanity altogether" (Arendt 1962:297). With the recent proof of history at the time of writing, she dispelled the idea of actually existing inborn and inalienable "human rights", based on some kind of abstract qualities of "being human".

> The conception of human rights, based upon the assumed existence of a human being as such, broke down at the very moment when those who professed to believe in it were for the first time confronted with people who had indeed lost all the other qualities and specific relationships – except that they were still human. The world found nothing sacred in the abstract nakedness of being human (Arendt 1962:299)

In consequence, statelessness confines people to a kind of purely private existence outside of civilization, without the right to have rights (Arendt 1962:300). It should be noted that within the new politics and ethics of the European border, migrating populations are ever more expelled into such an existence, not least through "neutral" practices such as biometric profiling, which position the individual within biological epistemologies deprived of biographical and emotional depth. This becomes an existence at the mercy of potential protection by the union due to matrixes of legitimacy, but whose death may as well go ungrieved (Chouliaraki & Georgiou 2019:18).

Thus, drawing on the narrative bioethics of Btihaj Ajana, and existential media studies (EMS), this article ultimately argues that our current time of interrelated crisis is indeed a "limit situation" (Lagerkvist 2022), not least in terms of democratic principles and international law. This is seen in the rapid spread of anti-migration discourse across western democracies, increasingly implemented through border practices where human

value is bracketed, such as detention centres, the outsourcing of responsibility to third-party countries and the legal unpredictability and uncertainty of the international right to asylum (e.g. Picum 2024; Civil Rights Defenders 2024). As democratic principles and liberal values such as equality, human rights and international solidarity are today openly questioned by world leaders and large segments of voting populations in the democratic world, in ways difficult to even imagine just a few decades ago, we certainly seem to have reached a limit – a limit where we, among other things, must reflect on how the ever-increasing datafication of our individual and collective lifeworlds affect ethical sensibilities.

Background: Unaccompanied minors and medical age assessments in Sweden

During the migration wave in 2015, commonly referred to as "the migration crisis" in Europe, Sweden, like the rest of the union, received a large number of asylum seekers, initially overwhelming the country's public institutions, while evoking large-scale civic engagement and support (Betänkande av utredningen om migrationsmottagandet (2015 [2017])). Researchers examining Swedish media reporting about the events during the autumn of 2015 have suggested that it can be regarded as a three-part-narrative (Dahlgren 2016), where, towards the very beginning, the reporting as well as the political speeches were very much in line with the humanitarian framework, historically significant to Swedish self-identity (Dahlgren 2016; Emilsson 2018; Abdelhady 2020). According to such a frame, the situation was presented as a "*migration crisis",* in terms of immense human suffering and the vulnerability of displaced populations in need of protection and solidarity. Newspapers also frequently reported about the overwhelming support among the general Swedish population, with volunteers filling the train platforms, waiting to help out with the reception of those newly arrived. However, in the next phase of the narrative, as migrants were arriving to Sweden in great numbers, the frame turned into a "*crisis for Sweden*", in terms of overburdened administrative institutions and a situation increasingly "out of control". Along with general and abrupt policy changes, which took Sweden from one of the most generous countries in the EU in terms of migration policy to the EU's absolute minimum level, the framework of the narrative further changed to an enhanced focus on "*the need for policy changes*". Along with these discursive shifts, which took place over a few intense months, forcibly displaced people became symbolically paired with symbols of the police and confinement, primarily depicted in relation to issues of national security, and visually composed of groups of unidentifiable people (Jovovic 2020:110). At this point, a social media counter discourse expressing suspicion towards the motives of some refugees, and in particular towards those stemming from Afghanistan, also found its way into mainstream media (Dahlgren 2016:390).

What was particular for the situation in Sweden in 2015 was that as many as 40% of the entire group of unaccompanied minors[1] seeking asylum in the EU during that year came to Sweden. This meant the arrival of an unprecedented number, 35,400 young individuals, among which roughly 70% originated from Afghanistan, many of whom lacked valid identification documents and passports[2] (Press release 87/2016). However, due to the special rights of children within the asylum process,[3] it was regarded necessary for Swedish authorities to somehow verify the age of applicants. If it was not clear from ocular inspection that the applicant was younger than 18, the law text said that it was up to the applicant claiming to be a minor to, beyond reasonable doubt, prove their age (Migrationsöverdomstolen, 2014). But there were a lack of systematic procedures for assessing ages, leaving both applicants and case officers to a juridical grey-zone and undermining legal security (Farr 2017). The inherent ambivalence of the Afghani asylum cases had already constituted fertile ground for conspiracy theories to grow, theories which now bloomed (Elsrud 2023). The lack of systematic procedures also became politically charged, and opposition parties were vocally demanding the introduction of MAAs (e.g Sveriges Riksdag 2015/16:523; Sveriges Riksdag 2015/16:746). However, this was not an uncontroversial issue at the time, and a lot of national and international debates were ongoing about the reliability and legal certainty of available methods (see e.g. Noll 2016). Nevertheless, in November 2015, the Swedish government, as they simultaneously launched a new temporary migration law seriously limiting the possibilities for asylum in Sweden, decided to "promptly" and in accordance with scientific state of the art, create a centralised system for MAAs.

It is a well-established fact since then that the method chosen by public authorities – an MRI scan of the knee – was invalidated and that the estimated margins of error officially given were based on serious miscalculations (Axelsson 2018: Bring & Rönnegård 2019 Dagens Medicin 2018; Tidningarnas Telegrambyrå 2018; Tamsen 2019;

1 As a legal category, the "unaccompanied child refugee" implies a migrant under the age of 18, who at the point of arrival is separated from both its parents or from other grown-ups who have taken on the role of parent, or who after arrival stands without such a guardian (Betänkande av utredningen om migrationsmottagandet 2015 [2017]:44). Unaccompanied minors are described in terms of their unique vulnerability and need of special protection within all stages of the displacement cycle.

2 In Afghanistan, few births are officially registered, and many lack identity documents. This is particularly common among rural areas and persecuted minorities who have commonly lived in exile elsewhere, often in Iran or Pakistan. Further, Afghani documents are not validated by the Swedish Migration Agency, due to the high level of corruption in Afghanistan (Eckerman 2021a). Hence, the entire group of unaccompanied minors from Afghanistan lacked the possibility to identify themselves.

3 In Sweden, the reception of unaccompanied minors implies, first of all, the kinds of rights that an applicant is entitled to during the asylum process (2 and 3 §§ LMA), such as access to health and dental care, school attendance and special secure housing, as well as a custodian. The Swedish Aliens Act (2005:716) Chapter 1 §10, also makes clear that decisions concerning children should be made with special consideration for their health and development as well as their best interests in general. In accordance with EU Regulation No. 604/2013, unaccompanied minors can apply for a visa in all EU states even if they have arrived in another European country first.

Tamsen & Monstad 2019; Eckerman 2021a, 2021b). After persistent protests from the research community and medical expertise, on both a national and international scale, the report on which the method choice was based was withdrawn and the National Board of Health and Welfare admitted that it relied on meta-analysis of incompatible studies, resulting in inadequate estimates. Hence, there was "substantial uncertainty about the true relationship between chronological age and the age indicators used" (Tamsen & Monstad 2019:615). Experts in forensic medicine and statistics were able to produce models that showed that the more probable error-rate for 17-year-old boys was 41%, rather than the 3% initially stated, and that approximately 33% of all male children that had been subjected to the procedure in 2017 had been "erroneously classified as adults" (ibid. 622).

Methods

This article is part of a larger study on the existential ethics of body data in international mobility, mainly drawing on in-depth interviews with asylum seeking youth who have gone through MAAs. However, in this article, the focus has rather been on the surrounding context through media discourse. The material primarily consists of articles from Sweden's four major newspapers, *Aftonbladet*, *Expressen*, *Dagens Nyheter* and *Svenska Dagbladet*, found on the Swedish news database Retriever, using the search criteria "medicinsk åldersutredning" (medical age investigation) and "medicinsk ålderbedömning" (medical age assessment). The articles analysed were published between 2015 – when discussions about MAAs started to reach public discourse – and 2017 – when they were being introduced. After removing non-relevant search results, the material consisted of 218 articles, including news stories, editorial material and debate pieces. More than half of the material stems from *Svenska Dagbladet*, which has been the – by far – most active arena for debates surrounding MAAs, both initially in terms of lobbying for its implementation, and later in terms of critical investigation. The analysis also draws on a vast number of official documents on the topic, stemming from involved public authorities and the political sector. Further, an overview of the headlines from all national news articles including the above-mentioned search criteria during two particular dates in 2017, have been used for analysis.

Analysis of the material engaged critical discourse analysis (CDA), focusing on the ways in which discourses "structure, enact, confirm, legitimate, reproduce, or challenge relations of power abuse (dominance) in society" (van Dijk 2015:2). The CDA approach, hence, distinguishes itself as explicitly political in its pronounced attention to social–power abuse, and its enactment within political and social contexts through text and talk. In line with the discourse-historical approach (DHA) in CDA, "discourse" should thus not be regarded as isolated semantic units, but rather as argued by Reisigl and Wodak (2015:583):

> as a complex of interrelated context-dependent semiotic acts (in the sense of semiotic tokens) that are situated within specific fields of social action and belong to conventionalized genres and subgenres (in the sense of semiotic types). They are socially constituted, socially constitutive, and related to a macro-topic. They are linked to argumentation about validity claims, such as truth and normative validity, involving several social actors who have different points of view.

In this article, I am hence tracing a number of discursive strategies considered within the DHA as reoccurring components of discourse, in particular when it comes to the articulation of racist ideology (ibid). First of all, this includes the active integration of the broader sociopolitical and historical context surrounding the events in 2015-2017, when aiming to interpret the media discourse about MAAs on unaccompanied minors. Further, the analysis focuses on *nominations* and *predications*, implying the discursive construction and characterisation of social actors, processes and objects involved (e.g. as ingroup/outgroup, personalisation/depersonalisation, stereotypes etc.). It also involves *argumentative* and *persuading* elements, in particular regarding what is constructed as valid, true and taken for granted. And finally, *intensifying* and *mitigating* strategies, serving to emphasise or downplay the significance of events and elements (Reisigl & Wodak 2008). Semantic segments that are particularly tackled are headlines and leads due to their power to define and emphasise the texts' preferred meaning, as well as editorials and op-ed articles, where control over the text and context by publishers becomes particularly clear, and "repeated political or media discourse about similar events, and via specific discourse moves of generalization, […] may condition the generalization and abstraction of specific mental models to more general structures of knowledge and ideology" (Reisigl & Wodak 2015:473). While the analysis is mainly structured according to overarching tendencies and themes within the larger corpus of articles, discursive strategies are highlighted and discussed throughout with reference to more specific illustrative text segments.

A discursive struggle over the migrant body

During the time of the migration wave in Sweden 2015, the question about how to deal with the assessments of unaccompanied minors' asylum cases became highly politicised early on, with the opposition party to the right and the far-right populist party demanding the implementation of MAAs. In fact, there had been a directive ever since 2012 from *the National Board of Health and Welfare*, that the age of unaccompanied minors *was supposed* to be assessed through dental x-ray and an x-ray of the wrist combined with examination by a paediatrician (Eckerman 2021a:155). However, all the involved professional parties of the chosen methods, i.e. *The Swedish Bar Association*, *The Swedish Paediatric Association* as well as *The Swedish Dental Association* had taken a stance against them (Ahlstrand 2015; Hjern & Asher 2015; Svenska Barnläkarföreningen 2015; Sveriges Advokatsamfund 2015). Hence, it was near impossible to find doctors or dentists in Sweden who were willing to perform the examinations at the time. But

as the number of unaccompanied minors registered in Sweden quadrupled in 2015, the pressure for a viable solution for standardised age estimates grew exponentially and the political opposition and debaters brought the discussion about MAAs to public attention.

Competing world views

In all of the newspapers analysed for this study, numerous medical and legal experts condemned the use of MAAs during the time leading up to its implementation. Paediatrician Bengt Erik Ginsburg, for example states that there is in fact no such thing as "medical age", and that physical and psychosocial maturity must be regarded first hand when deciding on a young individuals' need for protection (Ginsburg 2015). The president of the *Swedish Society of Medicine's* delegation for medical ethics was further quoted in an interview in *Dagens Nyheter*, saying that there "are no ways to assess an exact age medically", but that, for example, the United Kingdom uses a method that rather pays attention to social maturity (Ahlstrand 2015). Similarly, Elisabeth Dahlin, the Secretary-General for *Save the Children International*, in an interview in *Expressen*, refers to the possibility of doing a multidisciplinary assessment using both medical and social examinations, interviews and paediatric experts (Kvarnkullen, Lapidus, Salihu, Johansson & Okpu 2016). In *Svenska Dagbladet*, one professor in dental medicine, and two professors in paediatrics come together in a debate piece saying that no available method for MAAs of young individuals on the verge of 18 had the precision demanded by rule of law and medical ethics (Klingberg, Asher & Hjern 2015).

However, there were several others arguing for the urgent need to implement a solution based on medical data, making it seem like the *only* viable option of certainty. These were though, most commonly, not medical experts (with one very vocal exception) but rather debaters, journalists and politicians. At this point, a conflict seemingly arose between the state of the art within professional communities on the one hand, and a politically driven ambition to implement much more restrictive migration policies on the other. The then spokesperson of migration for the oppositional Moderate Party went public several times demanding, among other things, that Sweden "put one's house in order", under the headline "M [The Moderate Party] demands that child migrants have their age assessed" (Tidningarnas telegrafbyrå 2015) in order to "separate grownups that claim to be children from actual children" (Pirttisalo 2015). Three local Moderate politicians similarly wrote about the topic in a debate article with the headline "Sweden must be able to do medical age assessments" (Flechter, Gripestam, Reichenberg & Mossberg 2016), hence making the issue primarily a question about political will. The medical experts cautioning against MAAs were called "the loud and politicized group of paediatricians" (Andersson 2015) by some debaters, and editorials claimed that "authorities and politicians have disregarded the problem that unaccompanied [minors] lie about their age" (Kjöller 2016). Ivar Arpi, conservative opinion leader, wrote in an editorial piece in SvD that:

> It is possible to judge if someone is lying about their age, but in Sweden, very few age assessments are being done […] [But] the relationship between Sweden and a newly arrived migrant needs to be based on facts. Medical age assessments are thus necessary (Arpi 2015).

Looking at the strategies being used in this discursive struggle over meaning, it is clear through the *argumentative* and *persuading* elements of the texts that the different interpretative communities depend on two competing versions of what is real and objectively true. While medical and legal experts rely on the weight of their professional identity and knowledge both in terms of what is deemed possible and ethically viable, those arguing for the implementation of MAAs largely refer to what is being done in an often unspecified elsewhere.

In Europe at the time, EU rules did allow for MAAs to be carried out when needed by member states, but did not stipulate what situations or methods were justified (Roscam Abbing 2011:15). Hence, *The Study Group on Forensic Age Diagnostics* (AGFAD), consisting of 130 researchers from 16 different countries, had been developing guidelines for MAAs since the year 2000 (Tamsen & Mostad 2019:613-614; Eckerman 2021a:154). Among their recommendations, certain forms of x-rays were preferred, in combination with physical examinations of e.g. sexual maturity, and the general consistency of x-ray results with "the organism as a whole". They further pointed out the need for – but overall lack of – population-specific reference studies due to the impact of socioeconomic factors on body growth and development (Schmeling et al. 2008). But there was also much debate on the topic internationally, with critics both emphasising the prevailing imprecision of available methods, and that margins of error were often not properly considered in the weight given to medical estimates. Several European organisations for healthcare professionals had thus recommended their members not to take part in MAAs (e.g. Sauer, Nicholson & Neubauer 2016). Also, UN High Commissioner for Refugees (UNHCR) (2015) underlined that MAAs should never be used as routine procedure, and must always be part of a more comprehensive and multidisciplinary assessment, while the *European Union Agency for Asylum* (EASO 2013), stressed that all other forms of proof must be regarded *before* turning to MAAs.

However, the complexity of the problem is rarely mentioned in the argumentation from debaters arguing for MAAs in Swedish newspapers, and the assessments are framed as straightforward true-or-false operations. *Lexically*, MAAs are continuously associated with words like "objectivity" (Mörnstad 2015; Arpi 2015), "facts" (Arpi 2015), and "realism" (Lönnqvist 2016; 2015-11-25). Further, they are by many public opinion builders, politicians and journalists described as "age *tests*" (e.g. Wager 2016; "Skynda på med ålderstester, Morgan" 2016; "Ålderstest är bra för barn" 2015), "age *controls*" (e.g. Åkesson 2016; Drevinger 2016; Danielsson 2016), and "age *determination*" (e.g. Pettersson Ohlsén 2016; Flechter, Gripestam, Reichenberg & Mossberg 2016; Ahlstrand 2015). All these false synonyms add to the idea of body data being nothing less than pure evidence, perfectly able by themselves to tell all there is to say on the matter in a discrete, argumentative manoeuvre. The two opposing camps in

the debate hence describe two diametrically different realities. One, where there are no reliable methods for MAAs, and hence a need for multidisciplinary procedures, and another where there are, without doubt, readily available methods, that are not only the *solitary* option if not wanting to decide on age purely based on guesses, but objective, factual and "scientifically proven" (Wager 2016). It is also clear that for those agitating for MAAs, the narrative, and the self-proclaimed experience of the individual applicant has no general value as "evidence", and that in the light of body data, no alternative methods seem valid or required. This attitude is much in line with the general shift towards the body, described by Ajana, implying a turning away from the narrative.

The urgent need for data

Towards the end of November 2015, Swedish migration policy took a U-turn and a renewed directive for MAAs of unaccompanied minors were one of three actions taken. *The National Board of Health and Welfare* was given the task of performing a systematic overview of current available methods (Socialdepartementet S2016/04832/FS) and the *Swedish National Board of Forensic Medicine* (Rättsmedicinalverket, hereafter RMV) was told to promptly and in accordance with scientific state of the art, create a centralised system for MAAs (Tamsen 2019). In April 2016, the results of their revision were presented in a report that concluded that many of the current methods for MAAs were indeed too unreliable, but that a new method using magnetic resonance imaging (MRI) of the upper part of the knee had "potential" to be more precise. However, the method was principally untested and the board thus recommended a larger pilot study. At the time, there were only six studies completed, among which only two were relevant, with merely a handful of participants in relevant ages (Tamsen 2019). The report quickly met harsh critique from the medical community, due to investigators' lack of expertise in the field; disregard of large segments of previous research; and the fact that it reached a conclusion that was in significant ways completely contrary to international expertise at the time, such as the recommendations from AGFAD (Tamsen 2019).

Nevertheless, in the newspapers, the tone is optimistic after the release of the report. In an editorial in *Dagens Nyheter*, the journalist seems mesmerised by the promising new method, likely to be both "inexpensive" and "legally secure". Among the "potential drawbacks" of the method is, however, according to the journalist, the situation that "we don't really know yet how reliable the method is" ("Ledare: Ett rejält kliv i rätt riktning", 2016). The right-leaning publications are more impatient though, and the need for a pilot study is presented as a political failure, since the solution is needed sooner rather than later. Hence, even though experts from the *National Board of Health and Welfare* are quoted in *Expressen* saying that "We must do a pilot-study. We need more data […] To do such a study takes at least half a year", the journalist still points out in the same article that "it is *technically* possibly to start using the method already in the autumn" (Jakobson 2016, emphasis added). Only two days later, an editorial in the same newspaper states that:

> It's a shame that there is no time for a comprehensive pilot study before the magnetic resonance imaging starts. But in a situation where many unaccompanied [minors] cannot prove their acclaimed age with identity documents, the state must do their best with what they have ("Skynda på med ålderstester, Morgan" 2016).

Once again, this way of reasoning gives the impression that there are no other ways of assessing age, such as multidisciplinary methods combining psychosocial aspects, sexual maturity, expert testimonies and official documentation from e.g. schools or other authorities in the home country. In effect, while all public documents from Afghanistan had been deemed not trustworthy by the Migration Board at the time, due to the high levels of corruption in the country, an unvalidated medical procedure was regarded trustworthy enough. Also, then minister of migration, Morgan Johansson, is quoted in *Svenska Dagbladet* saying that "I hope to be able to shorten the time, both when it comes to the pilot study and the evaluation" (Kudo 2016), and debate articles are published urging that "Medical age assessments must start now" (Mörnstad & Zeba2016). It is remarkable to note how both politicians and journalists are here openly arguing for disregarding the need for validation of an untested method that is to have life defining repercussions for those involved, and that the unknown reliability of the method is only a "potential drawback" of an otherwise promising technology. Even if not verified, the method *will* turn these unruly bodies into data that *can* be used in a systematic manner in the bureaucratic apparatus, regardless of whether the data itself is systematically collected. It is this urgently desired formula; this promise of order and structure, that seems to drive the history of events forward, as the government, just months afterwards, announced the launching of the method – without further testing.

The naive nation state and the bogus migrant

So, who are the social actors involved in these events according to the discursive structures of the newspapers? Looking at the *nomination* and *predication* strategies actively used, a central actor is the imagined Swedish "we", which is variously embraced or ridiculed, largely depending on the political colour of the publication. Thus, among more left/centrist publications and debaters, the decision to implement MAAs, as well as the new methods introduced, are commonly discussed according to the three-part narrative found in previous research, where restrictive police measures are regarded as an unfortunate, but necessary and responsible step to take in a crisis situation (Dahlgren 2016). According to such a framework, the moral integrity of the Swedish nation state remains intact due to the generosity shown so far, why "we" have now deserved a "breathing space". However, among the right leaning publications and debaters, the Swedish "we" comes forth as an outdated and duped "other", which is now being defeated by crude reality. The day after the decision to implement MAAs was announced, *Expressen* thus writes in an editorial "Welcome realism. On Tuesday, Stefan Löfven [then Prime minister] announced that Sweden will reintroduce medical age assessments of unaccompanied minors", but the fact that "naivety has been treated

as a virtue has had serious impact" on the migration system ("Ålderstest är bra för barn" 2015). The picture of a Swedish migration system that up until now had been hopelessly candid and unsuspecting is reoccurring. Parliamentary politician Staffan Danielsson from the Central Party viciously attacks the sitting government and its institutions in several debate articles on the matter, saying that "the Migration Board has not taken their public responsibility, long and naively letting unaccompanied minors decide about their own age" (Danielsson 2016a) and "consistently accepted the applicants' own claims" (Danielsson 2016b). This is interesting, considering what was well known among researchers at the time, who had observed a deep seated "culture of disbelief" as characteristic of the ways unaccompanied minors were approached by the authorities. A study of the key credibility principles used by Migration Agency case-officers in Sweden in these kinds of cases, for example, indicated that "the children were so consistently questioned that it appears as if even the humanitarian aspects of their claims are diminished" (Hedlund 2016:80). But according to political debaters, up until now in Sweden,

> as good as everyone who has claimed to be a child has been accepted by the Migration Agency as children, received asylum and insurance number as children, received benefits as children and been placed in housing with children (Danielsson 2016c).

And if the Swedish nation state is constructed by critical voices as irresponsible and naive, the unaccompanied minors are in the same move assigned the role of a mischievous outgroup, likely to take advantage and deceive unsuspecting others. The unaccompanied minor now becomes, as has been argued elsewhere (Lems, Oester & Strasser 2020), a "crisis figure". This is a child who is discursively positioned in between childhood and adulthood, as someone who is losing their innocence, and thus takes central stage in the ongoing contestation over the legitimate refugee subject.

During 2017, when the new MAAs were put into practice, 9617 males and 337 females were subjected to the procedure, among which an overwhelming majority were deemed above 18 (Tamsen & Mostad 2019). Already after hardly more than a month, when approximately 600 individuals had gone through assessments, RMV decided to send out a press release with the results, where more than 8 out of 10 of those examined had been assessed as 18 or older. When reporting on this news, *Aftonbladet* is the one newspaper among the four analysed, who seemed to have an ambition to contextualise the results. Their headline reads "Three out of four *who have been tested* are above 18 [emphasis added]" and already in the ingress, a representative from the Migration Agency is quoted as saying that "If all unaccompanied minors had been tested, then the majority would likely have been under 18". The process leader from RMV is further quoted stating that MAAs have "a margin of error, and especially if the person who is being tested is close to the 18-year limit". The article is commented on by a columnist urging readers to put the results into context, and to remember that only a small minority of the group of unaccompanied minors, i.e. those who have not been able to convince the Migration Agency

about their age, are in fact sent for MAAs (up until then, 4200 individuals out of the 45,000 who had come to Sweden over the past three years, according to Svensson 2017). Looking at the headlines of all Swedish news articles reporting on the results across the two days following their release, there were several examples of similar attempts to keep a sober tone, and to contextualise results in terms of margins of error and the limited group of individuals who had been tested. However, while alt-right publications use an openly hostile tone, many mainstream outlets across the country also use highly misleading *nomination strategies* in their discursive framing of the press release. Several, for example, conflate the group of tested individuals with the larger group of unaccompanied minors, such as "Many young asylum seekers were above 18" ("Många unga asylsökande var över 18 år" 2017), "Three out of four unaccompanied minors assessed as adults" (Olsson 2017 [this headline was eventually changed due to being "misleading"]), or "Test shows: Asylum seekers older than they have claimed" (Swahn 2017). By taking the body data from a small non-representative part and conflating it with the whole, such discursive moves make it look like these numbers are generalisable over the entire group of "asylum seekers" and in particular "unaccompanied minors". The way the content of the press release is presented in these regards, amplified and *intensified* in media discourse, should be viewed in relation to the ethical analysis of MAAs in the asylum process, commissioned by the *Swedish National Board of Health and Welfare* before its implementation. Here, the authors raised serious concern about how MAAs could affect public attitudes towards asylum seekers. The ethical analysts stated that there are potential long-term effects worthy of consideration, since such assessments, "if widely or frequently practised, could be interpreted as suggesting that asylum seekers as a group, or more generally the ethnic groups to which they belong, are not to be trusted" (Malmqvist, Furberg & Sandman 2018:815). As such, they could intensify discriminatory and racist views in society.

The ways in which the results of the body data are turned into suspicion against the group of unaccompanied minors through media discourse can be most clearly seen in some highly problematic *predication strategies* to be found in the headline of mainstream news outlets in relation to RMVs press release, such as "Three out of four lied about their age: "Most of the age tested asylum seekers did not say the truth"" (Jakobson & Micu 2017), "First results show: Three out of four unaccompanied minors lied about their age" (Karlsson 2017). The day of the release of the results, *Expressen* publishes a news article with the ingress:

> An overwhelming majority among the 581 young asylum seekers who have gone through a medical age assessment is above 18. New results from the Swedish National Board of Forensic Medicine indicates that they are not telling the truth about their age. SD-leader [Sweden Democrats] Jimmie Åkesson now demands that the controls become mandatory: Results from the Swedish National Board of Forensic Medicine prove the naïve attitude of others, and simultaneously provoke the question about how many have already received asylum on inadequate grounds? (Micu & Jakobson 2017)

The editorial piece of the same newspaper the following day carries the headline "The lies about age are witness to a breakdown", and the author states that:

> A reasonable conclusion is, hence, that a considerable number of those seeking asylum as unaccompanied minors, are in fact adults. […] But it is not the lies of the unaccompanied minors that are most upsetting, but the lies that have dominated the Swedish public. ("Lögnerna om ålder visar på ett haveri" 2017)

Here, we can repeatedly see how the idea about the bogus migrant is positioned in relation to the naive nation state. In many of these articles, the natural authority of the MAA results come with such ease it almost makes them uninteresting. The results have simply served to prove – beyond doubt – what the rational voices were already claiming all along, namely the indispensable need for protectionist and restrictive migration politics. It is hence clear that even if the launching of the method had been accompanied by information about (however miscalculated) margins of error, and even if representatives from RMV occasionally were careful about mentioning that the results are only estimates, the discursive subtext of the datafied body seems to be that of objective and scientific proof. Hence, when the body is turned into data, the very operation in itself seems to have an overwhelming truth effect. In SvD, conservative opinion leader Ivar Arpi writes in an editorial with the headline "No, grown-up men are not unaccompanied minors" that:

> 96 percent lied about their age […] The age assessments that are being done now should have been done long ago, if so 35,000 alleged unaccompanied minors would likely not have come to Sweden in 2015 (Arpi 2017).

Further emphasising the sense of having disclosed the true nature about the entire group of unaccompanied minors, both the far-right populist Swedish Democrats and the Moderate Party publicly demand "tests" of *all* unaccompanied minors, and some local party factions even discuss the possibility of prosecuting those who have "cheated" (Moreno 2017). Hence, the result clearly leads many public voices to assume that those who have been assessed as 18 or above have been deceitful. However, what is for example not being mentioned by the press release, is that among the 447 out of 581 cases, where the applicant had been assessed as 18 or above, as many as 243 had specified 1999 as their year of birth and were, according to their own claims, about to turn 18 the same year (Rogberg 2017). Due to the fact that most of them had waited for approximately two years to have their cases opened, 23 individuals had even turned 18 according to their self-proclaimed age. And while information such as year of birth was not available to RMV who did the assessments, it was readily available to the Migration Board who had ordered them. However, when confronted by journalists, who soon started to investigate the circumstances surrounding the MAAs, the Director of Communication rejected all responsibility, saying that "It would be very strange to come to another public authority and ask that authority to take responsibility for how

media, and political representatives choose to use and create public opinion around a result" (Rogberg 2017).

On the one hand, this is telling of the immense lack of care in the communication about the results on behalf of RMV and the Migration Agency when dealing with such a vulnerable group, who had already at this point become a target of intense public suspicion. But on the other hand, it is perhaps even more telling of the way in which body data seemed to inherently turn against the subject, as in the language of a lie detector. Besides, all of those who had already willingly said that they were 18 or more, and who were added to the statistics, we today also know that approximately 33% of the male children subjected to the MAAs that year were likely incorrectly classified as adults (Tamsen & Monstad 2019. However, and this is important, even if the methods *would* have worked in accordance with what they said they could do, the results would *still* be nothing more than estimates, and the fact would have remained that to this day, there are still no available methods that can establish an exact chronological age based on medical evidence. But in large parts of the media discourse during these events, complexities such as error-rates and the absence of population-specific standards obviously got lost in the translation of body data into media discourse, as though the discursive power of the data, by its mere existence, resists ambivalence.

Final discussion: Data epistemologies and dehumanisation

During the rapid shift towards stricter migration policies in Sweden following the migration wave in 2015, news media obviously became a scene for an intense, discursive struggle between traditional liberal values and new conservative attitudes that would come to change Swedish self-identity from then on. Within this discursive struggle, the group of unaccompanied minors turned into a crisis figure, and their self-proclaimed ages became a politically charged issue. As such, MAAs took on the significance of a litmus test for the validity of the different political camps. Hence, it is probably difficult to overestimate its impact on the larger renegotiation of public attitudes taking place throughout this particular period. Even if the MAAs have been debated, questioned and critiqued since then, both nationally and internationally, by legal and medical experts as well as human rights observers (Eckerman 2021a), the fact remains that they are still in use, and that the public report meant to investigate malpractice and responsibility during the period 2015–2017 was recently shut down by the new Moderate-led Government (Trysell 2023). Looking at my own interviews with those who went through the MAAs in 2017, it is also clear that even if results of the assessments were proven to rely on miscalculated estimates, the truth-effect of the body data remains in public memory, since so many of them are still met with suspicion and hostility in their everyday lives (Tudor*forthcoming*). Within a situation marked by administrative challenges and ethical complexity, the MAAs, in line with Ajana's argument, turned into Boolean true/false operations, through which, something as feasible as data and numbers could be produced. This urgently needed formula trumped the requirement for legal and scientific validity, which can be seen in the active argumentation among

debaters and journalists in the material, particularly in the disregard for a need for pilot studies. Within this discursive struggle, news media assisted the political actors in translating body data into objective and scientifically solid proof material, with the ability to decide on vulnerability, ethics and the legitimate migrant subject. As such, media discourses helped undo ethical dilemmas of deservingness in migration policy, while simultaneously unleashing reservoirs of racialised hate and suspicion towards those deemed undeserving.

The implementation of an untested and under-validated method to produce support of vital importance for asylum processes of unaccompanied children must be regarded in relation to the extent to which migrant populations, colonised subjects and other vulnerable groups have functioned as test beds for modern science throughout history (Ajana 2013). Also, more specifically, technologies for identification, such as fingerprinting and current biometric systems, were first tested on people with the "fewest rights", before being more broadly implemented throughout society (Ajana 2021:474-475). So, while the question may be asked about how it is possible that such an insensitive treatment could be possible towards a group, generally described as particularly vulnerable and in need of special protection throughout the entire displacement cycle, perhaps the question should rather be posed the other way around: against *whom else* but those most exposed, lacking all forms of legal status and authority in the world, could such a treatment be possible? As such, the case study discussed in this article seems like a cautioning echo from Hannah Arendt, about the ways in which the nation state and its policing agencies could become increasingly oppressive due to the power they assume over stateless people and refugees (Curthoys 2020:38). Hence, in conclusion, this article hopes to have articulated the need for a broader discussion on the effects of these hyper-empirical epistemologies on ethical sensibilities and the dismantling of the right to asylum in contemporary Sweden and beyond.

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Author presentation

Matilda Tudor is a PhD media researcher and lecturer at Uppsala University.
Contact: matilda.tudor@im.uu.se

INGRID FORSLER

”It’s not about the tech but the mindset”

Sociotekniska föreställningar om framtidens datadrivna klassrum i Sverige och Estland

“It’s not about the tech but the mindset” – Sociotechnical Imaginaries of the Future Data Driven Classroom in Sweden and Estonia

This study discusses how representatives of the EdTech sector and stakeholders within the field of educational policy in Sweden and Estonia imagine the classroom of the future and the role of digital technologies in these visions. Based on material from a series of *future workshops* where a total of nine groups gathered to discuss future school development, the study analyzes the sociotechnical imaginaries of education present in each country and the logics underpinning the datafication of the education sector. The results show that participants in both countries highlight datafication as a means to achieve a more individualized educational system, but they also identify tensions between this vision and another common imaginary of a school with diverse learning environments and teaching methods. The study also discusses national differences in the material and how they reflect the educational politics in each country where Estonia uses digitalization to strengthen its national identity as a modern and innovative tech nation, whereas in Sweden there is a growing tendency to question the effects of digital technologies on students’ well-being and cognitive development. These findings contribute to critical research on the datafication of schooling by offering a deeper understanding of the relation between national and global imaginaries of educational futures.

Keywords: datafication, education, future workshops, educational technologies, sociotechnical imaginaries

DEN PÅGÅENDE DIGITALISERINGEN av utbildningsväsendet har medfört en ökad tillgänglighet av data som erbjuder nya sätt att mäta och representera lärande. Dessa automatiskt insamlade data framställs ofta som mer objektiva och tillförlitliga än mänskliga bedömningar, och företrädare för teknikbranchen menar att de att skulle kunna användas för att revolutionera skolan och göra lärandet mer effektivt och individanpassat (Williamson 2017). Redan nu är datadrivna teknologier i bruk i utbildningssammanhang, där de på global och nationell nivå tas i anspråk för att jämföra skolor och skolsystem, medan de på individnivå används för att synliggöra och följa upp enskilda elevers skolresultat (Williamson 2016; Jarke & Breiter 2019). Att samla in data för att jämföra skolor och elever är naturligtvis inget nytt, men nya tekniker för automatisk insamling och analys av data har gjort att dessa praktiker ökat i omfattning.

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Utbildningsforskaren Neil Selwyn (2014) betonade tidigt vikten av att kritiska granska vilka konsekvenser detta kan få för hur utbildning organiseras och genomförs.

De samhälleliga effekterna av datafiering har tidigare diskuterats av forskare inom sociologi och medievetenskap, vilka bland annat kritiserat hur stora teknikföretag har skapat en ny ekonomisk ordning genom att samla in och använda data från användare (Zuboff 2021 [2019]), liksom hur dessa processer påverkar tilltron till samhälleliga institutioner (van Dijck 2014) och de sätt på vilka vi förstår och orienterar oss i världen (Kitchin 2014). Frågor om makt och kunskap återkommer också i forskningen om skolans datafiering, som enligt Juliane Jarke och Andreas Breiter ”förändrar inte bara utbildningen som sådan utan också vår förståelse av den, vad som räknas som ’god utbildning’ och vilka mål och medel som krävs för att nå dit” (Jarke & Breiter 2019:5, min översättning). Företrädare för den mer kritiska forskningen om utbildningsteknologier menar att forskare och utbildare, i stället för att diskutera effektivitet och användbarhet, bör återföra diskussionen till mer grundläggande frågor om syftet med och värdet av utbildning (Williamson & Eynon 2020).

Denna studie vill bidra till detta framväxande forskningsfält som kombinerar kritiska datastudier med utbildningssociologiska och utbildningsfilosofiska perspektiv för att förstå hur datadrivna praktiker förändrar inte bara *hur* utbildning genomförs och organiseras, utan också *varför* detta görs, för vilka syften och i vilkas intresse. Genom att undersöka hur representanter för EdTech (utbildningsteknologi)-sektorn och beslutsfattare inom det utbildningspolitiska fältet i två olika nationella kontexter (Sverige och Estland) tänker kring framtidens utbildning, och vilken roll de tillskriver datadrivna teknologier i dessa framtidsvisioner, belyses hur datafieringen av utbildningssektorn som ett globalt fenomen förhandlas och omformas i mötet med nationsspecifika förutsättningar och diskurser samt vilka spänningar och motsättningar denna process rymmer. Begreppet ”data” används här i vid bemärkelse för att beteckna information som samlas in och lagras genom digitala system på alla nivåer inom utbildningsväsendet för att sedan bearbetas och användas för att utveckla skola och undervisning (jfr Jarke & Breiter 2019; Pangrazio et al. 2023).

Tidigare forskning inom detta område har undersökt bland annat vilka aktörer som ges inflytande över hur skolan organiseras och vilken kunskap som prioriteras. När data betraktas som en allt viktigare resurs i utbildningssammanhang förskjuts makten över skolan som plats från myndigheter och professionella pedagoger till andra aktörer med expertis inom digitala system (Williamson 2016, 2017; Macgilchrist 2019). Även om ekonomiska intressen bidragit till denna utveckling, hänger den också samman med andra, pedagogiska, förändringsprocesser inom skolan, inte minst det utbildningsforskaren Gert Biesta (2005) kallar *lärifiering*, alltså ett ensidigt fokus på läraktiviteter och självstyrt lärande på bekostnad av undervisning och lärarens roll i utbildning (Knox, Williamson & Bayne 2020) samt en ökad tilltro till evidensbaserat och mätbart lärande (Williamson, Macgilchrist & Potter 2023). Dessa förändringar i synen på utbildning skapar i sin tur förutsättningar för det som på svenska kallas *lärandeanalys* (*learning analytics*), det vill säga insamling och analys av elevdata i syfte att förstå vad eleven behöver hjälp med, för att därigenom kunna optimera lärandeprocessen.

En fara med att elever producerar data som sedan analyseras och används för att utforma undervisning är att detta riskerar att ge företräde åt pedagogiska aktiviteter som genererar rätt typ av data (Selwyn, Pangrazio & Cumbo 2022). Det speglar också en närmast behavioristisk syn på lärande som påminner om de metoder som används vid maskininlärning, där önskat agerande belönas så att eleven styrs mot en viss typ av beteende och prestationer (Knox m.fl. 2020). Resultatet blir ett slags ”rekursivt arrangemang” där data genererar lärandesubjekt i samma utsträckning som lärandesubjekt genererar data (Williamson 2016:139). Något förenklat kan man säga att makten över undervisningen har förflyttats först från läraren till eleven och sedan från eleven till algoritmen. Denna förskjutning har inneburit ett omformande av lärarrollen där läraren gått från att vara den som leder och utformar undervisningen utifrån sin kunskap om eleverna och deras lärprocesser till att vara den som tolkar och implementerar färdiga analyser av lärdata (Ratner, Andersen & Madsen 2019; Grant 2024).

Ett annat spår inom den kritiska forskningen om datadrivna teknologier i utbildning handlar om relationen mellan datafiering och framtidsföreställningar. I någon mening handlar utbildning alltid om att forma framtiden, men också om att förbereda medborgare för den framtid man antar ska komma. I dessa framtidsvisioner spelar digital teknik en viktig roll, dels som verktyg för att omforma skolan och göra den mer effektiv och relevant, dels som en förgivettagen del av framtiden. Idén om att datadrivna teknologier ska revolutionera en föråldrad skola följer alltså ett etablerat narrativ i vilken digital teknik ses som en förutsättning för både skolan och samhällets utveckling (Cuban & Jandrić 2015; Buch, Lindberg & Cerratto Pargman 2024). Införandet av datorer och automatiserade system i skolan är inte bara en effekt av den tekniska utvecklingen i samhället, utan också en central mekanism för att styra den i önskvärd riktning (Rahm 2023). Datafieringen av utbildning gör relationen mellan teknik, skola och framtidsföreställningar mer komplex eftersom datadrivna teknologier inte bara antas kunna *forma* framtiden utan också *förutsäga* den. Därmed skapar de ett styrningssystem som bygger på en förväntad framtid (Webb, Sellar & Gulson 2020; Selwyn m.fl. 2023).

Idag är EdTech-sektorn en allt viktigare aktör i produktionen av denna typ av framtidsskapande som ”inte bara föreställer sig framtiden utan också disciplinerar nuet” (Amsler & Facer 2017:9, min översättning). Det är därför viktigt att inkludera aktörer från detta område i diskussionen om skolans syfte och vilken typ av framtid vi vill att den ska skapa (Williamson & Eynon 2020). Detta görs bland annat av Felicitas Macgilchrist (2019) i en etnografisk studie om hur företag inom EdTech-branchen tänker kring data i utbildningssammanhang, där hon identifierar en motsättning mellan de förhoppningar som företagen hyser om hur datadriven teknik ska kunna bidra till en mer likvärdig skola med god utbildning för alla, och de kapitalistiska system i vilka dessa system ingår. Hon menar vidare att den ”grymma optimism” (cruel optimism) som omger datafieringen av utbildning speglar en genuin vilja att förändra skolan till det bättre, samtidigt som den riskerar att skymma de större problem och djupt rotade strukturella ojämlikheter som finns i skolan och på så sätt bidra till att de reproduceras.

Naturligtvis styrs inte skolan enbart av teknikföretag, men de utgör en viktig del

i de komplexa policynätvek av privata, offentliga och ideella aktörer som driver olika utbildningspolitiska frågor, inte minst den om skolans digitalisering och datorisering (Williamson m. fl. 2022). Genom dessa nätverk får globala teknikföretag allt större inflytande över skolan, men utbildningspolicy formas också av nationella diskurser och traditioner (Gulson & Witzenberger 2022; Rensfeldt & Rahm 2023). Eftersom införandet av digitala tekniker och system i utbildning är så tätt förknippat med föreställningar om modernitet och progression har skoldigitalisering också kommit att bli en viktig del i hur nationer väljer att framställa sig själva internationellt (Ljungqvist & Sonesson 2022).

I denna studie fokuseras två länder som på olika sätt använt digitaliseringen för att stärka sitt nationella varumärke: Sverige och Estland.[1] Som Lina Rahm (2023) visar har automatisering varit en del av det svenska utbildningsväsendet sedan 1950-talet, ett sätt att förbereda medborgare för nya typer av jobb och att kunna verka i en digital offentlighet och i förlängningen för att stärka landets status som en modern välfärdsstat. I Estland har skoldigitalisering tvärtom använts för att bryta med det förflutna och ersätta bilden av Estland som ett underutvecklat, postsovjetiskt land med bilden av ”e-Estonia”, ett digitaliserat samhälle i framkant, präglat av innovation och entreprenörsanda (Mäe 2017; Forsman m.fl. 2023). För att undersöka vilken roll dessa nationella skillnader i hur skolan som digitaliserad plats och praktik vuxit fram har idag genomfördes en rad workshops på temat ”framtidens klassrum” med representanter från EdTech-företag, forskningsinstitutioner och utbildningsenheter i respektive land. De framtidsvisioner som framträder i materialet förstås och analyseras som *sociotekniska föreställningar* (Jasanoff 2015a), det vill säga kollektivt hållna visioner om hur (ny) teknik kan lösa dagens problem och bidra till samhällelig progression. Dessa föreställningar präglar i sin tur pågående teknik- och policyutveckling och kan därmed förstås som vad Lindberg och Johansson (2023) kallar ”framtider i nuet”.

Nedan beskrivs den metod som använts (framtidsworkshops), hur den konfiguerats för att passa studien och hur den förhåller sig till andra framtidsorienterade och spekulativa metoder. Därefter beskrivs det insamlade materialet följt av en kort redogörelse för respektive lands utbildningspolitiska historia vilken används som utgångspunkt för analysen. Denna är indelad i tre delar, där den första beskriver workshopdeltagarnas syn på skolans uppdrag, hur utbildning bör organiseras och vilken kunskapssyn dessa visioner bygger på. I den andra delen fokuseras deras föreställningar om datadrivna teknologier i skolan, medan den tredje diskuterar de spänningar som uppstår i mötet mellan olika värden och framtidsvisioner gällande utbildning. De nationella skillnader som framträder i materialet diskuteras löpande och sammanfattas i en avslutande diskussion.

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Metoden framtidsworkshops

Future workshops, här översatt till framtidsworkshops, är en modell för medborgardialog som tog form i kölvattnet av Frankfurtskolans kritiska teori i kombination med de kreativa metoder som utvecklades i USA under 1970-talet (Jungk & Mullert 1987; Vidal 2006). Syftet med modellen var att ge utrymme för grupper som annars sällan kommer till tals i samhällsdebatten att diskutera tänkbara lösningar på problem och tillsammans utveckla alternativa framtidsvisioner som kunde skilja sig från de ofta teknikdeterministiska scenarier som tillhandahölls av experter och beslutsfattare. Här finns en likhet mellan efterkrigstidens syn på teknik och den nutida diskursen om digitalisering, menar Juha Suoranta and Marko Teräs (2023), vilket gör framtidsworkshops till en lämplig metod för att undersöka och utmana också dagens vedertagna föreställningar om teknikutveckling (se också Markham 2021). Modellen har senare använts i forskning för att undersöka just frågan om skolans digitalisering (Dirckinck-Holmfeld, Ipsen, Lindenskov Tamborg m.fl. 2019) och för att komma åt de sociotekniska föreställningar som underbygger denna process (Forsler 2020).

Denna studie tar sin utgångspunkt i framtidsworkshops som en kollaborativ metod för att diskutera både förväntade och föredragna framtider, men den modell som använts här skiljer sig från den ursprungliga metoden genom att fokusera på makthavare snarare än på marginaliserade grupper. Robert Jungk och Norbert Müllert (1987), som utvecklade workshopmetoden, betonade vikten av att ge utrymme åt personer eller grupper som påverkas av politiska beslut men sällan får möjlighet att påverka dem eller delta i planeringsprocessen. Här är det i stället just beslutsfattare som bjuds in för att synliggöra produktionen av dominerande framtidsbilder som annars tenderar att ”dyka upp i organisationer likt spökskepp ur dimman, utan att någon eller där bara några vet varifrån de kommer och varför de uppstått” (Suoranta & Teräs 2023:324, min översättning).

Genom att undersöka hur centrala aktörer inom utbildning och teknikutveckling vill att framtidens klassrum ska se ut bidrar studien med kunskap inte bara om vilka sociotekniska föreställningar som cirkulerar, utan också hur dessa förhandlas och omformas i olika nationella kontexter. Att framtidsvisioner är ”väl synkroniserade med pågående projekt för nationsbyggande” och ”dominerande nationella identiteter” är, enligt Jasanoff, en förutsättning för att de ska få gehör och kunna genomföras i praktiken (Jasanoff 2015b:335, min översättning). Att sammanföra olika grupper med intresse för skolutveckling har också ett värde i sig, som består i att diskussionen om vad god utbildning är och hur vi ska nå dit inte bara förs mellan forskare inom kritisk teori utan också inkluderar andra aktörer med inflytande i frågan, och därmed kan leda till faktisk förändring (Williamson & Eynon 2020; Suoranta & Teräs 2023).

Vid genomförandet av en framtidsworkshop utgår man från ett gemensamt problem eller en gemensam fråga som man diskuterar i åtskilda steg eller faser. Workshopen inleds alltid med en genomgång av formatet och vad som kommer att hända. Därefter går deltagarna från att inventera nuvarande situation och identifiera vilka problem som finns till att gemensamt föreställa sig och visualisera en alternativ framtid och slutligen diskutera

hur man gemensamt kan nå dit. Tanken med denna struktur är att stegvis gå från det bekanta till det obekanta och på så sätt komma bortom förgivettagna idéer om hur samhället bör organiseras (Jungk & Mullert 1987:27). Detta successiva tillvägagångssätt med utgångspunkt i nuet skiljer framtidsworkshoparna från andra spekulativa metoder som används inom den kritiska utbildningsforskningen, där man oftare utgår från ett givet framtidsscenario eller arbetar med fiktivt berättande för att skapa diskussioner om andra, möjliga framtider (se t.ex. Cerratto Pargman et al. 2023; Houlden & Veletsianos 2023; Hrastinski & Jandrić 2023; Ross 2022).[2] En annan viktig utgångpunkt som utmärker framtidsworkshops är att de ska resultera i någon typ av gemensam visualisering som framkallar vidare diskussioner i gruppen (Jungk & Mullert:63; Forsler 2020). I denna workshop användes också ett färdigt visuellt material som diskussionsunderlag för att synliggöra den dominerande bilden av framtidens skola.

Material och tillvägagångssätt

Totalt genomfördes fyra workshopsessioner, två i Sverige och två i Estland, med sammanlagt nio grupper om tre till fem deltagare och en medverkade forskare i varje. Deltagarna kom från olika typer av företag – enpersonsfirmor, startupföretag och etablerade företag, med verksamhet på både nationell och internationell nivå – samt från branschorganisationer för EdTech- sektorn i respektive land, skol- och utbildningsmyndigheter och forskningsinstitutioner som på olika sätt medverkat i utveckling eller testning av EdTech-produkter. Tanken med att bjuda in deltagare från olika organisationer och professioner var inte att jämföra deras individuella visioner med varandra inom grupperna, utan snarare att få in flera perspektiv i diskussionen och att undvika yrkesspecifik jargong. Grupperna dominerades av aktörer från EdTech-sektorn men innehöll också, i samtliga fall utom ett, representanter för andra delar av det utbildningspolitiska fältet.

Majoriteten av deltagarna bjöds in personligen. I Sverige rekryterades några deltagare också via ett nyhetsbrev för en branschorganisation, och i Estland genomfördes den första workshopen som en del av ett längre kurspaket för startupföretag inom EdTech-sektorn. Samtliga deltagare fick skriftlig och muntlig information om studiens syfte samt om hur materialet skulle förvaras och användas och har samtyckt till att delta. Förutom organisationstillhörighet har ingen bakgrundsinformation om deltagarna samlats in, såsom bostadsort eller socioekonomisk bakgrund, eftersom detta ligger utanför studiens undersökningsområde. En sammanfattning av resultaten från varje workshoptillfälle samt en sammanställning av resultaten från alla tillfällen rapporterades också tillbaka till deltagarna på projektets blogg i syfte att kunna användas mer direkt i policy- och produktutveckling.

2 För en diskussion om studiens metodologiska bidrag, se Forsler, I., E. Bardone, M. Forsman & P. Mõttus (under utgivning 2025) "Future Workshops between Imaginaries and Imagination" i P. Jandrić, J. Suoranta, M. Teräs & H. Teräs (red.). *Postdigital Imaginations: Critiques, Methods, and Interventions.* Cham: Springer.

Workshoparna varade i ungefär tre timmar och dokumenterades i sin helhet genom ljudinspelningar, anteckningar och fotografier. I Sverige genomfördes workshoparna på svenska och i Estland på engelska.[3] Delar av diskussionen filmades och det deltagarproducerade materialet samlades in. Det insamlade materialet består för samtliga nio grupper av ljudinspelningar (uppdelade på fas 1–4), fotografier av arbetsytan fas 1–3 (dvs. de fysiska ytor, papper och material där grupperna arbetade och visualiserade sina idéer), videoinspelningar från redovisningarna av fas 1 och 3, gruppernas skriftliga anteckningar från fas 2 samt prototyperna från fas 3. Upplägget för workshoparna var som följer:

I den första fasen ombads deltagarna att inventera rådande sociotekniska föreställningar genom att sortera en uppsättning bildbyråbilder av framtida klassrum. Bilderna var de första 52 träffarna på sökströngen *future classroom* från tre stora bildbyråer (Getty, Shutterstock och Adobe), där bilden inkluderade någon form av digital teknik. Som beskrivits ovan utgår en framtidsworkshop alltid från nuet, i detta fall från de ”framtider i nuet” (Lindberg & Johansson 2023) som cirkulerar i olika skolutvecklings- och policysammanhang. Bildbyråbilderna tjänade här som illustration av dessa dominerade narrativ och gav deltagarna något att inledningsvis samlas kring, men ska inte förväxlas med de framtidsvisioner grupperna själva skapade senare under workshopen. Denna fas redovisades genom att respektive grupp kort berättade för den andra gruppen om hur de organiserat materialet och vad de fått syn på i processen.

Bild 1. Sortering och diskussion av bildbyråbilder.

3 De citat som använts från det estniska materialet är översatta till svenska av mig.

I den andra fasen använde deltagarna sin kartläggning för en mer kritisk analys genom att jämföra den bild av framtidens skola som framträdde i bildbyråbilderna med sin egen syn på de viktigaste aspekterna av utbildning och tillsammans reflektera över vad de tyckte saknades i den dominerande diskursen. Denna fas dokumenterades genom skriftliga anteckningar på ett papper som varje grupp fått sig tilldelat och som innehöll tre uppsättningar av frågor:

1. Hur beskrivs framtidens klassrum i bilderna? Vad framhålls som viktigt?
2. Vad tycker du själv är det viktigaste med framtidens utbildning? Vilka utmaningar behöver hanteras och vilken framtid ska den bidra till att forma?
3. Finns dessa aspekter med i bilderna? Om inte – vad saknas?

I den tredje fasen använde grupperna sina anteckningar som utgångspunkt för att skapa en prototyp av ett idealt framtida klassrum (se bild 2). Mer konkret ombads de tänka på hur skolan skulle kunna se ut när de elever som nu börjar skolan går ut gymnasiet, det vill säga år 2040, och visualisera detta i form av en karta, antingen en karta av ett fysiskt klassrum eller en tankekarta. Det material som fanns tillgängligt var stora papper, pennor i olika färger, bildbyråbilderna från den första fasen, saxar samt limstift. Deltagarna uppmanades att arbeta med bilder, symboler och kortare nyckelord snarare än med längre texter. Begreppet klassrum användes här i en utvidgad bemärkelse som beteckning för olika rum och situationer där lärande kan äga rum, men syftade också till att betona de materiella aspekterna i undervisning så att visionerna inte bara bestod av värdeord utan också av konkreta förslag på hur utbildning ska kunna organiseras i framtiden. Till sin hjälp hade grupperna tre frågor: ”*Var* är klassrummet?”, ”*Vem* är i klassrummet?” samt ”*Vad* gör man i klassrummet och vilka teknologier används?”. Denna fas utgjorde huvuddelen av workshopen och avslutades med att grupperna fick presentera sin karta för de andra deltagarna.

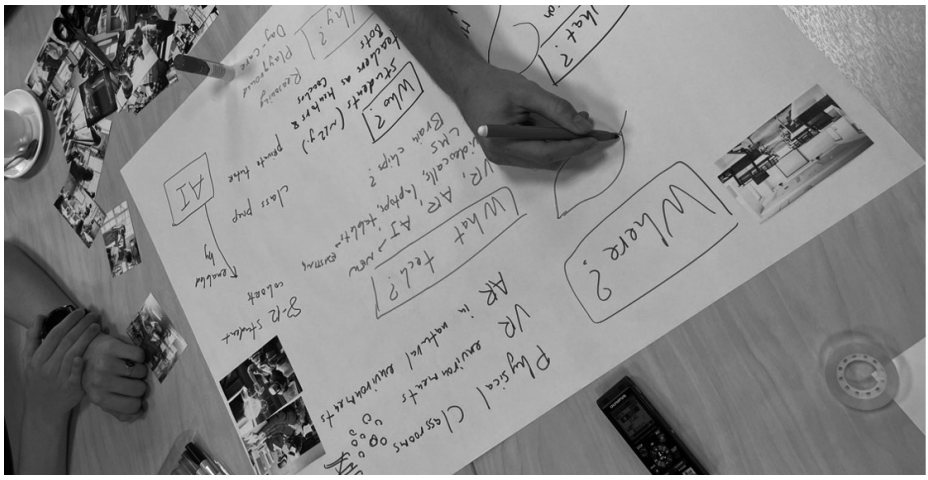


Bild 2. Grupperna skapar en gemensam karta över framtidens klassrum.

I den fjärde fasen avslutades sessionen med en gemensam reflektion om hur de framtidsvisioner som grupperna kommit fram till ska kunna uppnås, vilka utmaningar som finns och vilken roll deras företag eller institution kan spela i denna process.

Fokus i analysen ligger på workshopens tredje del, där deltagarna tillsammans skapade bilder av ett idealt framtida klassrum. Här används förhållningssätt från visuell etnografi som betonar att bilder och deltagargenererat material måste förstås i relation till det sammanhang i vilket de är skapade och inte bör uppfattas som fristående representationer av världen (se t. ex. Pink 2021). Ljud- och videoinspelningar, fotografier, anteckningar och de klassrumskartor som deltagarna producerade under workshopen har därför analyserats som en helhet med utgångspunkt i deltagarnas tolkningar. Även om materialet är för litet för att möjliggöra några säkra komparativa slutsatser, kan resultaten diskuteras i relation till respektive lands utbildnings- och digitaliseringshistoria varför några ord behöver sägas om dessa.

Estland har efter självständigheten 1991 positionerat sig som en utbildningsnation med särskild inriktning på digital innovation och entreprenörskap (Forsman m.fl. 2023). Denna process inleddes med projektet *Tiigrihüpe* (”tigersprång”) som handlade om att bygga upp de estniska skolornas digitala infrastruktur (Runnel, Pruulmann-Vengerfeldt & Reinsalu 2009) och har sedan fortsatt genom olika statliga initiativ för att utbilda lärare och elever i att använda dessa system och andra digitala verktyg (Education Estonia). Skolans digitalisering har här alltså drivits från centralt håll, i projektform och i samarbete mellan EdTech-sektorn och statliga institutioner.

I Sverige är utbildningssystemet decentraliserat och även om det tidigare förekommit statliga digitaliseringsprojekt så har utvecklingen sedan 1990-talets början främst drivits på kommunnivå, där olika teknikföretag sålt in sina lösningar (Hylén 2011). Detta har resulterat i en brist på samordning där det saknas gemensamma standarder, vilket är en förutsättning för att kunna aggregera och jämföra data från olika skolor (Hylén & Karlén 2019). Samtidigt finns det sedan 1970-talet en stark betoning på likvärdighet i svensk skolpolitik. Att ge alla elever tillgång till och kunskap om digital teknik ingår i detta kompensatoriska uppdrag (Samuelsson 2014).

Även tillgången till data om medborgare skiljer sig åt mellan de olika länderna. Folkbokföringen i Sverige går tillbaka till 1600-talet, medan Estland efter självständigheten från Sovjetunionen helt saknade statliga register över vilka som bodde i landet och därför fick ta hjälp av ideella krafter för att skapa ett sådant i början av 1990-talet (Norberg & Norberg 2024). I Estland är insamlingen av medborgardata alltså i någon mening kopplad till projektet att återuppbygga landet som en självständig nation, medan den i Sverige är en mer förgivettagen del av samhället.

Begreppet *sociotekniska föreställningar* har legat till grund för inte bara analysen av materialet, utan också det sätt på vilket det samlats in. Begreppet lyfter fram teknikutveckling som en central aspekt av hur framtidens framställs och tar form i policys och diskurser men också hur dessa framställningar materialiseras i praktiker, miljöer och tekniska system (Jasanoff 2015a). Användningen av bildbyråbilder i workshoparna var ett sätt att försöka synliggöra den här typen av dominerande föreställningar om framtidens skola och möjliggöra en kritisk diskussion om dem. Gruppreflektioner har

använts i tidigare studier för att komma åt de sociotekniska föreställningarna inom en viss gemenskap (se Felt 2015). I denna studie hade samtliga deltagare koppling till teknikbranschen eller till olika skoldigitaliseringsinitiativ, vilket gjorde att teknikutveckling var ett givet diskussionsämne. Den del av digitaliseringen som fokuseras här, nämligen användningen av datadrivna teknologier i utbildning, var däremot inget som introducerades av oss forskare utan ett tema som framträdde i analysen av materialet.

Föreställningar om framtidens klassrum

Trots att samtliga deltagare på något sätt var involverade i skolans digitalisering vidhöll samtliga workshopgrupper att teknik inte är något intressant eller viktigt i sig, utan bara ett medel för att driva skolans utveckling i önskad riktning. Kritiken av vad deltagarna uppfattade som en teknikcentrerad syn på skolutveckling var mest framträdande i den första fasen, där de interagerade med bildbyråernas ofta tillrättalagda bilder av det tekniktäta klassrummet. Dessa visioner avfärdades av deltagarna som ”teknikfetischism” eller ”teknikporr” med bristande verklighetsförankring. ”It’s not about the tech but the mindset!” förklarade en deltagare.[4] Det ”mindset” som deltagaren talar om handlar om komma bort från en standardiserad läroplan och i stället utgå från varje elevs intressen och förmågor samt att öka variationen av undervisningsformer och lärmiljöer. I strävan mot en mer individanpassad skola blir tekniken dock åter viktig, dels för att möjliggöra studier på olika platser genom onlinelärande, dels genom datainsamling och lärandeanalys som utlovar nya insikter om eleven. I analysen diskuteras hur denna relation mellan digitalisering, datafiering och skolutveckling framträder i materialet och i vilken utsträckning resultaten skiljer sig åt mellan de olika nationella kontexterna.

Ett utvidgat klassrum med eleven i centrum

Ett annat gemensamt drag i gruppernas presentationer är en samsyn kring att skolan är förlegad och behöver reformeras, både för att väcka elevernas engagemang och lust att lära och för att möta framtida behov och utmaningar. Det utbildningssystem vi har i dag skapades på 1850-talet, påpekar en av de estniska deltagarna, och är inte anpassat för dagens eller morgondagens samhälle. Den kritik som deltagarna riktar mot dagens skola kan grovt sammanfattas i två punkter: att den är standardiserad och att den i alltför hög grad bygger på envägskommunikation. I stället förordas ett studentcentrerat förhållningssätt, vilket också blir tydligt i flera av de kartor som producerades under sessionerna, där eleven placeras i mitten omgiven av olika resurser (se bild 3, 4 och 7). Mer konkret menar flera grupper att undervisningen måste utgå från elevens egna intressen och förmågor och inte från en standardiserad läroplan där

4 Eftersom ordet ”mindset” svårligen låter sig översättas har jag valt att behålla detta citat på engelska. Den svenska motsvarigheten ”tankesätt” är mer allmän och används inte lika ofta inom självhjälplitteratur och populärvetenskaplig kognitionspsykologi vilket är relevant i detta sammanhang.

alla läser samma sak. Motivation är nyckeln till ett mer effektivt lärande, menar en deltagare med hänvisning till neurovetenskaplig forskning, och om alla elever tvingas läsa samma ämnen finns det en risk för att begåvade eller specialintresserade elever hålls tillbaka. En annan grupp diskuterar hur en standardiserad läroplan med fokus på de teoretiska kärnämnena också kan medföra att mer praktiskt orienterade elever misslyckas med skolan.

Bild 3 & 4. Bilder av framtidens klassrum med eleven i centrum.

Ett steg i riktning mot en intressestyrd läroplan som föreslås av flera grupper är att elever ska delas in i grupper efter intresse och kunskapsnivå snarare än efter ålder. Det finns också en vision om att man ska frångå de traditionella ämnena och i stället arbeta mer problem- och projektbaserat, framför allt bland de estiska deltagarna, där flera förordar en övergång till en skola helt utan traditionell ämnesundervisning. Detta är också kopplat till utvecklingen av datadrivna teknologier och AI, som enligt en deltagare medför att man helt kan ifrågasätta behovet av traditionell utbildning i framtiden. I stället menar hen att generella förmågor som kreativitet, agens, samarbets- och problemlösningsförmåga och inte minst fantasi blir allt viktigare: ”Den viktigaste färdigheten i framtiden tror jag kommer att vara fantasin, eftersom den gör att vi kan tänka oss världen på nya sätt, och sedan kan de mata in det i en AI och på så sätt förändra samhället”, förklarar deltagaren. De visioner som lades fram under de svenska workshoparna är något försiktigare och påminner mer om en reformerad variant av dagens skola, men även här betonas vikten av att hjälpa eleverna att utveckla mjuka kompetenser och mänskliga förmågor som inte kan ersättas av en maskin. Hit hör både empati och inlevelseförmåga och mer traditionella hantverksyrken.

Visionen om en studentcentrerad och individanpassad skola är också kopplad till frågan om plats. Här hänvisar flera deltagare till erfarenheter från covid-pandemin, som enligt deras mening visar på möjligheterna att kombinera onlineundervisning med lärande på plats för att på så vis kunna skapa en mer flexibel skolgång. Detta illustreras i en av workshopkartorna som två rum, ett märkt ”på plats” och det andra ”remote”, hoplänkade med pilar som visar hur lärandet kan förflyttas mellan dessa platser beroende på elevens preferenser och hemförhållanden (se bild 4). Andra grupper

framhåller att distansundervisning möjliggör att alla elever, oavsett bostadsort, kan få tillgång till expertlärare inom olika områden, vilket är en förutsättning för en mer intressestyrd skola med möjlighet till fördjupning.

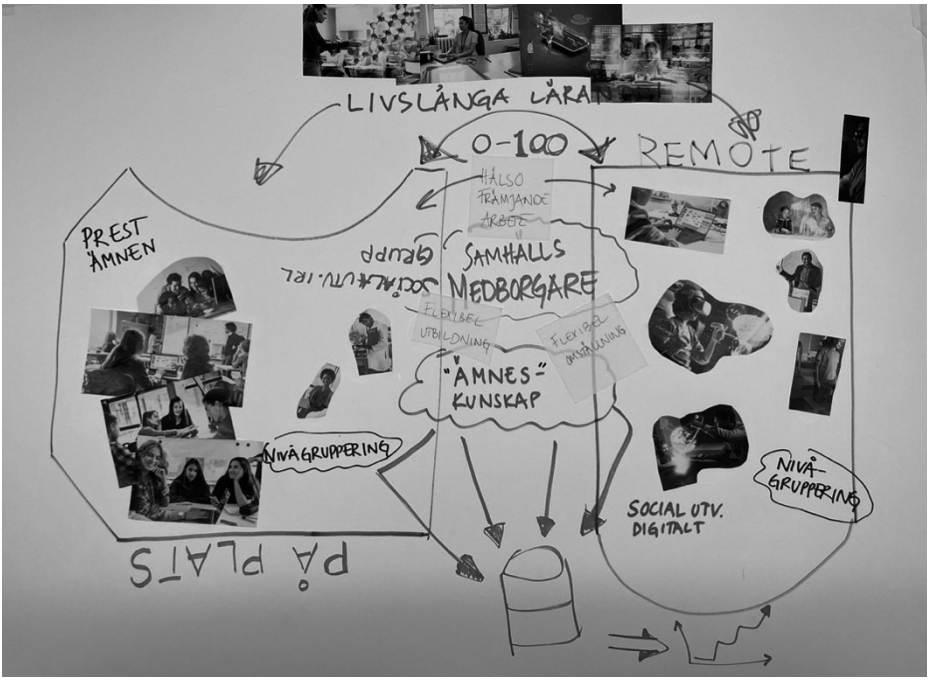
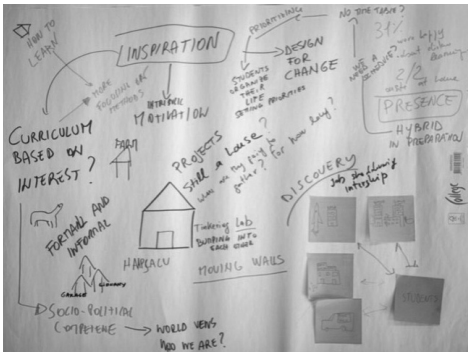


Bild 5. Det hybrida klassrummet.

Synen på digitala tekniker som medel för att individanpassa skolan och förlägga lärandet på olika platser formas också av nationsspecifika, utbildningspolitiska traditioner. När en grupp svenska deltagare presenterar sin vision om en skola där eleverna kan välja att delta antingen i skolan eller hemifrån, kritiseras detta av en deltagare från den andra gruppen som påpekar att man i det svenska skolväsendet konsekvent försökt att minimera hemmets och föräldrarnas roll i skolan för att ge alla barn likvärdiga förutsättningar oavsett hemförhållanden. I Estland bygger skolan tvärtom på ett nära samarbete mellan skolan och hemmet, vilket bland annat resulterat i en digitaliseringsstrategi för skolväsendet som går ut på att eleverna får ta med sig sina egna digitala enheter till klassrummet, kallat Bring Your Own Device (Lorenz, Kikkas & Laanpere 2016). Det finns också ett starkt fokus på livslångt lärande i estnisk utbildningspolicy, vilket kan förklara den optimism kring arbetsplatsförlagt och problembaserat lärande som är påtaglig i det estniska materialet.

Samtidigt menar deltagare i bägge länderna att undervisningen måste föras närmare verkligheten och handla om riktiga utmaningar. Lärandet bör därför förläggas på platser utanför skolbyggnaden, såsom utomhusmiljöer, arbetsplatser och kulturinstitutioner (se bild 6 och 7). ”Det finns inget behov av ett traditionellt klassrum,

lärande sker överallt", menar en deltagare, medan andra ser behovet av någon typ av hemklassrum eller "tryggt rum" där eleverna kan träffas och diskutera sina upplevelser. Detta utvidgade klassrum möjliggör olika undervisnings- och kunskapsformer, och flera grupper framhåller vikten av utomhuspedagogik, rörelse och estetiska ämnen. Genom att utforska världen med alla sinnen kan eleverna utveckla en mer holistisk syn på världen, vilket är en förutsättning för att lösa framtidens komplexa problem, menar de. Några deltagare, både från Sverige och från Estland, föreslår också att skolan bör erbjuda teknikfria miljöer för eleverna att vistas i som en motvikt till deras genomdigitaliserade vardag.



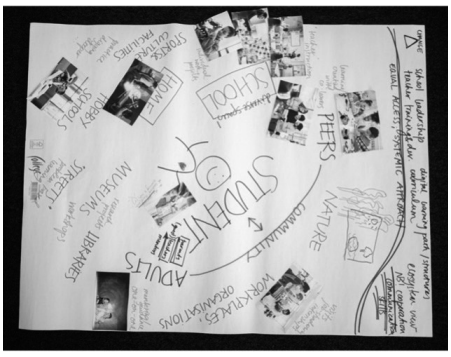


Bild 6 & 7. Det utvidgade klassrummet.

De förändringar i organisationen av undervisning som föreslås ovan förutsätter också en omformulering av lärarrollen. Katederundervisning används i diskussionerna som en bild av den förlegade undervisnings- och kunskapssyn man vill komma bort ifrån, eller som en estnisk deltagare uttrycker saken: "Läraren som kunskapsförmedlare kommer att förpassas till historieböckerna." I stället framträder en lärarroll av mer administrativ karaktär, där läraren möjliggör elevernas eget lärande genom att förmedla kontakter med yttervärlden, erbjuda inspirerande lärmiljöer och uppgifter samt sätta samman grupper där elever kan lära av varandra. Denna övergång illustreras i en av kartorna som ett skifte från en linjär process, där all kunskap kommer från läraren och läroboken, återgivna som överkorsade linjer, till ett mer dynamiskt grupplärande, återgivet som en samling cirklar (bild 8). En annan detalj från en karta visar hur läraren utgör en länk mellan eleverna och "det riktiga livet", till exempel arbetsliv eller universitetsstudier, vilket enligt gruppen är något som saknas i dag (bild 9).

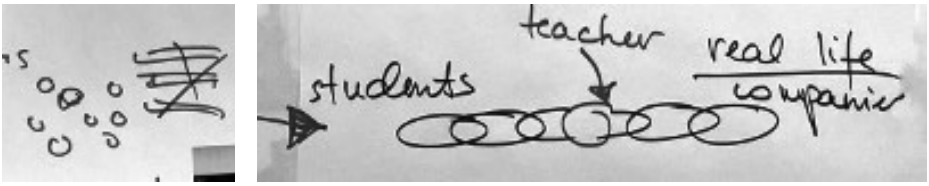


Bild 8 & 9. En förändrad lärarroll (detalj).

Framtidens klassrum har också utrymme för en diversifiering av lärarrollen, enligt några grupper. Lärare kan inte förväntas vara bra på allt, utan borde kunna specialisera sig och fokusera på till exempel undervisningsmetodik eller det sociala samspelet mellan elever. Tillgången till AI och möjligheten att bjuda in experter att undervisa på distans gör att behovet av lärare med goda ämneskunskaper minskar, menar grupperna. Samtidigt medför den tekniska utvecklingen nya behov, såsom lärare med kunskaper om att tolka data. Relationen mellan datadrivna teknologier och de visioner för framtidens klassrum som beskrivits ovan diskuteras i följande avsnitt.

Det datadrivna klassrummet

För att möjliggöra en mer flexibel och individanpassad skola lyfter flera grupper upp insamling och analys av elevdata som ett område med stor potential. De menar att det redan produceras stora mängder data i klassrummet, men att de inte används på något systematiskt sätt. ”Man förspiller mycket data i dag som kan vara med och driva utvecklingen framåt”, säger en deltagare och föreslår att man bör ”ta till vara den för att förbättra utbildning och förbättra inlärning och kunskaper […] så att den samlas på något ställe och kommer brukarna eller kunderna, eller hur man nu ser det, till del”. Data framställs här som en redan tillgänglig resurs som slösas bort i stället för att samlas in och användas för att förbättra lärandet. I gruppens prototyp illustreras detta av en tunna, som representerar den data som genereras i undervisningen med digitala verktyg, och en pil som leder vidare till en graf vilken representerar hur dessa data kan användas för att synliggöra hur lärande sker, både på individ- och på gruppnivå (se bild 5).

I det estniska materialet används ofta begreppet ”digitalt fotavtryck” som beskrivning av de data som genereras av eleverna i klassrummet. En förutsättning för att detta ska ske är förstås att man använder sig av digitala teknologier i klassrummet, förklarar en deltagare som menar att dessa data är så värdefulla att det i sig motiverar användningen av datorer och annan digital teknik i undervisningen. ”Därför är det digitala blir så viktigt för att skapa digitala fotavtryck eller lärandeavtryck som gör att vi kan få den här detaljerade överblicken över vad eleverna kan och på så sätt kunna individanpassa [lärandet].” Denna positiva inställning till datainsamling kan kopplas till den estniska erfarenheten av att skapa ett register av medborgadata från grunden, vilket var en av förutsättningarna för byggandet av en fungerande demokrati men också för den typ av digitalt medborgarskap som Estland har blivit känd för internationellt.

I båda fallen framställs datadriven teknik som en nyckel till att förverkliga visionen om en verkligt individanpassad skola. Deltagare i båda länderna hyser förhoppningen om att data ska kunna användas för att lära sig mer om elevernas individuella lärprocesser och optimera deras kunskapsutveckling, och även synen på datainsamling som något ständigt pågående och allestädes närvarande är gemensam. I en av workshoparna som genomfördes i Sverige beskriver en deltagare AI som ”en osynlig ande som svävar över allt” och som också kan förutsäga nästa steg i elevernas lärprocess. För att exemplifiera pekar hen på en bild föreställande två elever framför en dator och förklarar: ”Han [AI:n] är där i datorn. [...] Nu jobbar de [eleverna] vidare där och då dyker han upp och ställer exakt de frågorna som de två behöver för att komma vidare i sitt lärande.” Ett liknande scenario beskrivs av en estnisk deltagare, som menar att det år 2040 kommer att finnas AI-botar som cirkulerar i klassrummet för att se vilka elever som behöver extra stöd och ”helt enkelt optimerar flowet och effektiviteten i klassrummet”.

Den kunskap som genereras via data kan också användas för att skapa elevgrupper ”som inte bygger på ålder utan på kognitiva förmågor, nuvarande kunskaper och intressen”, förklarar en deltagare. Genom blandningen av olika kompetenser och personligheter skulle dessa grupper fungera mer som ”produktteam” än som traditionella skolklasser, vilket är en förutsättning för en skola byggd på problembaserat lärande, enligt vederbörande. En annan deltagare i samma grupp påpekar att man i sammansättningen av grupper då skulle behöva ta hänsyn inte bara till ämneskunskaper utan också till andra kompetenser, såsom kommunikations- och samarbetsförmåga. Det innebär att man behöver komma på sätt att ”samla in och mäta deras personligheter”, men deltagaren kan själv inte svara på hur detta skulle gå till.

Det förekommer också en föreställning om att datadrivna teknologier kan bidra till att organisera undervisning, i synnerhet om denna fördelas mellan olika virtuella och fysiska platser och om eleverna kan välja vilka dagar de vill vara med på plats och när de vill delta på distans. Detta administrativa pussel, menar en grupp, kräver en ”superdator” som kan hålla reda på varje elevs individuella läroplan och ser till att hen får nödvändigt stöd. Det kan röra sig om alltifrån att se till att elever inte hamnar i socialt utanförskap och tillbringar alltför mycket tid hemma till att skapa förutsättningar för den familj som ska ”åka till Bahamas och vill ha all undervisning på distans de veckorna” att göra detta utan att elevens skolgång blir lidande.

Datadrivna teknologier kan också vara ett stöd för lärare i pedagogiska frågor, menar deltagarna. Genom lärandeanalys synliggörs vilken typ av undervisning som är mest effektiv, en kunskap som kan användas av lärare som stöd i planeringen och i förlängningen resultera i bättre undervisningsmetoder och en mer likvärdig skola. Detta hänger samman med de förändringar i lärarrollen som diskuteras ovan. Om alla elever, som en deltagare föreslår, har ”sin egen lilla AI-assistent eller mentor” som har tillgång till all världens information och dessutom kan förmedla den till eleven på precis rätt nivå, finns det lite utrymme för en mänsklig lärare att göra exakt samma sak. Samtidigt uppstår behovet av en ny kategori lärare som är specialiserad på att tolka och använda data, eller som en deltagare lite krasst uttrycker saken: ”AI kommer inte ta ditt jobb, en person som kan AI kommer ta ditt jobb”.

I det möte mellan det utvidgade och det datadrivna klassrummet som beskrivs ovan finns en spänning mellan betoningen av det icke-digitala, kroppsliga och erfarenhetsbaserade och tron på vad datadrivna teknologier kan åstadkomma i utbildningsväg. Detta berörs av deltagarna när de diskuterar en rad dilemman som handlar om när och var data ska samlas in och hur de ska analyseras.

Dilemman kring skolans datafiering

Ett första dilemma är att det krävs någon typ av digital teknik för att data ska genereras. Oftast handlar det om elevernas egna digitala enheter eller en lärplattform som de interagerar med, men det kan också röra sig om mer avancerade AI-lösningar där kameror används för att övervaka elevernas rörelser i klassrummet. Det faktum att eleverna antingen måste befinna sig i skolan eller använda en lärplatta, mobiltelefon eller laptop för att data ska genereras går stick i stäv med ambitionen om att förlägga lärande på platser utanför skolan och att erbjuda eleverna teknikfria miljöer. Några deltagare uttrycker en oro för att barn och unga tillbringar för mycket tid framför skärmen, befarar att detta ska påverka deras välbefinnande och kognitiva utveckling negativt och menar att skolan inte bör bidra till denna utveckling, samtidigt som de ser värdet i att få tillgång till stora mängder elevdata från flera olika sammanhang. En estnisk deltagare sammanfattar denna problematik genom att säga att det viktigaste inför framtiden är att ”inte skapa miljöer som möjliggör skärmberoende genom att använda teknologier, men samtidigt se till att vi inte förlorar möjligheten att få tillgång till de här [digitala] fotavtrycken”.

Diskussionen om skärmberoende och hur mycket teknik som ska finnas i skolan förekom i båda länderna men på olika sätt. I Sverige har denna debatt resulterat i en digital backlash som genomsyrar skoldebatten och som resulterat bland annat i att den nationella digitaliseringsstrategin för utbildningsväsendet stoppats samt att digitala verktyg tagits bort ur förskolans läroplan (Forsler & Guyard 2023). Detta är något som teknikföretagen måste förhålla sig till och som också kan förklara en viss ovilja mot att tala om just teknologins roll i framtidens klassrum för att i stället fokusera på de pedagogiska aspekterna. I Estland finns inte motsvarande diskussion, men väl en utbredd oro över digitaliseringen som inte motsvarar den teknikoptimism som ofta sägs prägla både teknikbranschen och Estland som e-nation. I diskussionerna hänvisade flera av de estniska deltagarna också till Sverige och de pågående förändringarna i skolans digitaliseringspolicy, som enligt deras mening är ett steg i rätt riktning mot en skola som sätter elevernas välbefinnande i centrum.

De estniska deltagarna framhöll också särskilt vikten av att arbeta med problembaserat lärande i dialog med arbetsplatser och med lokalsamhället, men även här identifierades en svårighet, nämligen att det inte går att mäta resultatet av en helt öppen lärprocess. Detta innebär att man måste kompromissa och introducera problem där lösningen redan är känd, eftersom det annars inte går att mäta vilket lärande som har skett. Här framträder ett viktigt glapp i hur flera grupper talar om kunskap och framtidskompetenser, nämligen det mellan ny och etablerad kunskap eller mellan det okända och det redan kända. Ett tydligt tema i materialet är osäkerhet kring framtiden;

hur arbetsmarknaden kommer att se ut, vilka teknologier som kommer att finnas, vilka nya samhällsutmaningar vi kommer att stå inför och vilka kunskaper som kommer att krävas. Skolans viktigaste uppgift är att förbereda eleverna inför denna osäkerhet, menar de. Samtidigt förordas datadrivna teknologier som bygger på förutsägelser, att lärande och annan utveckling följer ett givet spår och att de åtgärder som genomförs faller ut som förväntat.

Några grupper menade att det främst är ämneskunskaper som ska mätas och inte sociala förmågor. Samtidigt är ett tydligt mönster i materialet att mellanmänskliga kompetenser framställs som extra viktiga, eftersom de är oberoende av hur framtidens teknik och arbetsmarknad ser ut, medan ämneskunskaper kan förvärvas på andra sätt eller delegeras till en AI. Det är alltså inte helt tydligt vilken typ av kunskapsinhämtning som ska mätas och utvärderas om det vi redan känner till om världen finns tillgängligt via AI och skolans uppdrag är att skapa ny kunskap. Frågan om vilken typ av data som kan och bör samlas in diskuterades också som en fråga om integritet. En av grupperna menade att det måste finnas platser och aktiviteter i skolan där data *inte* samlas in och registreras. ”Det måste finnas en trygg miljö att allting inte registreras […] det är jätteviktigt att lyfta fram här eftersom det här [datainsamling] sker så mycket överallt”, säger en deltagare och får medhåll av övriga gruppen.

Sambandet mellan sociala färdigheter och ämneskunskaper går också att koppla till skolan som plats. Deltagarna menar att teknik som möjliggör en mer individanpassad studiegång skulle vara positiv för elevernas utveckling av ämneskunskaper, men att en sådan organisation också skulle kunna motverka skolans sociala uppdrag. Även om många elever skulle föredra att studera hemifrån, skulle detta kunna innebära att de inte får träna på social interaktion, påpekar de. Också här hänvisar deltagarna till erfarenheter från covid-pandemin, som medförde att skolorna i Estland stängde och att fritidsverksamheten i den svenska skolan minimerades, något som påverkade många barn negativt. En mer praktisk problematik med att låta elever studera hemifrån med en AI-lärare några dagar i veckan är att skolan också ansvarar för omsorgen när föräldrarna arbetar. Här krävs en samordning mellan hemmet och skolan, menar en deltagare som ser optimistiskt på framtiden och hoppas att utvecklingen av AI-teknik också kan också medföra att arbetstiden förkortas och att föräldrar jobbar mindre och i stället tillbringar mer tid med sina barn.

Datafiering handlar inte bara om insamling av data, utan kanske framför allt om hur data analyseras och i vilket syfte de används. Majoriteten av grupperna var mer bekymrade över att de data som finns tillgängliga inte analyseras alls, men det fanns också deltagare som lyfte fram problemet med att AI-system bär på partiskhet eller snedvridning (*bias*) som kan leda till att de föreslår åtgärder som kan reproducera ojämlikhet. Eftersom det rör sig om stora datamängder är det inte möjligt för en människa att ta hand om analysen, ”men detta innebär inte att människan inte ska fatta besluten” enligt en deltagare. Det system som används för att analysera elevdata bör tillhandahålla förslag på hur lärare, rektorer och huvudmän ska kunna använda informationen, förklarar hen, men dessa måste sedan själva besluta om huruvida de ska följa rekommendationerna.

Diskussion

I analysen av materialet framträder föreställningar om en önskvärd framtid i form av en individualiserad skola byggd på personligt engagemang och olika former av kunskap, samtidigt som denna icke-digitala skola möjliggörs av just insamling och analys av elevdata. Att datafieringen av utbildning tas för given samtidigt som deltagarna insisterar på att digital teknik inte är något viktigt i sig kan ses som ett tecken på vad man ibland omtalar som ett *postdigitalt tillstånd* i utbildning, där det digitala har blivit en så integrerad del av skolan att det inte längre går att tänka bort men inte heller har en synlig position (Jandrić & Knox 2022; Carvalho & Lamb 2023). Data betraktas här som något som bara finns där, en resurs som skapas automatiskt och som det vore synd att inte använda. Samtidigt betonas skolans ansvar för att uppmuntra en balanserad teknikanvändning och att hjälpa eleverna att utveckla en förmåga att använda digital teknik på ett medvetet sätt och för det allmänna bästa i framtiden. Föreställningen om att skolan måste följa den tekniska utvecklingen i samhället, men också är ett verktyg för att styra den i önskvärd riktning, bekräftar det etablerade narrativet om ett ömsesidigt samband mellan teknikutveckling och utbildning (se Rahm 2023).

Deltagarna motiverar också användningen av datadrivna teknologier med hänvisning till forskning, att man genom att aggregera stora mängder data kan identifiera de mest effektiva undervisningsmetoderna och förutsäga vilken typ av insatser som bäst gynnar en elevs lärprocess. Williamson, Macgilchrist och Potter (2023:3) benämner denna process *scientization*, ett slags vetenskapliggörande av praktiker genom hänvisning till evidens och vetenskaplig teori, och menar att detta är ett vanligt sätt att mobilisera användningen av datadrivna teknologier och automatisering i utbildning. I materialet från denna studie används samma typ av retorik för att motivera också det som synbart är motsatsen till en datafierad skola, nämligen en teknikfri skola med mycket utomhusvistelse och med elevernas intressen, nyfikenhet och handlingsförmåga i centrum. Deltagarna hänvisar till forskning som visar att lärandet blir mer effektivt om det utgår från eleverna själva och inte tvingas på dem av läraren, och de använder sig av neurovetenskapliga begrepp som ”dopaminberoende” för att förklara farorna med överdriven teknikanvändning. Även om det rent praktiskt är förenat med vissa svårigheter att samla in data om eleverna befinner sig utanför klassrummet utan någon digital enhet, så finns det ingen ideologisk motsättning mellan dessa två ambitioner. Tvärtom tycks de bygga på liknande logiker och auktoritetsargument hämtade från natur- och datavetenskaperna.

Något annat som förenar visionen om ett utvidgat klassrum med studenten i centrum med den om datadriven utbildning är talet om varje elevs individuella lärprocess och hur denna kan optimeras för att hjälpa eleven att utveckla sina intressen och förmågor. Här reflekteras den syn på kunskap som identifierats i tidigare forskning, nämligen att lärande särskiljs från undervisning och framställs som en självstyrd process där läraren osynliggörs eller åtminstone får en annan roll, den som uttolkare och verkställare av datagenererade lärandeanalyser (Ratner m.fl. 2019; Knox m.fl. 2020; Grant 2024). Dessa analyser bygger emellertid på förutsägelser och en på förhand

definierad kunskapssyn (Webb m.fl. 2020; Selwyn m.fl. 2023), vilket står i direkt kontrast mot det problembaserade arbetssätt som deltagarna förordar för att förbereda eleverna på en osäker framtid. Användningen av datadrivna tekniker riskerar alltså, som Selwyn, Pangrazio och Cumbo (2022) förutspått, att exkludera pedagogiska modeller och praktiker som inte genererar rätt typ av data. Resultaten från denna studie visar att detta också omfattar pedagogiska miljöer som inte låter sig övervakas, såsom utomhusmiljöer, arbetsplatser och kulturinstitutioner vilka framhålls av deltagarna som viktiga komponenter i framtidens skola.

Föreställningarna om en evidensbaserad och individualiserad skola som kan komma till stånd med hjälp av digital teknik speglar det globalt förankrade narrativ som diskuterades inledningsvis, där digitalisering framställs som ett sätt att lösa skolans problem och bidra till en bättre utbildning för alla (Cuban & Jandrić 2015; Buch, Lindberg & Cerratto Pargman 2024; Macgilchrist 2019). Inom ramen för detta narrativ förekommer emellertid en del nationella skillnader mellan det svenska och estniska materialet. Till att börja med är de prototyper som framställdes i den estniska kontexten mycket mer utopiska och radikala än de svenska motsvarigheterna, och rymmer visioner om en helt lärarlös skola eller en skola där varje elev skapar sin egen läroplan. De kartor som presenterades under workshoptillfällena i Sverige ligger relativt nära vårt nuvarande utbildningssystem och innehåller också flera ekonomiska och praktiska överväganden, som att skolan måste vara på heltid så att föräldrarna kan arbeta eller att mindre undervisningsgrupper skulle bli för dyrt för samhället. Denna verklighetsförankring hänger förstås samman med vår svårighet att föreställa oss något utanför det vi redan känner till (se Markham 2021), men kan också kopplas till nationsspecifika förutsättningar.

Estland är ett relativt litet land med en tradition av samverkan mellan samhälleliga institutioner och näringsliv, inte minst kring skolans digitalisering, vilket innebär att det varit enklare att genomföra förändringar där än i Sverige. Omvandlingen från en före detta sovjetrepublik till tech-nation verkar ha bidragit till en optimistisk syn på det egna landet. Deltagarna själva beskriver den estniska skolan som ett utbildningssystem i framkant och menar att delar av de visioner, i form av bildbyråbilder, som presenterades under första delen av workshopen redan är verklighet i många estniska skolor. Den gemensamma erfarenheten av att ha genomfört stora förändringar på kort tid kan utgöra en förutsättning för att våga föreställa sig mer radikala förändringar av utbildningsystemet. En annan förutsättning för att datafiering ska kunna genomföras i större skala är det etablerade samarbetet mellan olika aktörer, och i framställningen av data som en outnyttjad resurs är det precis ett sådant samarbete som efterlyses av de svenska deltagarna. De estniska grupperna menar å sin sida att infrastrukturen för insamling och analys av elevdata redan finns på plats och att det mest handlar om att våga använda den för faktisk skolutveckling.

Samtidigt som resultaten visar hur etablerade vissa sociotekniska föreställningar om skolans digitalisering och datafiering faktiskt är, kan de smärre nationella skillnaderna i materialet bidra till att nyansera bilden av EdTech-sektorn som ett homogent område, dominerat av en handfull globala techföretag som drivs av vinstintresse. Denna bild är inte osann men något förenklad och säger inte heller något om hur globala föreställ-

ningar om vad utbildning kan och bör vara omförhandlas i nationella kontexter och lokala organisationskulturer. Frånvaron av teknikoptimistiska narrativ i båda kontexterna ger också vid handen en potentiell förskjutning från den rådande hypen kring digitala utbildningsteknologier men inte till kritiska humanvetenskapliga perspektiv, utan snarare till de evidensbaserade och kognitionsvetenskapliga trender som just nu präglar utbildningsdebatten, framför allt i Sverige men också internationellt. För att nyansera denna debatt och bidra till en mer hållbar och rättvis användning av digitala system i utbildning är det viktigt att hitta former för dialog och samarbete mellan forskare från olika discipliner och relevanta aktörer inom teknik- och skolutveckling.

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Författarpresentation

Ingrid Forsler är docent i medie- och kommunikationsvetenskap på Södertörns högskola.
Kontakt: ingrid.forsler@sh.se

MAGDALENA KANIA LUNDHOLM

Looking beyond the Glitch

What can we Learn from Sociologically Informed Critical Studies of Datafication?

Abstract
Despite dominant technology discourses focusing on novelty, growth, speed and effectiveness, the sociologically informed analyses of datafication have, to some extent implicitly, emphasised brokenness and glitches as productive and inherent elements of a datafied society. This article asks: "How can sociologically informed analyses of datafication be expanded to further guide and understand datafied societies?" The goal of this article is twofold: first, I depart from the idea of "broken world thinking" and the notion of glitch, and discuss some examples of previous research where sociologically informed and critical analyses of datafication provide a unique perspective of looking "beyond the glitch" and deeper into power relations and social structures. Second, I discuss some areas and directions for further exploration, suggesting that looking beyond the glitch is not only a productive perspective but that it also reminds us to keep up with the critical sociological imagination.

Keywords: Critique, Datafication, Glitch, Power, Sociological Imagination

THE TOPIC OF "big data" has been on the sociological agenda for at least the past decade. The term itself often refers to the recent expansion of digital data generated as products of users' digital transactions and other activities, including digital surveillance technologies like CCTV cameras, traffic monitors and sensors. In practice this means that users' activities become data commodities ready to be sold to third parties or collected by companies for their own advertising purposes. Although big data are often perceived as reliable, neutral and precise predictors aiming to improve safety, efficiency and resource management, sociologists, particularly critical sociologists have raised warnings about big data as sociocultural artefacts and that there is more to it than meets the eye (Lupton 2015). Some suggest that big data, likewise other digital data objects, are "systems of knowledge that are implicated in power relations and (…) both the product of social and cultural processes and themselves act to configure elements of society and culture. They have their own politics, vitality, and social life" (Lupton 2015:116). This notion of big data "living its own life" also emphasises that, despite the widespread assumption that technology is neutral, predictable and reliable, it is *also* breakable, prone to erosion, decay and repair.

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In this article I depart from the notion that sociotechnical systems are seldom smooth operating entities. Instead, they break, and it is at that very instance that we are reminded that a bug or a glitch can be a productive moment and a catalyst for change. I ask: "What can we learn from sociologically informed critical studies of datafication? How can this be sharpened by thinking with glitches? How can sociologically informed analyses of datafication be expanded to guide and understand datafied societies?"

The article is in two parts; first I discuss the idea of the "broken world thinking" and repair (Jackson 2014) and the notion of *glitch* (Sundén 2018; Benjamin 2019; Broussard 2024) followed by some examples of previous research where sociologically informed and critical analyses of datafication provide a unique perspective of looking "beyond the glitch" and deeper into the power relations and social structures. I argue that sociologically informed analyses of datafication offer an invaluable contribution to theorising and understanding of modern datafied social life, beyond the discourse of novelty, growth and predictability. Second, I suggest that sociological imagination can be a fruitful concept in research on datafication and discuss some areas and directions for further exploration focusing specifically on the issues of data, agency and public engagement. My goal here is not to give an extensive overview of either sociology or critical data studies, but rather suggest that looking beyond the glitch allows us also to scratch beyond the "tech surface" and maintain a critical perspective on datafication, digital technologies, capitalism, inequality and power.

Glitch as a catalyst and potential for change in datafied societies

Nearly ten years ago, there was a flurry of reporting on various incidents pointing to algorithmic bias, like the infamous 2015 incident where Google was criticised – and quickly apologised – for its image-recognition algorithm that auto-tagged pictures of black people as "gorillas".[1] The company promised "immediate action" to prevent occurrence of the error, by preventing the program from labelling *any* images as "gorilla, chimpanzee, or monkey – even pictures of the primates themselves" (Hern 2018), which still seems to pertain (cf. Grant & Hill 2023). More recently, another controversy came up when Google's AI Chatbot told a homework help-seeking student to "Please Die" (Prada 2024). Google has apologised, again, saying that "large language models can sometimes respond with non-sensical responses", and this is an example of that and that they have taken action to prevent similar outputs from occurring again. The issue that AI programs exhibit different types of bias has also been mentioned in the context of medical applications, where bias particularly affects disadvantaged groups that can be subject to less accurate algorithmic predictions which might underestimate the need for care (Mittermaier, Raza & Kvedar 2023). Also, the predictive analytics models employed by the justice system to predict and prevent crime occurring in some American cities use publicly available data but reveal increased police response in wealthy neighbourhoods while ignoring less advantaged areas (Wood 2022). In many

1 https://www.bbc.com/news/technology-33347866

instances tech developers argue that possible cases of bias are simply a matter of tech development, temporary fixable bugs or *glitches*. However, as some scholars argue, the concept of glitch can be more useful than that.

The word *glitch* originates from Yiddish and means to glide or a slippery space and often indicates a problem or distraction (cf. Benjamin 2019:77–96). In the context of modern technology, it implies some sort of mistake, a minor accident that can and oftentimes *should* be fixed. Glitch and repair belong together, although according to Jackson (2014), maintenance and repair work are not necessarily at the fore of our thinking of technology. Instead, it is rather innovation, novelty, growth and efficacy that are dominating the discourses around new technologies, digitalisation and more recently, datafication. Consequently, things, objects and relations that break become rather invisible or quickly replaced with new solutions. To shed light on these forgotten aspects of technology, Jackson employs the notion of "broken world thinking" to argue that breakdown, maintenance and repair constitute crucial but understudied sites of new media technology, and they are "one of our most significant sites and sources of sociotechnical difference (…) and an engine by which technological difference is produced and fit is accomplished "(ibid. 227). To illustrate his point, he uses images of abandoned and aging ocean vessels on the shores of Bangladesh; once the signs of trading glory and globalisation, they are left behind, forgotten, steadily dismantled and repurposed by local markets. They are a reminder that technological objects are made but they also fall apart, become dismantled and rendered invisible. They need repair and maintenance to continue working.

Repair serves, for instance, as a reminder that acts of care in the sense of fixing, support and healing can maintain and transform order and meaning in complex sociotechnical systems (ibid. 222). This approach challenges the notion of technological autonomy and self-sufficiency by emphasising that in moments of glitching and breaking, we learn to engage and perceive technologies in often new and surprising ways (ibid. 230). Such moments draw our attention to the political aspects of technology and the contexts in which they have emerged, the power relations, forms of valuation of objects, moral aspects of technology, such as the ethics of care and various other "glitches" that are oftentimes made invisible by the seemingly smooth operation of sociotechnical systems. In this sense breaking, maintenance and repair are both generative and productive, supporting the notion that it is a common occurrence that things do break and fall apart.

The productive aspect of *glitch* has been discussed by Sundén (2018) in the context of post-humanist feminism. She brings up gender as broken technology and femininity as an unfinished project, constantly in the making as there are neither faultless bodies nor technologies. What the glitch does is call attention to the material aspects of sociotechnological systems. It is the catalyst rather than an error that suddenly stops the anticipated and expected flow and smoothness of the program or system. When, for instance, the internet suddenly stops working, we become aware of broken cables or glitching routers. Sundén cites Lotringer & Virilio (2005:2), who argue that "[M]alfunction and failure are not signs of improper production. On the contrary, they

indicate the active production of the 'accidental potential' in any product" (2018:25). In this way, the machine and its inner workings are revealed through the glitch, its lagging and cracks. We are allowed to peek inside, to glance at the inner structure and become aware of its (im)possibilities. In this way glitch can be both a catalyst of anger, irritation and sudden loss of control *and* the critical point that invites transformation. The glitch reveals and heightens the awareness of what is oftentimes taken for granted and expected, like tacit knowledge or social norms.

In sociology, breaking or breaching of social norms has been commonly associated with Garfinkel (1967) and the ethnomethodological breaching experiments that imply conscious violation of social norms, such as turn taking in daily conversation. The goal of these experiments has been to examine and analyse people's reactions to norm breaching, but more importantly the focus has been on underlying normative social structures guiding those reactions. In other words, by breaching the implicit and seldom articulated social norms, we suddenly become aware of their existence in the first place. Breaching is also an exercise in resilience of social reality, as the most common reaction is to normalise the breach, to fix and repair the "broken norm".

Some argue that the glitches that occurred a decade ago or earlier, like the incident with "racist Google" mentioned earlier, have already been fixed due to technological improvements and development. Meanwhile, other voices from within the industry suggest that instead of pretending to eliminate bias, one needs to focus on remediating it to "reduce the chances of AI behaving badly" (Townson 2023). At the same time, critical scholars emphasise that these problems are not necessarily due to AI's "bad behaviour" but rather that the unconscious biases are built into tech and reflect developers' values and the power structures of which they are a part. Particularly salient here are voices of Noble (2018), Benjamin (2019) and recently Broussard (2024), who argue that glitches are systemic reflections of exclusion and discrimination which are built into sociotechnical systems. They do not only reflect the values and priorities of a relatively homogenous group of developers but also how solutions get defined in and by the tech industry. In other words, glitches are "powerful opportunities to examine the overall system" (Benjamin 2019:47) and "not an aberration but a form of evidence, illuminating underlying flaws in a corrupted system" (Ibid. 80). This means that, for instance, algorithmic bias is structural and cannot be addressed by quick code updates (Broussard, 2024:4). This capacity to see social occurrences as more than glitches, as inherent elements of a flawed system, rests at the bottom of sociological thinking and sociologically informed analyses of datafication. In the following section, I discuss some examples of critical research on datafication and identify some of the systemic glitches scholars have been pointing out.

Glitches within: What can sociologically informed analyses of datafication tell us about the broken system?

Attentiveness to glitches, brokenness and the need for repair has been one of the central concerns of sociologically informed analyses of datafication for the past decade or so. The following is not by far a comprehensive list or an entire review of the current research that engages with questions concerning datafication. Instead, I discuss and point out some concepts and directions where critical scholars have been discussing and exploring predominantly social consequences of extensive digitisation and datafication.

When it comes to ideology and systemic critique, there is body of research mostly inspired by Marx's class and capitalism critique as well as the Frankfurt school's critical theory approach both of which have been focusing on the intersections between late capitalism and digital technologies. It is not necessarily datafication as such that is in focus here, but rather capitalism as a hegemonic economic and social system that is constantly negotiated and renewed in new contexts and practices of digitised societies. One of the most popularised concepts in recent years has been *surveillance capitalism,* which emphasises the new logic of accumulation based on collection and commodification of personal data by corporations (Zuboff 2019). Also, concepts such as *digital discourse*, *digital labour* and *platform capitalism* emphasise the critical political economy of platform connectivity and the main actors of the digital economy as well as the power imbalances that drive them (Scholz 2013; Fuchs 2015; Sevignani 2015; Srnicek 2017). Among other, earlier, scholarly interventions that shed light on digital or platform capitalism, is the concept of *algorithmic ideology,* defined as a tool to understand corporate search engines (Mager 2012, 2014).

For instance, drawing on critical theory, Mager illustrates how capitalist value-systems manifest in search technologies, how they spread through algorithmic logic and become stabilised in sociopolitical contexts, often characterised by a techno-euphoric climate of innovation and politics of privatisation. This critical political economy perspective is also present in studies on digital workers, the gig economy, and in various forms of resistance and workers' emancipation under platform capitalism, such as collective commons and platform cooperatives (ÓRiain 2010; Lund 2017; Scholz 2023). It is worth noting here that the recent special issue of the *TripleC* journal has been dedicated to critical perspectives, including theory and praxis of digital capitalism and more specifically to the role that knowledge, communication and digital media play in this form of capitalism (Allmer, Arslan & Fuchs 2024). Overall, one could argue that it is particularly the critical political economic perspective that is central to this body of scholarly work. By emphasising the problems or glitches of the capitalist system, for instance in terms of accumulation and value extraction as part of the critique of the system, scholars suggest that inequalities and power relations remain central to understanding datafied societies. This is the case even though power relations in many cases are obscured by discourses of innovation, fairness and entrepreneurialism (cf. Sandoval 2020).

A slightly different, yet still techno-capitalist system-critical, is the approach by

scholars who focus on the continuous extraction of economic value from human life through data known as *data colonialism* (Couldry & Meijas 2019, 2023). Other similar concepts included here are, for example, *digital colonialism* (Kwet 2019), *decolonial turn* (Casilli 2017) and *technocolonialism* (Madianou 2019). This approach departs from the notion that "big data grabbing" practices or extraction of data by tech platforms and corporations resemble early stages of colonialism. In this new form of resource appropriation, it is not land or natural resources but rather data that is extracted from human practices, and which perpetuates power inequalities in the global economy. To understand this new stage of human, historical, economic and political development, we need to consider an integrated history of *both* colonialism and capitalism. The theory of global data extractivism directly links data extraction to capitalisms' colonial underpinnings. However, one of the main differences between colonial parallels today and then has to do with the nature of violence. In the absence of physical violence, the core of the *decolonial approach* to data research lies in emphasising the epistemic forms of violence (Couldry & Mejias 2023), namely the global asymmetries in economic, cultural and knowledge production (Casiilli 2017). This means that, for instance, data extraction is not solely an economic-profit-oriented endeavour, but is also employed as a mode of human governance. In other words, any decolonial and emancipatory struggle against this new mode of colonial power is as much a struggle over practices of technology as it is over human knowledge and rationality (Couldry & Meijas 2023:797).

Scholars who support this argument suggest that we are facing a decolonial turn in data and technology research followed by new modalities of oppression which are often inherent parts of seemingly smoothly operating technology design and use. A different take on the relationship between technology and society is offered in yet another critical strand of research which focuses on the algorithmic power and automation in the context of public service provision.

The idea that automation and datafication offer effective, neutral and objective solutions to social dilemmas and problems lies at the core of digital welfare and algorithmic governance. Demographic changes such as ageing populations, lack of qualified workforce, a strained economy and demands on local municipality services are often framed as a "care crisis" threatening future economic security. Consequently, welfare states, particularly in the Nordic context, are increasingly relying on digital technologies as a solution, offering more effective public governance and service provision (Cozza 2023). *Welfare technology* is a Nordic social policy concept, introduced to promote digitalisation and technological solutions to meet the social challenges facing Nordic welfare states (Frennert 2018). Scholars agree that welfare provision is currently undergoing major transformation, which implies the introduction of technological solutions supporting and enhancing welfare with the help of data (Kaun *et al*. 2023). Intensification of datafication is particularly present in elderly care where AI, algorithms, robotics and other digital devices, like surveillance cameras, are increasingly incorporated into daily care provision. Oftentimes health and social care provision are expected to be evidence-based and standardised, yet challenges with implementation and coordination persist (Gustafsson 2021). Critical scholars who study public welfare

provision and the *digital welfare state* emphasise, among other things, that digital transformation of the welfare sector is often marked by the competing logics of care and control (Zakharova, Jarke & Kaun 2024). For instance, Zakharova, Jarke & Kaun (2024) in the special issue on "Care-ful data studies" suggest that critical data studies and care ethics can inform new ways of understanding the ambivalences of data power in datafied societies. Others suggest that datafication of the welfare state implies new ways of decision making and assessment of needs. At the same time citizens have little impact on automated decisions, for example on risk scoring, fraud detection or social benefits applications (Velkova & Kaun 2019). This development of the welfare state where big data, mathematical models and algorithms issue decisions on citizens' lives has been coined as *political* rather than merely *technological* (Dencik & Kaun 2020:3, emphasis added). Similarly, politics, power and social impact are often mentioned in the context of algorithmic bias in the public sector (Kronblad, Essén & Mähring 2024), for instance as in the case of the Swedish Insurance Agency's silent large-scale experiments with predictive algorithms that resulted in false fraud predictions and discriminatory practices against women who applied for child support (Granberg & Geiger 2024).

Social categories such as gender, class, age, sex, ability and race are at the forefront of understanding how digital technologies reinforce different forms of inequity (Noble 2018; Benjamin 2019; Rosales, Fernández-Ardávol & Svensson 2023; Broussard 2024). For instance, Benjamin (2019) explores how new technologies reinforce racism. She introduces the concept of the New Jim Code, in which power lies in allowing discriminatory and racist codes to enter and operate "through the backdoor of tech design, in which humans create the algorithms hidden from view" (ibid.160). This means that in a context where automation and algorithmic connectivity are presented as neutral and objective alternatives to human bias, the social dimensions of technology and tech design are often rendered invisible. Consequently, ways in which we design the techno-material world not only reflect but also often reinforce social hierarchies and inequalities.

Following a similar pattern of machine and algorithmic bias, inequality and potential exclusion, scholars have identified *digital ageism* as a generative area of study (Rosales and Fernández-Ardèvol, 2020; Manor and Herscovici 2021). This type of bias is operating both on an individual level with stereotypes of older people as digitally incompetent, as well as on organisational and structural levels, resulting in strategies and tools embedded in the design and implementation of digital platforms. The ageist bias implicates for instance, designers and software engineers, the products they develop, algorithms they train, as well as the values of the tech industry which often discriminate against users with lower digital skills and marginalised backgrounds. Also, the role of technology has been acknowledged in a particular type of ableism, called *technoableism* (Shew 2023). It is based on the solutionist belief in technology, including digital technologies, as eliminating disability, while at the same time, under the guise of empowerment, it is suggested that the use of technologies to allegedly support disability reasserts existing biases. This specific strain of ableism, often inherent in

the workings of algorithmic power and code, "informs how we decide who is worthy, who is entitled or deserving and what justice means when it comes to technology and intervention" (ibid.9). One of the key concerns of critical studies of AI and algorithmic connectivity is the potential machine bias resulting in discrimination, oppression and marginalisation in these systems (Lindgren 2023).

What the analyses discussed above have in common, apart from being critical of the power dynamics of datafied society, is not necessarily only the critique of technology and big data phenomenon as such, but rather the *social consequences* and implications of technological development and change on different social areas such as work, lifestyle, social participation, in both private and public institutions. In a current global, transnational and interdisciplinary academic environment, there is perhaps less space for articulating discipline-specific problems, methods and questions and more need to define and explore common ground and shared spaces for understanding current problems, such as algorithmic connectivity and the increasing datafication of social life. One of the ways of doing so is to look beyond the glitch not as a minor mistake but rather the capacity of seeing inside into the system. It is not only about pushing the critical research agenda further but also about getting more insight into social actors' lives, to capture the variety of experiences, understandings and views on life in datafied societies. By focusing on the social impacts and consequences of datafication or implementation of technological solutions, critical scholars shed light on the systemic contexts in which technological solutions are developed and employed. From systemic issues of the capitalist and colonial legacies to digital welfare and various biases in tech, connections are made between what might occur as personal experiences of discrimination or exclusion and their systemic underpinnings. What we learn here is that social problems are manifesting inside sociotechnological systems and that they are not necessarily solvable with data and algorithmic patterns, how social patterns and meanings revealed in data tell us stories that could be otherwise.

So, what *more* can we learn from looking beyond the glitch? In the remainder of this article, I suggest some directions where sociologically informed critical studies of datafication might go further in exploring and making sense of social life in datafied societies.

What do the sociological imagination and glitch have in common?

Introduced in 1959 by C.W. Mills and described as a framework or ability to see the link between individuals and wider society, the concept of the sociological imagination has been popularised as a distinct sociological way of thinking about and understanding the social world (Mills 1959, cf. Aarons & Willis 2022). Having sociological imagination, according to Mills, means not only understanding humans as ultimately social beings but also being aware of the relationship between individual troubles and biographies and the larger social context of which they are part. In other words, it is about an understanding of how social issues that are experienced by individuals can be perceived in a larger and wider context of public or global issues. From this perspective,

the task of sociology is to identify social forces, often on the macro-scale, that furnish our "personal and private troubles into public concerns and issues" of society and history. For instance, it allows us to see the connection between how a "workplace accident" can be understood as an employer's practice of saving on production costs (Aarons & Willis 2022:6-57) or how daily "incidents" of racism or sexism relate to social power structures and ideologies. In this view, the sociological imagination is also about attentiveness to historical and cultural change, context and differences, and ultimately also about exposing naturalising discourses and thinking beyond taken-for-granted understandings. This approach is particularly important in the context of a growing trust in data, algorithms and digital technologies as effective and objective solutions to social problems and issues. At the bottom of the sociological imagination is the capacity to make connections between individual "troubles" and what may appear as merely glitches and the actual social structures, to see the power relations that lie beneath them. In other words, the sociological imagination can be helpful for sociologically informed analyses of datafication, or any other scholarship that focuses on understanding the datafied society.

Looking beyond the glitch means reinvigorating sociological imagination in numerous ways. It can mean to see "flaws" like racist, sexist or ageist bias as inherent elements of social structures. It can mean that when acknowledging new forms of data being generated, there is also the possibility of augmenting rather than replacing other research methods or design (cf Housley *et al*. 2014), because ultimately data can tell us different stories depending on where and how we look at it. It can serve as a reminder to see the people behind the data and machines by acknowledging the social agency of human actors while engaging a variety of publics in the process of collaborative knowledge production. Below I identify some of the areas where glitch could be employed as a productive perspective to further guide sociologically informed analyses of datafication.

Glitches in datafied systems

For over a decade, scholars have noticed that big data has questioned the established epistemologies of science (boyd & Crawford 2012; Hardy 2013). This has resulted in new forms of empiricism and turn towards a more positivistic approach of knowledge and science. Sociology as a research discipline is no stranger to these developments. Although usually big data projects have relatively little direct engagement with sociology as such, some argue that big data and its methods of analysis can support the praxis of doing sociology (Mützel 2015:3). Burrows & Savage (2014) mention the methodological challenges of empirical sociology facing the big data and the hitherto dominant "descriptive power of the social sciences" by suggesting that big data offer the possibility of understanding the social world in a way that was not possible previously. For instance instead of relying on the accounts of actions, based on observations or interviews, new methods of digital tracking based on big data extraction offer more unobtrusive insights into social actors' actions. They also suggest that we need to

reinvigorate the sociological imagination that is needed to grasp the complexities of data. We currently witness a variety of "new" and "old" research methods and even some struggles over those. Moreover, new data sources often bring different modes of "addressing the public, mobilizing expertise, conceptualizing the social, and research methodology" (ibid.5). In this sense, big data is challenging researchers' own authority to define what passes as social knowledge and how to understand it.

At the same time, others have pointed out the dangers of this "new data revolution" and the risks occurring when we start to (over)trust in data as synonymous with objectivity and truth. For instance, Kitchin (2014) calls big data approaches "disruptive innovations" that challenge established ways of doing research. He also emphasises that, as much as the big data analytics approach might be signalling the new paradigm for social sciences and humanities, it is even more important to acknowledge an epistemological approach that is reflexive and considers the situatedness, positionality and politics of social sciences. Similar points could be made about data itself, namely we are reminded that making sense of data is always framed and examined through a particular lens which has an impact on how it is interpreted (ibid.5). This is an important reminder, since as big data analytics have impacted social research, the critical perspective reminds us *not* to trust data at face value by welcoming and accepting different narratives and meanings. This means also, as Broussard points out (2024:2), that computers can merely calculate mathematical notions of fairness and that "mathematical truth and social truth are fundamentally different systems of logic". Every now and then we are reminded about glitches in the datafied systems that put too much trust in data and often reduce human lives to numbers and indicators. For instance, an attempt to introduce a brand-new electronic health record system in November 2024 in western Sweden has been met with protests from both patients and medical personnel, who worry it is putting more trust in IT expertise and potentially marginalising patients' and doctors' perspectives (cf. Falk 2024). Cases like this illustrate that data can only become meaningful if it is interpreted with the help of professionals like medical doctors, not IT data experts and systems developers. Also in research, we should not underestimate the importance of interpretive approaches that were once dominant in social sciences, such as sociology and anthropology. The classic notion of "thick descriptions" (Geertz 1973) invites scholars to gain access to the conceptual world of socially established structures of meaning, not necessarily to provide all the answers, but rather to make others' answers available. The symbolic dimensions of social action can hardly be examined with the help of big data analytics. Already in 1973 Geertz had been suspicious of data-driven epistemologies by saying that "I have never been impressed (…) with claims that structural linguistics, computer engineering, or some other advanced form of thought is going to enable us to understand men *without knowing* them" (Geertz 1973:323, emphasis added). Today, over fifty years later, when AI technologies are on the rise, this sentiment can still serve as a reminder that attentiveness to glitches can be productive and helpful in connecting the dots between the data, social practices and social actors behind them.

Seeing the people behind the machine

Despite the widespread notion that most digital technologies come from Silicon Valley, are flashy and working seamlessly, this is seldom the case. Most tech innovation and software are developed globally, outside of California. Cracks and breaks are an everyday occurrence rather than an exception. And yet corporate tech cultures tend to celebrate success and innovation rather than the workers who stay for maintenance, repair and preservation, and focus on delivering software that is "good enough" (cf. Bialski 2024). So far, much research within critical data studies has been focused on the "data elite" including data activists, hackers and knowledge workers (Schrock 2016; Lehtiniemi & Ruckenstein 2019). Attentiveness to glitches and cracks in everyday technology, including its developers, can be a useful way to shift focus towards more "regular" social actors and everyday life in datafied societies as well as to the materialities of digital infrastructures. It is also a question of shedding light on the social agency behind the machines.

Datafication is as much about the new regimes of control, discrimination and exclusion as it is about resistance to them, by feeding data back to users to enhance their agency. For instance, Kennedy, Poell & van Dijck (2015) argue that the question of social agency should be central to our engagement with big data because "data subjects may be citizens or consumers, professionals, or amateurs, conscious hackers or unwitting bystanders as data streams increasingly direct our everyday lives" (ibid. 6). Also, Couldry and Powell (2014) urge for a more agent-focused big data perspective with space to examine how social actors make use of, for example, their online presence, by producing online content; but also how data is produced without users' consent or at least deeper insight into the data extraction process. In other words, the big data approach from the bottom up implies understanding that individuals and their private troubles are inherently connected to the public issues that these individuals are experiencing and are subjected to. Here again, attentiveness to glitches can be useful for examining data versus agency entanglements, risks and gains as well as opportunities of data sharing and creating.

Additionally, one can emphasise social agency by making use of social actors' own point of view and sense of justice. This is the approach suggested by Boltansky (2011) in his sociology of critique approach which refocuses scholarly attention on actors *en situation* (ibid. 24). Boltansky argues that "by adopting the viewpoint of the actor, the sociologist can in fact cast a normative glance at the world, without it being guided either by her personal prejudices (…) or by the adoption of a substantive moral philosophy" (ibid. 30). In his understanding of critique as a motor of transformation, Boltansky emphasises the fact that social critique can pinpoint the gaps (or glitches) between what the given system or innovation *promises* and what it is able to *deliver*. This approach can be particularly useful when, for instance, examining and evaluating the actual impact of various automation systems implemented in the context of public service provision of the digital welfare state or technology users' own understandings and experiences of digitisation or datafication (cf. Kania-Lundholm & Torres, 2018).

By employing such an approach, scholars can not only expand their empirical horizons by focusing on social agency, but also become more sensitive to questions about living in datafied, automated societies and how social actors continuously, and not without challenges, navigate them.

Glitch as the catalyst for public knowledge and awareness

In has been over twenty years since 2004 when sociologist – then president of the American Sociological Association (ASA) – Michael Burawoy delivered his speech calling for a disciplinary embrace of public sociology (cf. Burawoy 2005). Although he was not the first one by far to engage in the emancipatory and critical practice of public sociology, his task was to reinvigorate this branch of sociology and encourage colleagues to engage with issues that were, at the time, relevant for both public and political concerns. One of the main missions of public sociology, according to Burawoy, has been to revitalise the discipline from within by addressing different audiences and important public issues with the goal of defending and strengthening the institutions of civil society against the encroachment of both state and market. At the heart of engagement with public sociology has been the type of critique that invites the sociological imagination to pose questions about what has been, what is, but also what could be in the future and imagine what could be otherwise. Today, over twenty years after Burawoy's call, facing the "age of big data" we are perhaps even more than ever in need of public sociology and engagement touching upon contexts, conditions and most importantly, consequences of datafication.

One of the current challenges is not only the rise of new forms of control and the imperative to reimagine the infrastructural arrangements that support it, but even more importantly, the knowledge production and practices with which they are associated (Andrejevic 2013:165). This implies, for example, new challenges but also opportunities that emerge in relation to new forms of user-generated and naturally occurring social data. Since disciplinary boundaries have become increasingly porous, sociology's place and role in critical data studies has been previously acknowledged in the context of the Collaborative Online Social Media Observatory (COSMOS), an open platform for social data analysis providing resources for public sociology, based on citizen participation (see Housley *et al*. 2014). Issues of public concern such as data privacy, state or corporate control and surveillance that have become matters of public sociology require collaborative knowledge production practices and engagement by multiple publics including scientists, journalists, activists, community members and others. It also asks for collaboration across a variety of disciplines stretching across philosophy, sociology, political science, media studies, geography, computer science, engineering, law and other professions working at the intersection of technology and society. Examples of an ongoing work include *The Algorithmic Justice League* (ajl.org) whose mission it is to "raise awareness about the impacts of AI, equip advocates with empirical research, build the voice and choice of the most impacted communities, and galvanize researchers, policy makers, and industry practitioners to mitigate AI harms

and biases". Other initiatives include *European Digital Rights Watch* or a UK- based *Open Rights Watch*, both working to protect citizens' right to privacy and free online speech.

These and many other initiatives start with the notion that it is the citizens' right and responsibility to stay informed and up to date with AI developments, to shed light on often hidden social implications and harms that AI brings. In other words, to peek behind the, sometimes random, glitches and cracks that come to the surface.

The task of public sociology in the context of datafied societies could be to provide guidance, critique, conceptual and analytical tools allowing us to look "beyond the glitch" into the social structures and power relations of technological systems. It can mean reinvigorating the classical technology critique and such concepts as *technological rationality* (Marcuse 1982 [1941]). Doing public sociology can also mean making noise and raising awareness about the already ongoing work on tech equity projects, like the ones on algorithmic accountability and audit (Donovan *et al*. 2018; Brown, Davidovic & Hasan 2021), data justice (Dencik *et al.* 2019), AI ethics (Crawford & Schultz 2024) and public interest technology (Broussard 2024). Last but not least, the task could be to continue contributing to the social scientific critique of the "computational turn" (cf. boyd & Crawford 2012) by recognising that technological innovation and social progress are not necessarily always synonymous with each other. In this context, it is important to remember that, as Broussard says "[i]nnovation and social progress are not the same thing. Using more technology does not bring about social progress if the technology causes algorithmic harms or reverses hard-won civil rights advances" (2024:172). This is an important reminder when considering various technological solutions to socially relevant problems and even more importantly the tasks for public sociology to engage with.

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It is virtually impossible to underestimate the social impact of technological innovation and advancement in technical communication over the past decades. A common denominator of what has been defined as digital or datafied society is often the "unprecedented speed" of data and information flow through global networks (Redshaw 2020). The speed of social change that accompanies these developments progresses at a much slower pace, and yet in public discourse, tech innovations are often rendered effective and useful tools in dealing with numerous social issues or problems such as crime prevention, public decision making or predictive analytics of networking platforms. In most cases these technologies and the results they deliver are taken for granted, and materialise in algorithmic recommendations, citizen profiling or sophisticated language models that can answer random questions on the internet. However, when things go wrong, the "slips" or "glitches" that are at times an easy technological fix become symptomatic signs of the social impact of technologies themselves and/or of the social conditions and structures under which they were designed.

In one of the cult scenes of the classic action sci-fi film *Matrix* from 1999, the main

character Neo encounters the same black cat twice in a matter of a few seconds and suspects he has just experienced a *déjà vu* moment. He is quickly made aware of that it was possibly "a glitch in the matrix that happens when they change something". The phrase "glitch in the Matrix" has become pop cultural shorthand for an occurrence that is unusual and cannot be logically explained, something that does not quite match what we know about the reality around us. Glitch also generates an eerie feeling that something is not quite right, even though we perhaps have difficulty articulating what is wrong. It is a reminder that technological systems do break, are never flawless and as smoothly operating as some would like us to believe. As the critical scholarship discussed in this article has shown, looking beyond the glitch is more than just pointing out the brokenness, even though it often begins there. By raising awareness about algorithmic biases, problems with datafied systems' reliability, platform economies, social/digital inequalities and the broader consequences of algorithmic governance, scholars offer a critique that implies potential for change and transformation. Looking beyond the glitch becomes not only seeing more than just flaws on the surface, but also becomes a sociological imperative to once again reimagine technologies with and for people.

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Author presentation

Magdalena Kania-Lundholm is an Associate Professor and Lecturer in sociology at Dalarna University.
Contact: mkd@du.se

Recensioner

Katherine Harrison, *Behind the Science: The Invisible Work of Data Management in Big Science*, Bristol University Press 2025.

Behind the Science: The Invisible Work of Data Management in Big Science is a book about a neutron-scattering facility in Lund, and in particular their data management practices (as told by data scientists); or in Harrison's own words, a book "on the technical and organisational challenges involved in selecting, connecting, and aligning the software and hardware that must deliver the brand new 'valid' data" (p. 8). If data is so essential to the scientific outcomes of these facilities, why has data management remained largely invisible – both in scholarly discussions and within the facilities themselves? And why does this invisibility matter for the way knowledge is produced at Big Science institutions like the European Spallation Source (ESS)? These are the questions Harrison's study seeks to shed light on with the help of the two concepts: *invisible work* and the *black box*.

Invisible work is a term that encompasses the intricate processes of adaptation, translation, and alignment that users (at some level) undertake to make technological systems functional. Invisible work thereby represents the additional cognitive and practical efforts required to bridge potential gaps between technological design and actual usefulness, revealing how professionals and users reshape their contexts and activities to accommodate these new technologies. The concept is particularly significant because it illuminates the hidden labour that creates organisational value while remaining systematically unacknowledged. The concept of invisible work serves as a bridge between critical data studies and science and technology studies (STS). But why not include critical studies of algorithms as well? We find ourselves wondering: What is the difference between algorithm studies and the study of data processed by machines? Why focus solely on data management? What about other instantiations of data, such as visualisations, models, algorithms, or information architecture?

The black box (or "blackboxing") is a somewhat related metaphor, originally introduced by Bruno Latour in STS. Derived from cybernetic theory in the 1940s, the concept deals with processes where input and output are central, but where intermediate processes are less visible. To "open a black box" means to examine the hidden aspects that appear neutral and self-evident, but which, upon closer examination, turn out to contain a complex history of claims, policies, and positions. The more user-friendly an artefact appears to be, the more difficult it is to examine its development history,

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which obscures much of the work required to create it. Latour advocated "opening" the black box through historical reconstruction, which means studying artefacts before they become closed and stable. Here, Harrison had a unique opportunity in her study to examine the black box before it closed as the studied facility was literally under construction. This potential openness made it easier to recognise the invisible work being done, as it had not yet become hidden as part of the infrastructure, which otherwise often happens once everything appears to run smoothly and the black box is closed.

As such, the book is built on a study that Harrison did in conjunction with the establishment of ESS and in particular the Data Management and Software Centre (DMSC). DMSC is used as the primary source of information for understanding how infrastructural decisions reflect and shape knowledge-producing practices in Big Science. Harrison defines (New) Big Science as follows: "The term is often now associated with any kind of scientific endeavour involving large, geographically distributed research teams producing or curating large data sets, and not necessarily tied to a single facility or institution" (p. 7). Big Science is thus a global spectacle with an international audience in a fiercely competitive and costly arena, as Harrison says: "Money, expertise, people and equipment flow into the ESS. Data flows out" (p. 8)

So, what are the *practical* consequences of these observations of (mis)managed data? What does it *matter*? What are the (hidden) *purposes*? Harrison makes a point out of the fact that the study sits on two chairs, telling two parallel stories; one that regards raw data as an oxymoron and one where it is a precondition for conducting proper science (p. 32).

The empirical data most readily visible to the reader comes from interviews, mainly with individuals in leadership roles within the previously mentioned part of the organisation known as DMSC. A total of seven people were interviewed once a year over three years (2015–2017). The interviews focused on three themes: organisational and production patterns; practices; and artefacts, which also form the basis for three empirical chapters in the book. Harrison carefully highlights the limitations of the study, noting that this particular methodological approach and selection can only provide a snapshot of the complexity and diversity involved in data management.

Harrison goes on to examine the "data flows" managed by DMSC, tracing the journey of data (Leonelli 2016) from the experiments conducted to the end users who engage with the generated data. The data takes its journey across various software and hardware instances, and a key example of this is Kafka – an open-source software designed to handle and store streams of data. This software must be aligned and integrated with other systems to ensure that data flows as smoothly as possible. This synchronisation process (or alignment work), which involves both humans and machines, also requires data to be adapted for different "relays" and recipients within the network. At its core, this process concerns the precision and categorisation with which a given instrument measures something – a fundamentally Baradian perspective (2003, 2007). The informants navigate between presenting data as "raw" or unaltered (primarily when it has only been processed by machines) and acknowledging that some data may be lost or renegotiated (especially when handled by humans). While

this is neither new nor unique to the ESS, Harrison makes it clear that "tidying up" is not merely an innocent act of organisation; it actively shapes how data is interpreted, understood, and legitimised within scientific practices.

Harrison further demonstrates how data management in Big Science is becoming increasingly professionalised. In the past, software development and data handling were managed informally, often by individual researchers within a research group. However, as datasets grow larger and more complex, specialised technical expertise is now required. As such, gatekeeping and protecting through boundary work (Gieryn 1983) would have been interesting as an analytical lens. Harrison examines both the standardisation and commercialisation of data management software, as well as the professionalisation of data handling as an occupation. While the book argues that traditional boundaries are dissolving, the divide between scientific and technical work has never been as clear-cut as much research seems to suggest – especially if you ask the technicians. The boundaries that do exist are likely already well known to those involved and are maintained through both invisible, routine labour and deliberate strategic demarcations.

Still, Harrison presents a valuable research overview highlighting how the role of technicians in scientific and knowledge production has often been overlooked. However, it remains unclear how the debate she engages in – between technicians and scientists – differs from similar discussions in other fields, or how it fundamentally impacts knowledge production itself. Instead, the primary effect seems to be about access to funding and visibility in academic publications. Data management professionals perform skilled craftsmanship when they "cook" data, yet they place great importance on keeping the data "raw". In doing so, they themselves contribute to the invisibility of this work. This makes us wonder about alternative ways to describe this professionalisation. To us, it sounds more like a commercialisation and commodification of science, where research unfolds within a market at every stage of the data's journey.

By the end of the book Harrison has returned to the intriguing concept of "rawness" in the data produced by ESS. The central debate revolves around whether data is inherently mediated and influenced or can exist in an unaltered, "raw" state. Harrison argues that behind-the-scenes processes at DMSC impact data production, raising questions about transparency. While transparency (at least in terms of data) might benefit experts, it could arguably also overwhelm most audiences. Harrison resolves this tension by focusing on how group leaders at DMSC perceive, modify, and negotiate data "rawness". To us, their discussions echoe clearly of Karen Barad's theoretical framework, which includes concepts such as phenomena, apparatus, and cuts, as the chapter highlights that "rawness" is context-dependent (situated), shaped by tools, processes, purposes, and intended audiences.

Data itself is something that remains undefined in the book – what exactly is data? Computation consists of both data and algorithms, so drawing sharp distinctions between different fields (e.g., critical data studies (CDS), STS on science, algorithmic regimes) may be misleading. After all, computers are fundamentally algorithmic data processors. As such, we would love to see a follow-up book by the author exploring concepts, their trajectories, and the invisible work behind these.

The title of this book might lead readers to expect Harrison to unveil the hidden mechanisms of Big Science with a dramatic: tada! – revealing the machinery that sustains its magic as truth. And as such to burst out: "I told you so: 'raw data is an oxymoron and a bad idea' (Bowker & Star, 2000; Gitleman, 2013), and it is always shaped by management procedures, practices, and technologies – and thus always already cooked." And yes, Harrison does indeed do this (even though this is not her primary goal), but she also does something more – something subtle and nuanced. She does reveal the invisible labour of data management in Big Science, which may not come as a surprise to CDS or STS researchers. However, what makes her approach distinctive is that, as we trace the journey of data through the Big Science facility, we also follow Harrison's own journey. We particularly appreciated this aspect of the book. The book is written with a clear well-organised structure that makes the project journey easy to follow. The writing is both enjoyable and exemplary in its simplicity, relying on just two key concepts – black box and invisible work – without introducing unnecessary neologisms. Harrison's study not only brings much-needed attention to the hidden labour of data management but also offers a thoughtful examination of how knowledge infrastructures take shape through daily practices. With its clear structure, engaging writing, and well-grounded theoretical approach, the book is a valuable resource for anyone interested in the intersections of data, technology, and scientific work.

Lina Rahm and Jörgen Behrendtz

Lina Rahm is an associate professor in the History of Media and Environment with specialization in Artificial Intelligence and Autonomous Systems, at KTH.

Jörgen Behrendtz is professor in media studies at Stockholm University.

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Pawson, Ray. *How to think like a realist. A methodology for social science.* Cheltenham: Edward Elgar 2024.

Ray Pawson är sociolog och professor emeritus i Social Research Methodology vid Leeds universitet. Han har gjort sig känd för att ha utvecklat nya sätt att göra utvärderingar av olika politiska handlingsprogram (Pawson & Tilley 1997, Pawson 2006), varvid han bildat skola (t.ex. Greenhalgh 2014). I grunden består förnyelsen helt enkelt i att han utvecklat den vanliga frågan ”vad fungerar?” till ”vad fungerar för vem under vilka villkor?”. Pawson har alltid påpekat att han utgår från en realistisk ontologi i sin forskning, och i den här boken går han utförligt och systematiskt igenom vad det betyder när det gäller några basala samhällsvetenskapliga frågor. Han är också mycket generös med att återge studier och undersökningsresultat för att illustrera sin argumentation, inte bara från samhällsvetenskap utan också från naturvetenskap. Härvid presenterar han till exempel på bara några sidor en givande analytisk historik av fallstudiens utveckling. Därtill är boken skriven med en god portion humor, något som annars är en bristvara i sociologins texter.

Pawson strukturerar boken i tre delar, som avhandlar varsitt grundläggande ontologiskt och metodologiskt begrepp inom all vetenskap: kausalitet, objektivitet och generalisering. Varje del innehåller korta kapitel och alla kapitel avslutas med en liten pedagogisk reflektion över vilka lärdomar vi kan dra av innehållet.

I del 1, som alltså handlar om kausalitet, utgår Pawson från en distinktion mellan två sätt att tänka om orsaksrelationer. Enligt det ena sättet att tänka är kausalitet en följdverkan: händelsen A inträffar och får till följd att B händer. En orsak är en succession av händelser, så som det till exempel framställs inom positivismen. Det andra sättet att tänka är den realistiska förklaringen, som bygger på uppfattningen om underliggande mekanismer vilkas verksamhet kan leda till en viss effekt under särskilda omständigheter. I stället för A→B är formeln här M+K=R, uttytt så att en Mekanism som utlöses i en viss Kontext medför en tendens till ett visst Resultat. Kontexten utgörs av en existerande struktur, mekanismen är en individuell eller kollektiv mänsklig handling och resultatet någon form av regelbundet mönster. Kontextens beskaffenhet avgör om mekanismen över huvud taget utlöses, samtidigt som det eventuella resultatet är mer eller mindre tillfälligt – vad som kallas en demiregularitet. Pawson betonar härvid att allt i samhället förändras oavlåtligt, varför förklarande teorier om mekanismer, kontext och resultat också måste vara föränderliga.

Resonemanget i del 2 om objektivitet är förmodligen det mest kontroversiella och komplicerade. Utgångspunkten är dels en kritik av empirismens idé om att data är neutrala och består av objektiva observationer, dels konstruktivismens tanke om att sanningen är subjektiv och utgörs av vad som anses sant i ett visst socialt sammanhang. Världen kan beskrivas på oändligt många sätt, framhåller Pawson, och ingen beskrivning är neutral. Data kommer inte till genom insamling, utan konstrueras i relation till teori. Data är oundgängliga för all vetenskap, men leder inte själva fram till objektivitet. Utan ett bestämt syfte är data meningslösa. Syftet med belägg är att utveckla, pröva och förfina teorier. Det är genom teori, inte data, som förklaringar skapas. Däremot

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kan vi gräva fram (*excavate*) den teori som ligger bakom en viss uppsättning data, för att jämföra den med den teori som vi själva formulerat. Det första steget mot att åstadkomma objektivitet är alltså att gräva fram teori ur befintliga data och sedan att jämföra olika teoriers relativa styrka i förhållande till förklaringen. Därigenom kan vi i ett tredje steg bygga upp ett nätverk av relevanta teorier för att uppnå syftet. Slutligen handlar det om att utnyttja den kultur av organiserad skepticism som hela den akademiska granskningsapparaten utgör. Ingenting garanterar objektivitet, men på det här sättet kan vi närma oss den.

I fråga om generalitet (del 3) urskiljer Pawson två typer. Den ena kallas enkel generalisering och rör sig från del till helhet. Det främsta exemplet är kvantitativa urvalsstudier, där tanken är att empiriska mönster i ett urval gäller för hela populationen. En annan benämning är därför empirisk generalisering. Den andra typen går från en till många genom att konstruera en teori som kan förklara likheter och skillnader mellan en stor mängd fall. Den går därför under benämningen utbredningsgeneralisering med vad som även på svenska kallas *middle range*-teori som prototyp. Ett annat namn är därför teoretisk generalisering. Pawson avfärdar den förstnämnda som tids-, plats- och kontextberoende. Samhället förändras ständigt och resultaten blir högst begränsade utan någon möjlighet att följa förändringarna. Den sistnämnda innebär å sin sida att man utvidgar och prövar substantiella teoriers räckvidd genom att jämföra förklaringar inom och mellan fall. Detta är enligt Pawson realismens strategi, varvid teorin kan förändras. Utgångspunkten är jämförelser av likheter och olikheter inom ett fall, och dessa kan ge upphov till en uppsättning provisoriska teorier för att förklara dem. Teorierna ligger till grund för jämförelser med andra fall. Dessa kan inte förklara de respektive fallen som helhet, utan inskränks till en och samma företeelse eller process som förekommer i samtliga fall. Här är det emellertid viktigt att uttryckligen ange vad som *inte* förklaras i respektive fall, det vill säga att markera var teorins gränser går – något som Pawson kallar stoppregler. Det är alltså på detta sätt som teoretiska generaliseringar byggs upp, inklusive vad som inte ingår i generaliseringen.

Det verktyg som ska åstadkomma sådana förklarande generaliseringar är *middle range*-teorier. Väl att märka ligger sådana teorier inte mellan mikro- och makronivån, utan mellan olika abstraktionsnivåer. De placerar sig mellan hela systemteorier och operationella definitioner. De kan därmed befinna sig var som helst på skalan mellan mikro och makro, från enstaka individers personlighetsstruktur till kapitalismens historiska utveckling. De antar en om–så-form: Om den här mekanismen finns i den här kontexten, så finns en tendens till det här empiriska mönstret. Men om det rör sig om en annan mekanism eller en annan kontext, så framträder ett annat mönster. Generaliseringen görs genom att fler och fler fall tillförs där samma förklarande teori kan tillämpas.

Det jag återgivit är bara lite av grunderna i Pawsons rika och systematiska argumentation, samtidigt som jag inte alls kunnat göra rättvisa åt hur välskriven och pedagogisk boken är. En brist är dock att Pawson inte definierar ”realism” inom samhällsvetenskapen. Det är en svaghet eftersom realism inte är en monolit. Både Pawson och jag kallar oss realister och därmed har vi vissa likheter. Vi är till exempel båda motståndare

till radikal relativism, som postmodernism (när den fanns) och poststrukturalism. Vi tycker om att påpeka att sådana ontologiska uttalanden som ”det finns ingen sanning”, ”det finns ingen objektivitet” och ”det finns inga fakta” i praktiken är högst ologiska genom att påstå att ”det är sant att det inte finns någon sanning”, att ”objektivt sett finns ingen objektivitet” och att ”det är ett faktum att det inte finns några fakta”. Vi tar också båda starkt avstånd från den typ av realism som går under namnet positivism. Samtidigt kritiserar Pawson den typ av realism som jag hyllar, kritisk realism (Danermark m.fl. 2018), trots att jag kan hålla med om det mesta som Pawson säger och utan problem inlemma det i kritisk realism (se t.ex. Ackroyd & Karlsson 2014).

En liten men irriterande brist är att även om boken är välskriven, så är den dåligt korrekturläst. På något ställe blir konsekvensen till och med att innebörden av en mening förvanskas.

Pawson är pessimistisk beträffande möjligheten att övertyga icke-realister om realismens förtjänster. Han talar till exempel om dem av sina kollegor som ”avfärdar varje intresse av kausalitet, förnekar varje behov av objektivitet och hånar möjligheten att generalisera. De är utom räddning. Jag försöker inte omvända dem” (s. xviii). Själv är jag lite mer optimistisk. Jag menar att icke-realister kan låta sig utmanas av Pawsons argumentation och till och med ha nytta av några av hans konkreta råd i sin forskning.

Pawson sammanfattar sitt budskap i några meningar som han ser som så betydelsefulla att han avslutar såväl förordet som efterordet med dem: ”Realism förser samhällsvetenskapen med den optimala metodologin, som tillhandahåller objektiva och generaliserbara kausala förklaringar. Kausalitet förstås genom generativa mekanismers verksamhet. Objektivitet uppnås genom avdömande mellan konkurrerande teorier. Generalitet fångas genom *middle-range*-teorier. Realismen ger konkret form åt vetenskapen i samhällsvetenskap. Men den är ofullkomlig.” Så sant som det är sagt, så jag hoppas att boken får många läsare.

Jan Ch Karlsson
Professor emeritus i sociologi vid Avdelningen för arbetsvetenskap
Karlstads universitet.

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Daniel Hedlund, Dennis Martinsson och Kavot Zillén (red.), ***Sammanhållning eller splittring? Olikgörande av barn och unga i samtidens Sverige.*** **Jure Förlag 2024.**

Hur påverkas barn och unga i en tid av polarisering, när auktoritära stater växer sig starkare, när nationalistiska och främlingsfientliga krafter flyttar fram positionerna och när demokratin hamnar i försvarsställning? Blickar vi tillbaka på historien och gör ett nedslag någonstans mellan det första och andra världskriget, går det i flera texter att läsa om hur progressiva reformivrare och experter kopplar ihop den typen av frågeställning med barns och ungas villkor och välfärd. Barns frihet och individuella rätt sågs som betydelsefulla delar i byggandet av ett demokratiskt samhälle som skapade gemenskap och sammanhållning. Det ställdes mot det auktoritära – mot disciplinering, tvång och bestraffning, som i förlängningen ansågs leda till splittring mellan människor. Det var tankegods som både bar spår av Ellen Keys idéer och hade stöd i tidens barnpsykologi. Det var en del av kunskapsförmedlingen samtidigt som det var direkt riktat mot dåtidens politiska samtal (Löw 2020).

När vi nu befinner oss i 2020-talet har samhället givetvis förändrats. Men den inledande frågan är i allra högsta grad giltig i vår samtid, och när jag läser antologin *Sammanhållning eller splittring? Olikgörande av barn och unga i samtidens Sverige* är det just den som skvalpar i bakgrunden. Boken tar avstamp i de förslag, reformer och lagar inom områden som migration, integration och kriminalitet som under de senare åren gått i en riktning där lösningen på formulerade samhällsproblem anses vara tvång, kontroll och bestraffning. Författarna studerar hur detta både direkt och indirekt påverkar barn, unga och deras familjer genom att följa sådant som särskilt fångas av politikens strålkastare: ungdomar med utländsk bakgrund och områden med låg socioekonomisk status, det vill säga förorten eller så kallade utsatta områden. Och på samma gång som antologin lämnar bidrag till forskningssamhället riktar den sig mot det politiska samtalet. Som redaktörerna själva skriver är förhoppningen att antologin ska kunna fungera som ett ”kunskapsstöd av politiskt verksamma, men också som utgångspunkt för reflektion över den riktning som det svenska samhället befinner sig i och vilka konsekvenser det kan få för barn och unga samt vår gemensamma framtid” (Hedlund, Martinsson & Zillén 2024:27).

Vi lever i en tid då barns rättigheter intar en plats i det offentliga samtalet. Det syns inom forskning, politik, förvaltning och civilsamhälle. Utvecklingen har förstärkts av att FN:s barnkonvention sedan 2020 blivit en del av svensk lag. Därigenom har samhället ålagts ett större ansvar att respektera och främja barns rättigheter, något som ska genomsyra såväl myndighetsutövning som lagstiftning. Barns bästa ska beaktas i alla beslut och åtgärder som rör dem. Men denna utveckling till trots beskriver antologin en situation där politik om barn och unga (och barns rättigheter) knyts till en alltmer repressiv politik. Detta har sin grund i flera av de förslag och beslut som kanske blivit allra mest signifikativa för Tidöavtalet, den överenskommelse som vår nuvarande regering har slutit med Sverigedemokraterna. Överenskommelsen har markerat en tydligt hårdnad linje inom migrations- och kriminalpolitik samt en kravställd integration och

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välfärdspolitik. Genom att samla forskare från olika vetenskapliga fält, discipliner och traditioner blickar antologin ut över de konsekvenser denna utveckling har haft, eller riskerar att få, för barn och unga.

Antologin innehåller 14 bidrag, inklusive en introduktion av redaktörerna och ett efterord, uppdelade på sex delar. Efter den första introducerande delen, där studiens ramverk och övergripande syfte skisseras, får vi i del två ta del av tre bidrag under rubriken ”Olikgörande välfärdsinsatser”. Här behandlas olika aspekter av barns rättigheter och välfärd i Sverige, med fokus på strukturell diskriminering och exkludering, samt hur rätts- och socialpolitiska åtgärder påverkar barns livsvillkor. I det första bidraget behandlas hur förslaget om informationsplikt (den så kallade angiverilagen) står i strid med barnkonventionens principer, särskilt med avseende på dess krav på icke-diskriminering och likabehandling. Vi kan därefter läsa om hur hårdare migrationspolitik och sämre resurser för kommuner har lett till minskat stöd och ökad utsatthet för gruppen ensamkommande barn. Här illustreras en negativ särbehandling och hur rättigheter för vissa barn gradvis urholkas, vilket riskerar att förstärka segregation och sociala problem. Delens sista bidrag lyfter fram risken för stigmatisering och strukturell diskriminering när välfärdsinsatser såsom utökade hembesöksprogram riktade till familjer i socioekonomiskt utsatta områden blir en del av integrationspolitiken i stället för en generell välfärd för barns hälsa.

Den efterföljande tredje delen, ”Plats och gräns”, vänder blicken mot hur unga själva uppfattar sina livsvillkor i förorten, inte minst genom den exkludering och stigmatisering som sker på grund av den problembild som ligger som ett skynke över det geografiska området. I delens första kapitel behandlas hur rörelsefrihet kan stärka ungas urbana medborgarskap. Samtidigt diskuteras hur negativa förortsrykten och politiska förslag som säkerhetszoner begränsar ungas rörlighet och hur dessa begränsningar kan skapa hinder för deras delaktighet och bidra till en känsla av utanförskap. I det efterföljande bidraget, som utgår från intervjuer med ungdomar, visas hur den negativa (själv)bilden av områdena kan utmanas. Kapitlet handlar om teater i mångkulturella förorter vars föreställningar väckt samhällskritiska tankar och gett ungdomar möjlighet att reflektera över sin plats i samhället och stärka sin känsla av gemenskap. Delen avslutas med ett bidrag som behandlar hur kommuner använder lokal bostadspolitik för att styra mottagandet av nyanlända och hur detta påverkar barn, unga och deras familjer. Kapitlet belyser kopplingen mellan nationella reformer och lokala praktiker med fokus på bostadens betydelse för integration och rättigheter.

I antologins fjärde del, ”Språk och kultur”, ingår två bidrag, av vilka det första lyfter fram hur språkkrav, språkscreening och förändrad syn på modersmålsundervisning kan kopplas till migrations- och integrationspolitik. Därigenom visas hur frågor om språk ingår som en del av en exkluderande diskurs som särskiljer och kategoriserar människor utifrån deras språkliga bakgrund. I det andra bidraget förs en diskussion om begrepp som kultur, familj, släktskap och heder ur ett antropologiskt perspektiv. I kapitlet fokuseras på hur diskussioner om släktskap och uppfostran påverkas av migration och hedersbegreppet. Författarna analyserar och problematiserar hur antaganden

om begrepp som heder, hedersvåld och hedersförtryck ofta framställs som kulturellt specifika utan hänsyn till dess komplexitet.

Den femte delen, ”Skydd, tvång och kontroll”, inleds med ett bidrag som undersöker varför ungdomsfängelser skulle innebära en förändring i hanteringen av barn som begår brott och hur detta förslag reflekterar den politiska utvecklingen. Utöver en synnerligen välskriven teoretisk diskussion utifrån Bourdieu lyfter kapitlet fram konsekvenserna med att låsa in unga människor. Delens andra bidrag fokuserar på den politiska trenden att öka de tvingande och auktoritära inslagen i den sociala barnavården. Kapitlet diskuterar det rimliga i att skärpa lagstiftningen, tillämpningen av tvångsvård för ungdomar och de möjliga konsekvenserna för det sociala arbetet med utsatta ungdomar och familjer. Det tredje bidraget utgår från upplevelsen av godtyckliga polisära ingripanden som sker i områden där polisen ofta misslyckas med att skydda invånarna mot våld. Författaren diskuterar den ojämna geografiska fördelningen av utsatthet för kriminalitet och att polisens insatser ofta riktar sig mot rasifierade grupper. I delens fjärde bidrag diskuteras de negativa attityder och fördomar som uppstod i Sverige efter flyktingmottagandet 2015, särskilt i fråga om migration och kriminalitet. Kapitlet belyser liksom andra i antologin rätten till icke-diskriminering som en grundläggande rättighet, skyddad av bland annat barnkonventionen, och hur den kan hotas när unga blir olikbehandlade i rättssystemet.

I efterordet som utgör antologins sista del frågar sig Tommy Lundström, professor i socialt arbete, om hans bidrag skulle ha kunnat heta ”En bra bok i en dyster tid?” eller ”En nödvändig bok i en dyster tid?”. Han tycks landa i att båda förslagen ger en rättvisande beskrivning av antologin, men har valt att döpa efterordet till ”En dyster bok i en dyster tid?”. Och det är onekligen en bekymmersam bild som målas upp i flera av bokens bidrag, delvis som en följd av att de ligger inom det område som belyses av politikens (läs: Tidöavtalets) strålkastare. Sådant som eventuellt skulle ge en mer optimistisk bild av utvecklingen i städernas förorter eller i så kallade utsatta områden, och de initiativ som tas i såväl kommunernas som civilsamhällets regi, faller utanför antologins fokus. Ett undantag som till viss del bekräftar detta är det bidrag som handlar om ”Teater och hoppet om förändring”.

Joel Löw
Biträdande lektor vid Tema Barn, Linköpings universitet

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Henrik Fürst & Erik Nylander. *The value of art education: Cultural engagements at the Swedish folk high school.* Palgrave MacMillan 2023.

Henrik Fürsts och Erik Nylanders kultursociologiska monografi *The value of art education. Cultural engagements at the Swedish folk high schools* utgörs av totalt åtta kapitel som på olika vis riktar fokus mot den svenska folkhögskolans konstnärliga utbildningar. Teman som tas upp är olika utbildningars ekonomiska respektive kulturella värde, folkhögskolans institutionella karaktäristika, konststudenters sociala dispositioner, de konstnärliga folkhögskoleutbildningarnas antagningsprov och grindvakter, vad som händer i verksamheten samt hur lärarna på utbildningarna själva kombinerar undervisning på folkhögskola med karriärer som frilansande kulturarbetare.

Den fråga som utforskas i boken lanseras redan som en slags övergripande rubrik i det inledande kapitlet: Vari består egentligen de konstnärliga utbildningarnas värde? I bokens upptakt problematiseras denna fråga i relation till den påtagligt osäkra arbetsmarknad som en konstnärlig utbildningsväg leder till. Samtidigt, skriver Fürst och Nylander, fortsätter de konstnärliga utbildningarna ständigt att attrahera nya studenter, trots samtidens politiska ambitioner om att all form av utbildning i första hand ska leda till nytta och anställningsbarhet. Det är detta mysterium som Fürst och Nylander tar sig an i den ungefär 180 sidor tjocka boken, vars syfte är att avtäcka vilka värden deltagare och lärare på folkhögskolor tillskriver konstnärlig utbildning och hur dessa i sin tur bidrar till att forma folkhögskolans konstnärliga praktik.

Empirin i boken är eklektisk och bygger på statistik och kvalitativa intervjuer såväl som utdrag ur skönlitterära skildringar av folkhögskolemiljöer. Teoretiskt vänder sig författarna bland annat till den postbourdieuska sociologi som formulerats av de franska sociologerna Luc Boltanski och Laurent Thévenot (se Boltanski & Thévenot 2006). Det är en teoribildning som öppnar för analytiska resonemang om vad som står på spel i den specifika kontexten, hur olika aktörer rättfärdigar sina respektive handlingar samt hur detta sammantaget kan bidra till att förstå de konstnärliga folkhögskoleutbildningarnas värde. Analytiskt fokus riktas bland annat mot lärares resonemang om vad de tar i beaktande vid antagningsprov, vilket tydliggör skillnader mellan folkhögskolans olika konstnärliga utbildningar; de mer hobbyorienterade (där kulturaktiviteter exempelvis fungerar som medel för att uppnå studiemotivation) kontra de mer elitinriktade (där deltagarna tänker sig en yrkesbana som kulturarbetare). I boken beskrivs hur selektion genomförs genom olika former av antagningsprov. Lärarna agerar konstnärliga grindvakter och subtila, informella normer uppstår kring vilka som ska antas. Å ena sidan väcker detta tankar om de subjektiva bedömningar som uppstår när det inte finns några formaliserade antagningskriterier (i vissa utdrag visar Fürst och Nylander snarare hur dessa närmast antar formen av sinnliga omdömen om de aspirerande deltagarna). Å andra sidan aktualiseras vad som sker när man inom ett fält själv får avgöra vilka som får tillträde. Författarna lyckas därmed visa något som i princip liknar forskarvärldens sakkunniggranskningar, en slags dold läroplan som också framgår av andra tidigare studier om antagningsprov till konstnärliga utbildningar. Jag tänker inte minst på Monica Lindgren, Ragnhild Sandberg-Jurström och Olle Zandéns (2021) forskning

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som pekat på liknande tendenser när det gäller antagningsprov på musikhögskolor – det vill säga att antagningsprocessen inte enbart rymmer värdering av musikaliska kunskaper utan också de blivande studenternas personliga egenskaper. Genom att blottlägga sådana premisser för tillträde till folkhögskolan bidrar Fürst och Nylander med kunskap som i förlängningen skulle kunna leda till att konstnärliga utbildningar blev tillgängliga för fler.

Ett annat spår i boken handlar om folkhögskolans komplexitet och hur denna ter sig i relation till just de konstnärliga utbildningarna. Det handlar exempelvis om att deltagare kan ha väldigt olika motiv till att studera på en konstnärlig utbildning. Medan vissa strävar efter att utvecklas konstnärligt är andra där för att stilla sitt behov av återhämtning och ytterligare andra för möjligheten att testa en ny studieform. Fürst och Nylander visar också att folkhögskolan ibland kan framstå som flummig, och att det inte är ovanligt att det uppstår intima förhållanden mellan lärare och deltagare. Detta pekar sammantaget på folkhögskolans komplexitet som, enligt författarna, gör det svårt att finna sammanhållna begreppsapparater för att analysera den. Studier av samtidens folkhögskola står därmed i kontrast till tidigare folkhögskoleforskning som kunnat använda sociologiska begrepp som Goffmans "total institution", Foucaults "heterotopi", Eriksons "psykosocialt moratorium", och Turners "communitas" för att beskriva och förstå folkhögskolan.

Det är även tydligt att folkhögskolans konstnärliga kurser har olika status, inklusive inbördes hierarkier mellan olika skolor. Vari består då konstens värde på folkhögskolan? Helt klart samsas konstnärlig verksamhet på elitnivå med folkhögskolans mer egalitära ambitioner, där individualism krockar med kollektivism och likriktning. Boken aktualiserar frågor om konstens värde på utbildningsmarknaden men också om folkhögskolan som konstnärlig institution. Genom konkreta exempel i bokens sjätte kapitel diskuteras exempelvis två pedagogiska uppgifter som används inom bild- och formkurser vilka får deltagarna att både acceptera konstnärliga konventioner och ifrågasätta dem. Som konstnärlig institution präglas folkhögskolan också av en dubbelhet som bland annat beskrivs i relation till lärarnas dubbla kompetens. Ofta är de både pedagoger och frilansande kulturarbetare, och Fürst och Nylander finner i sin studie att det också tycks finnas två grupper av lärare. En som försöker separera de båda områdena och en som ser det som en slags korsbefruktning att både undervisa och utöva sin konstnärliga praktik.

När det gäller utbildningarnas värde så visar boken hur detta upprätthålls genom olika former av konstnärliga kretslopp där även folkhögskolan blir en del av en konstnärlig arbetsmarknad genom att tidigare deltagare blir lärare på utbildningarna. I boken tydliggörs även att konstnärlig utbildning på folkhögskola i vissa fall har en attraktivitet som överskrider motsvarande konstnärliga högskoleutbildningar, vilket också säger något om värdet av konstnärlig utbildning på folkhögskola. Att det fortsatt främst är de som kommer från ekonomiskt trygga förhållanden som dominerar utbildningarna säger också något om relationen mellan utbildningsvärde och risk och att det alltjämt är en riskfylld investering att satsa på konst- och kulturutövande. Sammantaget har boken också ett stort värde på så vis att den ger sina läsare värdefull

insyn i sådant som snedrekrytering och informella kunskapsinnehåll. Det gör det i sin tur påtagligt tydligt att folkhögskolans aktörer befinner sig i spänningsfältet mellan det konstnärliga fältets logik och folkhögskolans egalitära ambitioner.

Johan Söderman
Professor i barn- och ungdomsvetenskap vid Göteborgs universitet

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