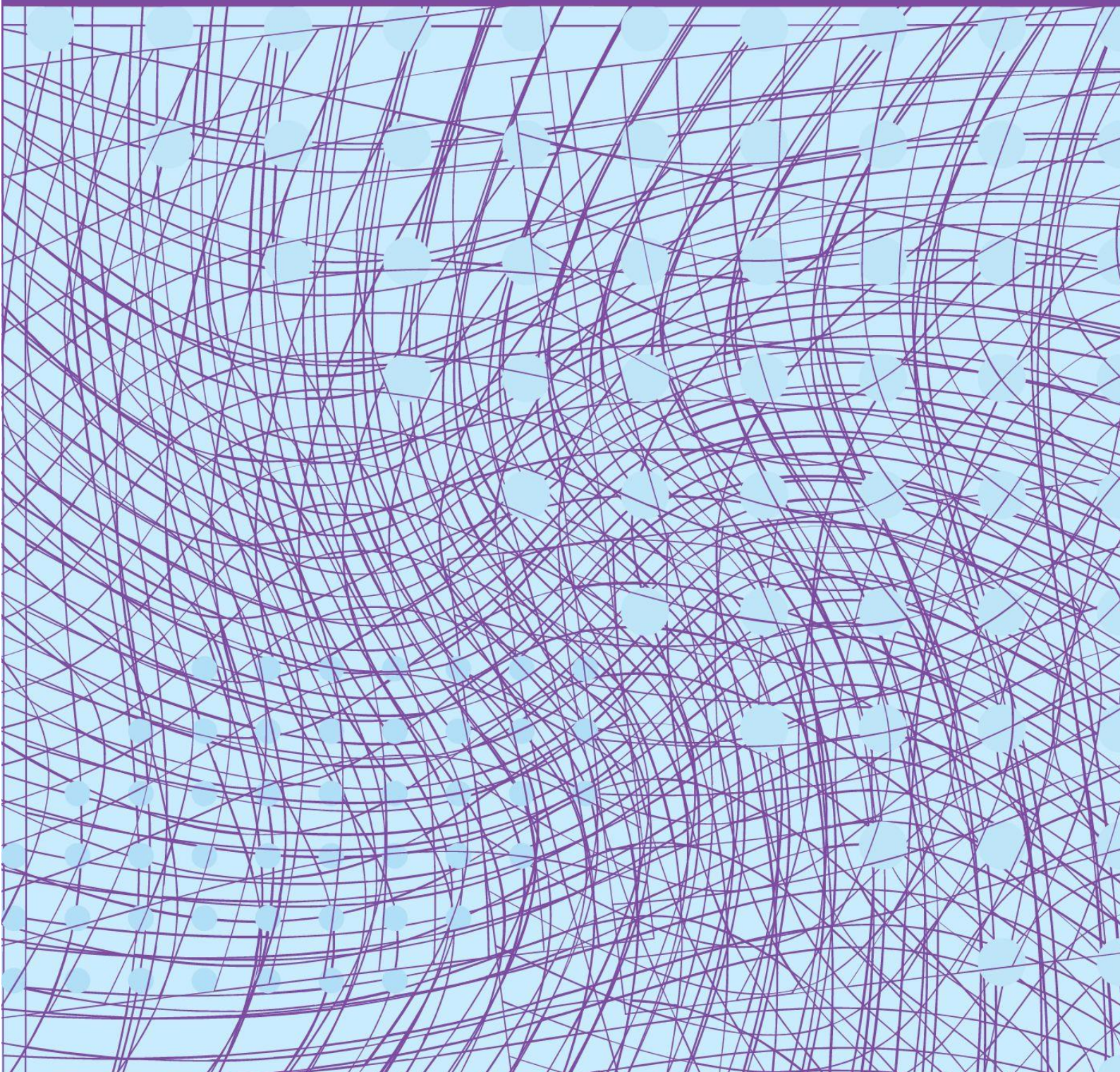


AGENTIAL REALISM AND GENDER EXPANSIVENESS: EXPLORING DIGITAL-MEDIATION AND THE SHAPING OF GENDER

October 2022

Program: MA Gender Studies,
Utrecht University, 2020-2022
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ABSTRACT

The world is silently shaped and mediated by digital technologies, algorithms, and databased categorisations in what legal scholar Frank Pasquale terms a ‘black box society’, while the constraints of binary gender categorisation unravel as increasing numbers of genderqueer and nonbinary people step forwards. Considering digital technologies as an inextricably intertwined element of daily life, equally shaping gender and upholding binary-categorisation models rooted in colonial human categorisation techniques, this research examines how binary-discourse is programmed into digital systems shaping contemporary society, and if non-binary people can congruently exist with their gender in digitally mediated societies. Embracing approaches through the eyes of Karen Barad’s theory of Agential Realism as a core concept to analyse genders mutual constitution with multiplicities of inter- and intra-acting digital systems and networks, the work considers the constraints this has upon digital gender identity, examining the boundaries and roles of digital platforms and profiles. and highlighting occurrences of programmatic discriminations and data violences. Secondly, digital and data neocolonialism are explored, offering a historical contextualisation of how gender has been realised withing and across databases and digital systems, and further solidified through platform- and surveillance-capitalist logic that is managed by big tech’s sovereign control of the global data landscape. The last section discusses inclusive-design methodologies and data- and design-justice theories. Exploring if and how such approaches could viably work in different settings, the approach of inclusivity versus structural systemic change is questioned, while calling for an intervention in how data is conceptualised and understood to account for the in-flux nature of queer lives. The principle aim of this work is to offer a theoretical intervention and basis for exploring the research topic in greater detail and develop departure points for future research centring gender-inclusive system design practises.

Keywords: *Agential Realism, Data, Design Practises, Digital Neocolonialism, Gender Expansiveness, Human Categorisation, Nonbinary, Queer Lives, Technological Mediation*

INTRODUCTION AND RESEARCH QUESTION

Almost every day I am either forced to misgender myself or not declare my gender, erasing and fragmenting my identity, and chipping away at my own sense of self. As a person growing-up in the late 1990's and early 2000's partially online, the internet offered a welcome escape and means of connections to the wider world, and the possibilities of more fluid and nuanced identities than everyday society at the time demonstrated. Later, finally finding language matching my experiences of gender, digital spaces offered locations to begin testing gender expression - changing my gender and pronouns on platform profiles, finding content and communities bursting with others experiencing similar things. My experiences here are not unique, and my experiences as a nonbinary person forced to continuously misgender myself, are tangled in the origins of this thesis. By writing this, my aim is to emphasize the fundamental influence and intra-connections of digital-spheres with everyday ontologies, highlighting the role this plays on the experiences and construction of gender, provide historically contextualisation of binary categorisations and discourse, and discuss ethical-methodologies towards gender-inclusive design practises for gender-expansive futures. The following chapters are a theoretical exploration of nonbinary gender representation and existence in a digitised society, asking the central research question; *Can nonbinary people exist congruently with their gender in a binaried, digitally co-constructed society?*

Through investigating the deep intra- and inter-connections of technologies on everyday life, unpacking digital and data neocolonial practises, and considering methods for gender-inclusive system design, I guide the reader through various theories, and provide a holistic framework of thought for future research. This is structured as follows. Chapter one asks; *How do digital technologies mutually co-construct and mediate daily existences, and do these allow for minority-gender people exist in our technologised society?* I first draw upon Karen Barads theory of Agential Realism (2007) and Brian Latour's Actor Network Theory (1987) as foundations for considering digital technologies interrelations and mutual constitution of everyday life, discuss algorithmic governmentality, consider data as part of our sociotechnical assemblage, and highlight occurrences of programmatic discriminations and data violences. The role and boundaries of platforms and profiles are considered as categories structuring identities and gender, and I touch upon the concept of 'splintering' gender identities across multiple locations. Chapter two asks *What is digital and data (neo)colonialism and its binary-gendered discourse, and how is it applied in a digitally co-constructed world?* Here, I

unpack colonial discourse programmed into digital technologies and data as a modern incarnation of colonial practises through the seizure, and control of personal data, reinforcing capitalistic logic through digital technologies. Mbembe & Meintjes (2003) concept of splintering occupation, an approach I weave into several parts of this thesis, considering the splintered occupation and control of global digital infrastructures that supports big tech's mechanisms for avoiding accountability of their systemic control and regulation of online territories. Platform and surveillance capitalism are acknowledged as key elements of modern digital neo-colonial discourse, together with the 'whiteness' of AI, and a genealogy of binary-gender categorisations programmed into computer- and data-systems. Lastly, chapter three focuses on design futures and ethical considerations for recording gender in data and system design, by asking *What ethical considerations and methodologies can be employed for designing fair and more gender- expansive world?* Here I examine Ruberg & Ruelos' (2020) argument that current understandings of data may need to be reconceptualised to adequately account for gender-expensive people and the in-flux nature of queer lives, methodologies towards gender-inclusive design practises, and data- and design-justice methods of Linnet Taylor (2017) and Sasha Costanza-Choch (2020). Lastly, I discuss if inclusive design practises are helpful, or if approaching deeply-rooted systemic inequalities underlying design choices is a more fruitful pathway.

Principally, the ambition of this work is to open conversations about the deep entanglements, history, and influences of digital technologies upon gender and gender-categorisation, sharing insights into how technologies program social, societal, and culture norms onto bodies and identity.

GENDER TERMINOLOGY

The term umbrella term ‘nonbinary’ is used throughout to refer to people who do not identify solely with the gender-binary, those whose gender falls in-between or outside binary definitions of man or woman. When talking to nonbinary people, they often self-describe with other terms, some of which are listed below, yet the naming convention of ‘nonbinary’ is one more understandable or commonplace for many to understand. Nonbinary people can experience gender as somewhere in-between or completely outside the dichotomous wo/man divide, and some also identify as transgender. Further genders mentioned throughout include genderqueer, genderfluid, gender-expansive, gender-nonconforming, binary-divergent, binary-incongruent, and third-gender, all of which refer to nonbinary people. Throughout this work, ‘nonbinary’ is used predominantly, and used interchangeably with other gender-terms mentioned.

Intersex people: While I do not specifically focus on intersex people here, I acknowledge they experience parallel but different experiences to nonbinary people, due to inaccurate gender-registration and binary-gender regularly being conscripted/inscribed upon them at birth and throughout their lives. I mention some intersex references and debates throughout and acknowledge it would be insightful to draw upon intersex debates further, something I hope to do in future research expanding this thesis.

ABBREVIATIONS:

AGR: Automated Gender Recognition

AI: Artificial Intelligence

ANT: Actor Network Theory

AR: Agential Realism

GNC: Gender-nonconforming

LIS: Library and Information Science

LGBTQ: Lesbian, Gay, Bisexual, transgender, Queer

ML: Machine learning

PGM: People of the Global Majority

STS: Science & Technology Studies

In recent years, greater knowledge and visibility of nonbinary people has emerged as more and more genderqueer people step forwards globally and self-identify, and more demographic data and statistics are gathered. It is not yet common practice to record nonbinary genders in census data or many larger demographic studies, therefore data is often unavailable, often limited and collected largely in western-centric nations, or acknowledgments made of simply not collecting gender-diverse data.¹ Data-collection methodologies must also be accounted for to, as many people may have feelings of assigned gender-incongruity while still identifying by their assigned-gender, or may not have language to describe their experience of gender. Further, some may not want to reveal their gender due to potential repercussions, safety, or privacy reasons. Please see appendix 1 for a continued discussion on gendered data collection. Below are some examples of studies estimating nonbinary populations:

US: The US Transgender Survey identified 35% of respondents (around 9,700 people) identified as nonbinary (Herman et al, 2015). The 2021 *Nonbinary LGBTQ Adults in the United States* report concluded there were 1.2M nonbinary people in the US.

Brazil: Estimated 1,880,200 nonbinary people, and 1,090,200 Transgender people (Spizzirri et al, 2021)

Canada: 0.33% of the population in the national census identified as transgender (59,460) or nonbinary (41,355) (Statistics Canada, 2022)

UK: 63% of the 2015 report *Non-binary Peoples Experiences in the UK* identified as nonbinary (Valentine, 2016). The National LGBT Survey in 2017, received 108,000 responses. 7% (7,560) identified as nonbinary, 52% of the transgender respondents identified as nonbinary (7,301), and 2% (1,980) as intersex (Government Equalities Office, 2018).

Belgium: Estimated 17,150-17,665 gender-incongruent men, and 14,473-15,221 gender incongruent women in Flanders. (van Caenegem et al, 2015)

The Netherlands: Estimated 4.6% of natal men and 3.2% of natal women reported gender ambivalence (Kuyper & Wijzen, 2014)

Israel: 5% of respondents (779 people) to the study *Queering Gender: Studying Gender Identity in 'Normative' Individuals*, identified their gender as 'other' (Joel et al, 2014)

Global Surveys: IPOS (2021) estimates around 1% of the world's population identifies as transgender, non-binary/non-conforming/gender-fluid/other, rising to 4% of Generation Z. 19,069 respondents from 27 countries.

¹ For example, the Dutch LHBT Monitor 2022 (Huweljik et al. 2022) acknowledges diversity within the LGBTI+ community, and that it does not discuss intersex and non-binary people due to a lack of data, which would need to be added to population surveys.

DISCUSSION: GENDER EXCLUSION AND INCLUSION

What are the consequences of gender-exclusion and forced self-misgendering? Without question, there are increasing global populations of nonbinary and gender-expansive people who are not commonly offered accurate methods of identifying themselves. Consequences include lowered general wellbeing, psychological distress, feelings of rejection, dehumanisation, oppression, and discrimination, and ontological oppression. Such disparities between one's internal sense of self and inaccurate categorisations gender-expansive people are often forced to use, contribute to a sense of splintering or fragmentation of the self. Meyer's Minority Stress Theory (2003) demonstrates that multiply-marginalised people experience significantly increased distress and stigmas associated with their identity, when conflicts in values between dominant culture and minority groups occur. For gender non-conforming people, this causes heightened psychological distress through internalised stigmas, expectations of rejection, and identity concealment (Rood et al, 2016). Bastian & Crimston's 2014 study *Self Dehumanization* demonstrated that when people remember experiences of ostracism, they see themselves as less human, impacting on their self-perception of humanity.

It is important to note positives of gender-inclusion for nonbinary people. Inclusion promotes dignity, respect, security, safety, feeling valued, visible, whole, and accepted, better mental health, belonging, and active participation in society, cancelling the above consequences of exclusion, and enabling gender-expansive people to freely exist congruently with their gender.

LEGAL DOCUMENTATION AND REGISTRATION OF GENDER

Largely, the world is structured through binary records of gender assigned at birth, commonly based upon external sex-characteristics. This is something that can be 'scientifically inaccurate and there are many variations of sex chromosomes that may or may not be visible' (Vivienne 2020, 99). In recent years there has been an increase of countries introducing third gender markers, including Canada, Australia, New Zealand, Pakistan, Nepal, Bangladesh, India, Malta, some US states, Denmark, Germany, and the Netherlands, with varying abilities to self-identify or being assigned a third-gender through court rulings. In 2018, Tasmania passed legislation that allows parents to opt out of recording their baby's gender on their birth certificate (Howarth, 2018). Conversely, while more opportunities for third-gender registrations appear, the use of third-gender passports may cause heightened surveillance and

difficulties crossing borders (Quinan & Hunt, 2021), worries of extra-security checks, discrimination, difficulties booking (travel) tickets, and limitation of employment opportunities (Savage & Banerij, 2022). With little global infrastructure to process third-gender passports or societal recognition alongside safety and discrimination worries of third-gender registrations, we are not yet in a place where third-gender registrations or gender-registration is easily acquired or even necessarily desirable, leaving gender-expansive and intersex people with little legal grounding or protection.

METHODOLOGY

The motivation for exploring the research question is rooted in personal experiences and aims to present a conceptual intervention and contribution by placing different bodies of scholarship that are not commonly united, together. Drawing parallels from different fields to build this body of work that is embedded in well-established areas, I incorporate my own situated knowledge in-line with feminist ways of working, building-out theory where previously there has been little. Diverse fields of literature and texts were chosen to integrate the research questions from multiple perspectives, including ontology, science and technology studies, feminist epistemologies, postcolonial theory, digital and data ethics, and design, amongst others. Key texts, like Barad's *Meeting the Universe Halfway* (2007), Latour's *Science in Action* (1987), Eubanks *Automating Inequality* (2018), and Zubroffs *Surveillance Capitalism* (2019), Cheney-Lippolds *We Are Data* (2017), plus multiple articles and studies were carefully selected to illustrate and support the research questions asked, expanding my questions and body of thought. Many scholars and works drawn upon approach the same questions and issues from vastly different perspectives and fields. For this reason, I often name the fields scholars quoted are situated in, contextualising viewpoints and ways of thinking, bringing them into conversation together. By embracing interdisciplinary approaches and leaving the idea of pure theory of individual disciplines, I believe richer perspectives can be achieved, subsequently broadening thought and opening pathways to (re)imagine gender, its inclusion, construction, and place in digitised society.

The structure of three chapters was chosen to form a theoretical grounding, historically situate it, and offer departure points for future research. A large part of the conceptual contribution is situated in chapter one to contextualise the overall research focus, investigating how digital technologies mutually co-construct everyday human experiences, acknowledging the inter- and intra-connections of various systems and their construction. Here, I navigate a

variety of literature, harnessing metaphysical, philosophical, and feminist theory alongside scholarship interrogating data, media, digitisation, algorithms, and social theory. In Chapter two, I build out a historical genealogy of thought to contextualise theories and discourse discussed in chapter one, reflecting on how coloniality is programmed into algorithms, databases, computer systems and digital technologies partially-constructing everyday experiences, boundaries, and society. Lastly, chapter three explores thoughts for alternative design futures and design concepts that could offer pathways to more gender-inclusive system design, while questioning if this approach could be successful. By placing these three chapters alongside each other, I wanted to build a landscape of thought incorporating many perspectives, mobilising diverse fields, and to ask questions offering departure points for further research. Ultimately, I hope to use this thesis as a basis for PhD research, expanding upon this initial work.

CHAPTER 1. INEXTRICABLY INTERTWINED AND DIGITALLY MEDIATED WORLDS

'We live in a world of ubiquitous networked communication, a world where the technologies that constitute the Internet are so woven into the fabrics of our daily lives that, for most of us, existence without them seems unimaginable'

Cheney-Lippold, 2017. We Are Data: Algorithms and the Making of Our Digital Selves

This chapter explores digital technologies as an inextricably-intertwined element of daily experiences and a fundamental building-block of contemporary Western societies make-up, while considering *how* or *if* such technologies embrace nonbinary genders. Harnessing Brian Latour's Actor Network Theory (1987), and Karen Barad's Agential Realism (2007) discourse as fundamental approaches for understanding the inter- and intra-connectedness of the material and digital-mediated world, I explore if nonbinary people can exist congruently with their gender in a digitally mediated world. Turning to embodiment, virtual space, gender, and the idea of 'splintering' I discuss how gender is constructed across multiple experiences and locations. I draw inspiration from Rob Kitchin's theory of data as part of our socio-technological assemblage (2014) and Antoinette Rouvroy's concept of Algorithmic governmentality (2020), as I ask the central research question of this chapter; *How do digital technologies mutually co-construct and mediate daily existences, and do these allow for minority-gender people exist in our technologised society?*

I address this, by discussing how digital / material experiences are inextricably intertwined, impossible to disentangle from one another, and algorithmically mediated through systems built upon binary, cisgender-normative roles. I question *if* and *how* gender-minority people are represented in the technologized and data-driven arena by turning to data-representation in digital profiles, examine platform boundaries, and the automated categorisation of humans. I draw upon a broad range of theory and literature spanning digital and data ethics, automation, capitalism, posthumanism, design, and science & technology studies. Ultimately, the goal of this chapter is to highlight and unpack how the world is silently structured and co-created through technological and algorithmic mediation, data-based categorisations of humans, the deep influence of digital technologies upon everyday life, and

the challenges and exclusions this presents to nonbinary people and those who do not fit reductive, binary categorisations programmed into databases and digital systems.

INTERTWINING WORLDS: AGENTIAL REALISM

It is almost impossible to disentangle off- and on-line realms from one another as our everyday, physical world is silently co-structured, co-assembled, and co-created through digital mediations. Algorithmic governmentality defines and influences ontological experiences as digital technologies operate on global scales, often with greater power than governments and nations. From physical technologies like weight-sensors in bicycle-paths communicating with city-wide traffic-management systems automatically clearing traffic-lights for cyclists, microphones in mobiles listening to conversations and sending our inner-most thoughts and emotions to advertising companies targeting devices with automated, personalised adverts, and location tracking through a multiplicity of ‘smart’ connected devices as we move through space, adding data-points and automatically calculated associations to our algorithmic identities, to the sonographical classification of human identity and life² from the second (or even before) a pregnancy is recorded – forming socially and culturally conditioned expectations of a fetus before it even enters the world, and the algorithmic categorisation of identities (dis)allowing us access to services, products, spaces, places, and nations. Considering even this small selection of examples inter- and intra-acting with one another, digital and material technologies assembling and merging together form a significant part of our everyday socio-technical existence, directly influencing daily experiences through a multiplicity of interacting systems and networks. Later in this chapter I focus on gender representation in such systems, but first I introduce Actor Network Theory and Agential Realism to contextualise the inter- and intra-connectedness of material and digital relationships.

Digital technologies have a deep impact on our daily lives, co-creating, mutually constituting, and influencing nearly every aspect of contemporary existence. Traditionally in sociology and other fields, humans and technology have been viewed as separate systems. However, in 1987, sociologist and philosopher Bruno Latour disrupted this traditional notion by introducing Actor Network Theory (ANT). ANT places human and non-human interactions on the same analytical level, where they influence, co-exist, and co-create one-another and

² See Butler’s notion of ‘girling’ or ‘boying’ (2011, pxvii), and Ebert’s discussion of sonographically gendered interpellation placed upon fetuses (1996, 360)

subsequently ‘assigning non-humans in[to] the composition of society’ (Callon, 2001). ANT (Detel, 2001) consists of *actors* affecting scientific statements and theories (e.g., objects, methodologies, background assumptions, social rules, institutions, experiments, measurements), and *networks* (a set of actors with stable relations and translations, determining the functions of the network). Feminist scholar Donna Haraway’s infamous *A Cyborg Manifesto* (1991) reinforces this, proposing that the boundaries of humans and machines have been broken, as machines have become an inseparable part of human life, as ‘technologies... are crucial tools recrafting our bodies’ (164). Such posthuman ways of thinking raise questions of decentring ‘man’ or the human (Braidotti, 2013), and embracing multiple other systems and entities into our understanding of what the world is³. A large contribution of Latour’s work focused on highlighting the role scientists and engineers play in making, documenting, and co-constructing technoscience *as well as* society. Latour’s work is well in-sync with feminist epistemologies, as ANT pays homage to the fact that much of our western knowledge and understanding of the world is attributed to those who have created, discovered, and documented the world since the enlightenment period, which we know has largely been recorded by the euro-western white man, providing a limited, or as Haraway terms it (1991) - a partial-perspective - of the world and society. Acknowledging that our knowledges and technologies are so closely intertwined and formed of partial, masculine-centric knowledges, how does this affect the experience of those moving through the world who do not fit into society as it has been constructed in this way? The focus here lies in the digital realm, underpinned by binary-logic and binary-programmed databases feeding machine learning, artificial intelligence, algorithms, and digital system design. With an entire digital-sphere built for decades in these binary-manners⁴, can non-binary people exist congruently with their gender in digital systems?

Increasingly, there are more options in digital systems for things like varied pronouns or options to not disclose gender - an *erasure* of gender rather than a representation – yet this is still uncommon, with nonbinary people facing endless daily encounters forcing them to misgender themselves or erase their gender. It is undoubtedly possible to change registration options, databases, and code powering these entities, although both willingness and funding

³ For example, Braidotti’s *Posthuman Knowledge* (2019) offers nuanced thought towards embracing alternative ways of knowing, knowledge production, subjectivities, and understandings in world comprising of complex multiplicities and critiquing western humanism and anthropocentrism.

⁴ See Chapter Two for more on the history of binary-logic in data and databases.

are required (Broussard, 2019). The willingness for gender inclusivity in digital-spheres is becoming increasingly apparent as tech-giants recognise more demographics as marketable / surveillable categories, yet this is still not the norm and reliant on capitalistic frameworks driving system design that is woven into the fabric of society. It is also crucial to note that bodies signifying difference are the disposables of the global economy (Shiva, 1997), until society reaches a place of full legal recognition and representation of non-binary genders, they remain a disposable digital-category with little protection.

Returning to embeddedness and intertwining frameworks, I turn to the work of feminist physicist and philosopher Karen Barad and their theory of Agential Realism (AR), building much upon Latour's and Haraway's earlier work. Barad's own definition of AR states it is:

'An epistemological-ontological-ethical framework that provides an understanding of the role of human and nonhuman, material and discursive, and the natural and cultural factors in scientific and other social-material practices, thereby moving such considerations beyond the well-worn debates that pit constructivism against realism, agency against structure, and idealism against materialism'. (2007, 26)

The conceptual framework of AR focuses on the *intra-* (internal, within things) and *inter-* (between things) connectedness of human and non-human systems, emphasizing their agentiality, real-world, and ontological effects. Using 'insights of quantum theory to reconceptualise our understandings of subjectivity, agency, causality, and – ultimately – the being of the universe itself' (Vint 2008, para 1), AR centres real-world effects of the intra-active agentiality of matter and discourse, placing them as intra-active participants in their inseparability, and as inseparable enacting entities. AR contests the cartesian distinction between subject and object, knower and known, refusing binaries that have plagued and structured western thought for centuries, embracing a fluid, ever-changing approach to understanding experiences. Barad's conceptualisation of discourse is important, stating discourse is not merely used as a synonym for language or linguistic acts and it is not *what is* said, reframing it as the constraints and enablement's of what *can be* said, a practice that produces (rather than describing) knowledge practices, shifting the linguistic to the discursive. Crucially, Barad shares this frees us from thinking of human concepts and the 'static nature' of apparatuses, as they 'are the material conditions of possibility and impossibility of mattering; they enact what matters and what is excluded from mattering' (147). To Barad, apparatuses are more than instruments or devices probing the world, they are not only us, social forces, or assemblages, but iterative reconfigurings in the 'ongoing dynamism of becoming' (142). They

accomplish boundary-making practices, as discursive practises are ‘material reconfigurations of the world... determining boundaries, properties, and meanings’. As AR unfolds, we can start to see how it can be used as a powerful tool and way of knowing to dismantle cartesian notions of humans and technologies as separate entities. Turning to embodiments of gender, sexuality, and virtual spaces, the work of new media and digital culture scholar Niels van Doorn is relevant. Van Doorn’s studies demonstrate how online expressions of gender are ‘intricately interwoven with people’s physical embeddings in everyday life... [as technologies] extend daily experiences into digital locales’ (2011, 532) as gender is embodied into digital ‘matter’, supporting AR and ANT concepts of different interacting systems and expressions co-constructing one another.

Responding to embodiment across digital / physical experiences, I wish to introduce three further concepts: splintering occupation, fragmentation of the self, and fragmented identities, in relation to the embodiment of gender, digital technologies, and one’s own sense of self. Firstly, Mbembe & Meintjes *Necropolitics* (2003) discusses the *splintering of occupations* in the context of the colonial occupation of networks and physical infrastructure, and overlapping landscapes of domination and hierarchies inhabiting these same locations.⁵ Alongside this, cultural theorist Sophie Oliver’s (2011) account of lived experiences of dehumanisation, discusses violations of human dignity and autonomy when one cannot be their whole, integrous self (including their gender) as a *fragmentation of the self and the body*. Lastly, Donna Haraway (1991) considers the complications of social movements that occur through social differences as *fractured identities*. Harnessing these concepts, can they be applied to how gender is experienced, understood, and manifests fluidly through a variety of different technological systems? By putting gender in conversation with humans, data, digital systems, and their complex interactions, can we consider gender as a splintered, fractured, and fragmented experience manifesting throughout infinite entities? These concepts do not necessarily need to be negative; by mobilising the idea of fragmenting gender *across* locations, extended possibilities are opened for embracing infinite expressions and expansions of what gender is and means to people, within systems, and in society, subsequently removing the static, immutable nature of binary-gender, in-line with how many describe nonbinary gender experiences. Here, we can conceptually draw upon AR for embracing gender-fluidity, destabilising binary-gender categories, offering softer, more nuanced, and perhaps more

⁵ In chapter two, I apply this concept to digital infrastructures, something we can already start imagining now.

fragmented interpretations of gender construction, in-line with a vast array of non-binary genders. A strength of AR that can help inform nonbinary gender expressions. is the ‘irreducibility of (posthuman) gender performativity to simple [binary/cartesian] characterizations’ (Pasley 2021, 3), as Pasley notes there will always be further entanglements between apparatuses, none of which are the same, opening space to ask ‘how the possibilities of gender may flourish’ (ibid, 3). Additionally, STS professor Vivian Lagesen (2012) proposes that ANT in its original form, mostly neglected gender issues, and can be harnessed as a useful analytical tool for welcoming gender-fluidity in technologies. Lagesen presents this through two notions, ‘the insistence of heterogeneity and focus on associations is important to avoid essentialisms’(6), and that ‘ANT calls for studying gender-in-the-making... to have uncertainties as well as stabilisations processes as a focal point’ (6). In the past feminist theory often tended to focus on how one ‘does’ gender⁶, yet what about how one’s gender is co-constructed by the influences of technologies around oneself? AR and ANT can facilitate other ways of understanding and interacting with gender-production, incorporating multiplicities of phenomena’s and intra-actions. Later in this chapter, I explore digital profiles as a digital performance and a ‘doing’ of gender, however by employing AR and ANT, we can move beyond the concept of merely ‘doing’ gender in digital locations, and understanding it as changeable and fluid, built upon multiple and ever-changing intra- and inter-acting factors, including the affects of surrounding technologies.

While ANT and AR help to contextualise the significance of technologies as an extensive and inseparable part of life and serve as a contextual building-blocks for this thesis, what are the other influences of digital technologies on daily-experiences? Zooming out, life is subsequently monitored, surveilled, and classified through data-footprints and written into the technologies co-constructing our experiences. Nearly every aspect of life has the capacity to be recorded in a databank, codifying life, identity, behaviour, and even our needs into database-based understandings of human identity. As a species with an infinite, complex, rich, and highly-nuanced level of variance, it seems impossible and wrong to code humans into reductive, binary-categories driving digital technologies. Human classification has grave consequences for many, particularly if they do not fit into dichotomous-binary models or belong to marginalised groups and do not fit the majority categories recorded by technologists

⁶ E.g., West & Zimmerman, 1987

building these digital-entities.⁷ As humans are datafied, ‘operationalised and made computable’ (Scheuerman et al. 2019, 144), our identities, boundaries, opportunities, access, and daily experiences are algorithmically shaped behind the scenes. Personalities and identities are reduced to neatly curated data-points, as data-driven decision-making structures, orders, and determines the shape of our material and digital world, and its inhabitants. Legal scholar Frank Pasquale terms this the ‘black box society’ (Cheney-Lippold 2017, 4). in which ‘algorithms determine the contours of our world without us knowing’ (ibid, 4). Pasquale’s words highlight the increasingly blurred of boundaries between off- and online systems, between data, technology, and the material world, breaking open traditional dualistic notions of nature vs culture, of subject and object as Barad (2007) highlights, ultimately changing how we relate to data and digital technologies as they penetrate our daily happenings. While this is not new information, I question topics like who has the ability and right to exist [and be accurately represented], and what happens if you default from the structure and categorisations that you are (algorithmically) allocated? What does the databased-human look like, and who decides this? Is it possible to exist in a system if a person does not fit into its boundaries or data-based categorisations? How do algorithms (mis)understand our digital-footprint, behaviour, and identity? What are the consequences of being marked as gender-divergent, when ‘big tech’ naturalises, reinforces, and reproduces binary-gender categorisations at macro and meso levels? Does having an awareness of our digital-identity lead to self-policing the data we do(not) share in different scenarios or systems? I begin addressing these questions by drawing on theories of algorithmic governmentality and data as part of socio-technical assemblages.

SOCIO-TECHNICAL ASSEMBLAGES AND ALGORITHMIC GOVERNMENTALITY

To approach these questions, I draw on geographer and data scholar Rob Kitchin’s notion of *data as part of our sociotechnical assemblage* (2014), and researcher of information, law, and society Antionette Rouvroy’s work on *algorithmic governmentality*. Kitchin (2014) shares that data should be understood as part of our sociotechnical assemblage - people, places, policies, technologies, practises, code, laws, interacting standards – all influencing, co-creating, and interacting with each other through complex networks. Data are the building

⁷ I elaborate on the issues and effects of data-producers later in the chapter, noting examples of digital-marginalisation and discrimination.

blocks of a large part of society, digital systems, machine learning, automation, categorisation, algorithms, voice technologies, AI, and much more. Therefore, data must be inclusive and representative of all intersects of society if they are to serve and represent society in a just manner. Alongside this, Rouvroy presents algorithmic governmentality, ‘the idea of a government of the social world that is based on the algorithmic processing of big data sets rather than on politics, law, and social norms’ (2020, para 3), a quantification of political issues through algorithmic processing (2020). Rouvroy notes this is a practise of governing and taming uncertainty, of optimising current affairs to the favour of certain stakeholders, essentially a flattening of the beautiful and infinite variation of humans and socio-technical assemblages to serve certain peoples’ or organisations’ interests.

The far-reach of algorithmic governmentality is present everywhere, manifesting through multiple, global big tech firms and platforms, many of which are often ‘larger than most nation states’ (Couldry 2019b, 26). Meta CEO Mark Zuckerberg echoes this statement; ‘in a lot of ways Facebook is more like a government than a traditional company’ (Kirkpatrick 2010, 254). Recent calls in August 2022 from EU regulators in France, Spain, and Italy, requested tech giants Google, Meta, and Netflix should partly-finance upgrading telecoms infrastructure (Pollina & Fonte, 2022), pose worrying questions around net-neutrality and handing further power to commercial companies at a continental scale. As other large platforms including Twitter and Facebook, and services from Apple, Google, and Yahoo termed as ‘mega social media platforms, places that dominate digital space and culture’ (Kennedy 2016, 7), and digital media scholar Szulc (2019) shares that ‘platformized social network sites have already accumulated great power over every day digital communication... [that have] given rise to an online infrastructure that is profoundly shaping the way in which societies are organised and publics are shaped’ (263). It is unquestionable such platforms and their algorithmic- and data-based construction of human-experience are of immense global influence, yet how have they come to be so binary-centric? This can be partially-unpacked by examining who produces and curates data and technologies.

DATA PRODUCTION AND PRODUCERS

Accepting life is algorithmically governed and tamed as Rouvroy theorises, and using the socio-technical building blocks of data, we must consider, does this experience include *all*, or only *certain* people, and if so, who are they? We know algorithms are programmed and taught using data-sets and machine learning, but who is responsible for selecting the original training-

data, and what or who's interests are invested here? To live in a fair, representative, and just society, datasets that fairly reflect and represent all humans - including gender-diverse people and not just the individuals preparing, curating, and managing the data - is a prerequisite for fair representation, and must be used. Data scholar Jonathan Cinnamon (2020) notes 'those who produce data are able to shape the world according to their own world view' (222). Digital designers, and data-producers and curators, are commonly white, middle-class, cisgender, heterosexual men, whose world view is highly likely to not be representative of the diverse intersections of gender, or race, ethnicity, sexuality, and class, and who 'rarely consider the experiences of trans [and nonbinary] technology users' (Shelton et al 2021, 4). We know that data-design choices harm transgender and nonbinary people through digital-erasure, creating gender-exclusive technologies that are built upon the 'existing, unexamined biases of white cisgender male tech designers' (O'neil, 2016) Such design situations contribute to 'a partial and biased digital representation of the world... encoded into the databases of [these] projects, which then shape our understanding of the world' (Cinnamon 2020, 222) If this trend does not change, bigger gaps in gender-representative data will continuously emerge, increasing digital marginalisation, erasure, and ontological-oppression of transgender and nonbinary people. This is already prevalent through rapidly increasing visibility and media attention in recent years, concerning the importance of diverse training datasets as automated racialised, classified, and gendered discrimination and inequalities are increasingly uncovered (Buolomwini 2018, Noble 2018, O'Neil 2016, Eubanks 2018), promoting the need to focus on data-inclusivity ever-more. It is also poignant to consider the ability to prove one's existence beyond self-identification for inclusion in data. With few countries legally recognising third-genders, data-producers to have no legal obligation to include nonbinary people in data's curation and in technologies design. Additionally, there multiple studies proving that improving gender diversity in the workplace holds a linear relationship with better financial performance (Costanza-Chock, 2020), yet changes to data-producer demographics are painfully slow. Luckily, we also know that big-tech, as a driver of the datafication of human life, is opportunistic and happy to capitalise upon pretty much any element it can identify, categorise, and monetise. Therefore, it is strange that there is little representation of third-gender people in many digital settings, as nonbinary people are most definitely a large enough demographic to capitalise upon⁸.

⁸ See demographics section for nonbinary demographics examples. Additionally, there is much evidence made particularly visible through homo-capitalism during annual pride-campaigns orchestrated by multinationals and corporates, focusing and profiting typically from gay and lesbian people.

Moving to everyday individual usages of digital technologies, the last focus of this chapter is platforms, profiles, and their boundaries, plus examples of issues in platformised spaces. How do we write ourselves into profiles through our own and digital-matters' agential actions? What strategies are behind the datafication of our platformised identities? Can fluid and genderful people exist in neatly-categorised and curated profiles, tailored to fit for-profit advertising models? As platforms and online-spaces have quickly developed since the early 1990's, users have increasingly lost agency over their ability to self-represent and self-narrate. Until the early 2000's user-agency was high; individuals enjoyed greater control through coding-freedom and personalisation of online spaces (think self-published Dreamweaver sites, HTML-pages, Yahoo's GeoCities, MySpace). From the mid-2000's onwards individuals had little control or agency over self-representation, relying on the borders, pre-defined, menu-driven profiles fields, categorisations, and curations of large Social Network Sites (SNSs) like Facebook, Twitter, and Instagram. In Lisa Nakamura's 2002 work on Menu-Driven Identities, she unpacks online racial categorisation and the assumption of universal whiteness through the use of menus and hierarchical lists as organisations (or as we name them today, 'tech giants') mediate users experiences by structuring online identities into a 'menu-driven sense of personal identity... progressively narrowing choices of... positions available to the user' (104), noting 'the web is much more pleasurable to use if one has a sense of control and order over the material' (102). Building on this, humans generally feel more comfortable and at-ease with things or identities they are familiar with, favouring those in their own social demographics, and othering those outside of their knowledge or understanding. I liken this to Leyens (2000) theory of infra-humanisation, where in- and out-group dynamics facilitate social hierarchies and attribute higher levels of 'humanness' to ones ingroup. Circling back to menu-driven categorisations of identities and dominant workforces 'designing' gender, there is still limited agency to accurately self-identify on platforms, and if there is, it can lead to self-ostracization and out-group experiences.

However, considering AR, agency should not only be understood as something in the human domain, as the apparatuses of platforms have their own agential existence 'enacting agential cuts that produce determine boundaries and "entities"... of agentially intra-acting components' (Barad 2007, 148). Through components intra-acting, meanings are made, affecting the boundaries of users and platforms, their representation, and experience with

digital spaces. Let's also not forget the profit-driven nature of platforms, spaces designed under surveillance capitalism logic for profit, opening another question, is accurate (gender) self-representation profitable under a capitalist framework? I acknowledge SNSs are not the only platforms; the likes of Google, Amazon, and Apple are of equal standing and of particular importance due to their widespread usage unpinning the skeleton of global digital spaces, and their focus on human data collection and sharing amongst infinite other digital spaces. The boundaries of SNSs' categorisations have become increasingly reductive and standardised, as digital-selves are sculpted, practised, and performed within these boundaries, the vast majority of algorithmic and data categorisation of profiles still relying on binaried understandings of human identity. It is equally pertinent to question how performative gender-inclusivity on platforms can be. In communications professor Rena Bivens 2016 article *Baking Gender into Social Media Design: How Platforms Shape Categories for Users and Advertisers*, Bivens examined 10 social media platforms to understand how gender is categorised and understood through user registrations and profile creation, analysing how they 'act as intermediaries within the larger ecosystem of advertising and web analytics companies.' (2) Bivens investigation into Facebooks front-end system which offered 58 different gender options to users setting up profiles, uncovered that some of Facebooks back-end systems and databases reverted non-standard genders back into binary categories, based upon pronouns selected by users. Researcher of marginalised perspectives on technology, Katta Spiel (2021), echoes this while discussing gender in digital infrastructures, noting 'seemingly progressive' (480) systems still reduce gender into binary categories in back-end systems.

Similarly, dating app Tinder offers an impressive list of 50+ gender options to self-identify, yet forces users to be included in binary-searches for men or women only. Additionally, the full list of varied gender-options seem to only be available in the dominant nations of the US, UK,

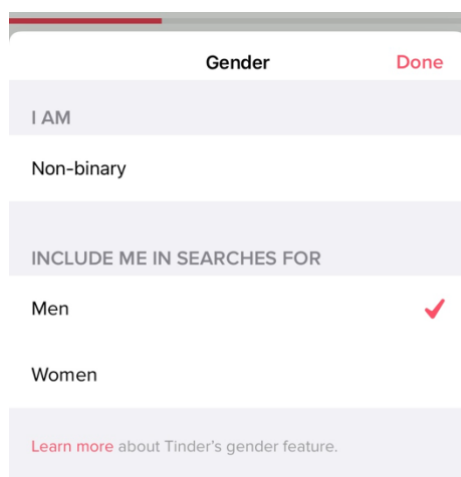


FIG. 1. TINDERS SEARCH-INCLUSION OPTIONS

and Canada, posing additional questions surrounding who has the right to accurately self-identify. Is it worth Facebook and Tinder offering these partial front-end gender options, if it's a performative action not backed-up by real system-design changes and categorisations? The consequences of Automated gender recognition and incorrect categorisations are harmful to genderqueer, nonbinary, and transgender people by 'encoding violent sexist and colonial ideas of binary gender' (Hoffmann

2021, 3542), acting as an ‘algorithmic violence’ (Onuoha 2018, para 2). By preventing people from meeting basic needs like accurate self-identification, it can also be understood as an ontological oppression (Dembroff, 2018) marginalising and excluding transgender and non-binary people, unjustly constraining gender-variant people’s behaviour, and enforcing social exclusion. This is problematic on many levels, not least as many are unable to contest incorrect categorisations as they are unaware this is happening. Nonetheless, the fact varied gender-options exist at least on the front-end of some platforms, is still important for digital self-representation and assurance that there is some form of existing or publicly present oneself congruently with their gender.

As our digital selves are algorithmically constructed, profiled, and categorised, our algorithmic identities change daily, something digital media professor John Cheney-Lippold shares as ‘who we are in this world is more than a straightforward declaration of self-identification or intended performance. Who we are... is also a declaration by our data as interpreted by algorithms’ (2017, 5). Our algorithmic identities can change on a minute-by-minute basis as interactions (clicks, likes, reading habits, shares, comments, posts, eye-movements, time-on-page, touch-pad interactions, etc) are surveilled, tracked, and categorised, feeding algorithmic understandings of users, while constant A/B tests refine formulas to keep people engaged in platforms.⁹ The surveillance and ‘making’ of our algorithmic identity, our digital self and its gender is nicely described by Cheney-Lippold;

‘Online a category like gender is not determined by one’s genitalia or even physical appearance. Nor is it entirely self-selected. Rather, categories of identity are being inferred upon individuals based on their web use. Code and algorithm are the engines behind such inference and are the axis from which I will think through this new construction of identity and category online. We are entering an online world where our identifications are largely made for us.’

Cheney-Lippold 2011, 165. *A New Algorithmic Identity: Soft Biopolitics and the Modulation of Control.*

But how much of our online-self is made *for us*, and how much is made ourselves? Returning to ANT and AR, we know these are elements deeply entangled, influencing, inseparable actions and systems, creating and affecting our on- and off-line identities. To ‘be’

⁹ This is discussed in Chapter two’s section on surveillance capitalism as a claim on human experience as a free, raw material that is transformed in behavioural data, directly feeding advertising models and (platform) profits (Zuboff, 2019).

online frequently requires a profile to be created to interact and participate with platforms and other digital spaces, through voluntary or required actions often strongly-encouraged through clever user-design. Profile creation is an everyday, unescapable part of digitised culture - from registering your intimate details with healthcare or dating apps, joining SNSs or verifying who you are with insurance companies, to creating trustable online identities to access bank accounts or home-exchange sites, professional profiles for job-sites, and endless other scenarios. Further, profile creation can be a necessity to access essential, required services to participate in society¹⁰, removing personal agency and freedom and forcing individuals to conform to the restrictions of a platforms or nations construction of human identity. Profiles subtly encourage users to share strategically-gathered personal data, providing unique and targetable insights into daily habits, desires, wishes, weaknesses, strengths, and being (an acquisition of raw, human data). Quick-and-easy sign-up methods in autofill registration forms are pervasively offered by requesting data-sharing access with other platforms which already possess extensive personal data about you, like Google, Facebook, or Apple. This is routinely positioned under the guise of receiving a better and personalised experience and a quicker-sign up process, while directly opening data-sharing pathways *between* platforms (an acquisition of data relations). As this happens, both platforms gather greater personal data and insights into individuals' data footprints, enabling them to gather detailed and targetable user profiles and algorithmic identities.

As users are cleverly retained through digital profiles, they can be equally recognised as an 'an explicit act of writing oneself into being in a digital environment' (boyd 2010, 4), a digital identity performance and 'a series of performative acts which constitute the self'(Szulc 2019, 258), technologies of the self (Foucault, 1988) blending digital and material selves ever-closer, and a method of self-representation or indications towards who you want to be. This can be a lifeline for some transgender and nonbinary people, as digital spaces can offer locations for one to self-identify, practise, and rehearse themselves and/or their gender, something not always possible in everyday, offline life for varying reasons including confidence, personal refinement, and safety.

¹⁰ For example, access to social security benefits, registration with hospitals or other care institutions. In the Netherlands it is required to have a DigilD linked to your official identity registration to access services like tax information, social security, energy bills, hospital appointments, etc.

Earlier, I discussed how AR and ANT may be used as tools for reconceptualising how gender is 'done' and understood, through the merging of intra- and inter-actions on- and offline that influence and co-construct each other. I argued that digital technologies mutually constitute life, or in other words, digital technologies could be viewed as a phenomenological splintering of contemporary society. If there are no physical bodily-boundaries that determinate gender, as edges of humans and technologies merge and intra-act, are there any boundaries of gender at all, and do binary-gender notions really exist? Barad shares the classic, physical example of prosthetics building disabled bodies, and Merleau-Ponty's infamous illustration of a blind-person's walking stick extending and merging with their body. Paul Preciado (2013) builds on this, noting gender is assigned to foetuses through sonographic scans digitally deciding 'sex', something Barad details as medical interpellations shifting infants from 'it' to 'she' or 'he'. Let's also consider the case of transgender people who oftentimes must 'prove' their assigned gender is 'wrong'. Generally, according to gender-law, this is only an internal feeling with no real evidence until psychological assessments 'prove' an incorrect gender, based upon binary-categories of societally-curated gender. Here, we start to see the boundaries of (binary-)gender unravelling, as internal feelings of gender, technologised and categorised inscriptions of what gender is and the apparatuses managing this, extend and build the body, while concepts of what the body and gender consists of shift according to ourselves, others, and the constraints of our surroundings. Sara Ahmed (2006) discusses orientation of the body in the world as a co-construction of the physical objects around us, her example of a soft chair providing seating for the body, in turn, softening the body occupying the seat, repetition building habitual constitutions of each other, just as digital representations of the self co-form and expand identities and ways of being repetitiously over time. As we write ourselves into being through digital technologies, our surroundings, feelings, our digital presence build-up our being. Szulc notes, profiles are also 'a site of control, allowing participants to determine who can see what and how' (boyd 2010, 5), which can offer relief and solace to those who are unsure of or discovering their identities, a way to become comfortable with oneself in a somewhat controllable environment.

Lastly, this section details some of the endless examples of how digital systems, algorithms, and algorithmic categorisations can do harm. People of marginalised groups are particularly at risk, with digital oppressions affecting human elements like gender, ethnicity, size, class, ability, accent, profession, and more. Digital segregations and oppressions are common through things like automated eligibility to access essential services, Automated Gender Recognition (AGR), exclusions based on professions (eg, sex-workers being shadow-banned on SNSs and barred from PayPal services¹¹), race, gender, or size, and programmatic discriminations upholding harmful stereotypes. Virginia Eubanks infamous book *Automating Inequality* (2018) is a great introductory example. Her book uncovers the far reach and impact of automated eligibility systems gatekeeping access to (public) services that ‘shatter [the] social safety net, criminalize the poor, intensifies discrimination, and compromises our deepest [national] values’ (12). Eubanks stresses these systems of the ‘digital-poorhouse’ are tested in low-rights environments, where there is little political accountability or transparency and are designed as models to be rolled out to wider society once they have been fine-tuned. Eubanks’ examples provide insights into who has rights to everyday social support, as the intersections of race and class rooted in system design are noted throughout. Questions of who *has* and who *needs* access are addressed; typically, wealthier, middle-class people can privately and anonymously reach out for services like therapists, support-programs, carers, or medical-services without data-repercussions or their details being added to personal social-security records. On the other hand, poorer, more vulnerable, and marginalised people who cannot afford this and must rely on state-interventions and support do so at the cost of their privacy, with such encounters added to their digital records. This can have life-long repercussions, subsequently placing them in the hands of automated decision-making models with the power to offer or deny access to things like shelter, child-support, medical-care, and benefits, as points-systems decide what access or rights individuals have. Such digital records can exist forever; eternal records that ‘diminishes life chances, limits autonomy, and damages self-determination’ (Eubanks 2018,187). We can see how tactics of digital profiling, policing, and punishment affect gender-variant people too; gender-variant people are frequently forced to misgender themselves, medical-systems exclude transgender and nonbinary people’s access to

¹¹ E.G., Tumblr’s ‘[adult content](#)’ ban, Paypal and Venmo’s blocking sex-workers from [using their services](#), TikTok and Instagram’s censoring and shadow-banning of [sex-positive content](#) and sex-workers.

life-saving care¹², and digital technologies' reinforcement of binary-gender on transgender and nonbinary people acts as a gender-based data-violence and punishment for diverging from societal gender-norms. Exclusions have repercussions, Meyer's Minority Stress Theory Model (2003)¹³ when applied to transgender and gender non-conforming people reveals individuals conceal their identity, internalise stigma, and expectations of rejection (Rood et al, 2016), heightening psychological distress.

Another worrying example of big techs' effect on gender-nonconforming people are Automated Gender Recognition (AGR) systems built upon immutable, static, and female-male binary understandings, derived from physical appearances misgendering many, and forcing nonbinary people to misgender themselves. Joy Buolomwini's ground-breaking 2018 study GenderShades, exposed programmatic bias in Microsoft's, IBM's, and Face++'s AGR, with reductive, binary classifications of gender, and higher misrecognition rates of women than men. Black and Brown women were misrecognised the most. Entering the private sphere, in 2018 music-streaming giant Spotify patented technology¹⁴ that recognised 'emotional state, gender, age, or accent' to recommend music to listeners. It is impossible to categorise gender based upon voice, without discriminating against and miscategorising transgender and nonbinary people - there is also no way to know what a nonbinary voice sounds like. Merrill's 2021 expose of Google's advertising system allowing advertisers to exclude non-binary people from seeing jobs, housing, and credit adverts, revealed the effective facilitation of digital-redlining against non-binary and some transgender people, and anyone who checked 'other' as a gender option. Facebook¹⁵ was also held accountable for the same practices in 2018 (Morris, ACLU, 2022). While Google pledged to 'crack down on this' (Merrill 2021, para 2) and Facebook made 'sweeping changes' (Morris 2022, para 6) to their ad delivery system to eliminate this, it uncovers larger problems of digital system design choices that facilitate the marginalisation of trans, non-binary, and gender-expansive people through technological infrastructures on a meso level. Nonbinary people are already a marginalised group who must

¹² For example, transmen's and AFAB non-binary people's difficulties accessing abortions, cervical-smear tests, and contraception services.

¹³ Minority Stress Theory demonstrates that multiply marginalised people experience significantly increased distress and stigmas associated with their identity when conflicts in values between dominant culture and minority groups occur (Meyers, 2003).

¹⁴ <https://patents.justia.com/patent/10891948>

¹⁵ <https://www.aclu.org/news/privacy-technology/holding-facebook-accountable-for-digital-redlining>

continuously fight for social and legal recognition, rights, legislation, and visibility daily, additional technological discrimination and lack of representation are unwanted headaches. Furthermore, the issue of gender-based data-exclusion extends beyond those who must fight for gender recognition, affecting anyone who chooses to not disclose their gender, opening different discussions around privacy.

Moving to stereotyping, we see online platforms reproducing, reinforcing, and perpetuating stereotypical sexist and cisgender-normative gender models, through a sexist assemblage (Gerrard & Thornham, 2020) of platform content moderation. This is something Saguy et al term ‘a self-perpetuating gender-binary cycle’ (2021), where a biological-essentialist theory of gender differences perpetuates a hierarchical, binary logic of gender ‘kinds’ with different social roles attached. Building on platforms as assemblages, Gerrard & Thornham consider platforms to consist of interfaces or content that are ‘momentary stabilisations or representations of socio-technical negotiations, alongside an interrogation of public-facing decision-making processes [community guidelines]; and machine learning (ML) processes’ (1268). Therefore, platforms are assemblages with durable elements that *do* things to the social world, reflecting ANT and AR principles. They share such assemblages are moderated twofold, through automation and human decision-making. Automated decisions are mapped against existing, known data, and unwanted databases followed-up by human moderation, who are ‘given seconds to decide if it [content] should stay or go’(Roberts, 2017), adding human decisions (and individuals’ bias’s) into ML models feeding automated decision making. Ultimately, Gerrard & Thornham argue this perpetuates normative gender roles. This is also reflected in internet-giant PornHub, as the platform builds fixed, limited gender identities that ‘work in conjunction with algorithmic infrastructure’ (Rama et al 2022, 4), subsequently embedding heteronormative-biases into its core, and reflecting Nakamura’s thought on menu-driven identities. Paraphrasing Rama et al - Pornographic sites are built around bodily categorisation (alongside race and sexual behaviour), frequently from a male, heterosexual perspective, with non-heteronormative practises depicted as ‘deviant others’. Paul Preciado (2013) places the categorisations within internet portals as spaces ‘modelled on and organised according to [this] masturbatory logic of pornographic consumption’ (39), with financial analysts of big tech ‘attentively following the fluctuations of the cyberporn market’(39. This divide and logic is not only prevalent in pornographic platforming, but across many and most platforms. Feminist publication *Salty’s* algorithmic bias reports (2019, 2021) on social media censorship, policing, and discrimination, show multiple examples of the

automated censorship and shadow-banning of people who were transgender, non-binary, disabled, sex-workers, sex-educators, BIPOC, fat, and other marginalised and stigmatised identities on Instagram and Facebook - essentially anyone who does not fit into heteronormative, monosexual, normative, and cisgender identities (i.e., data categories). These numerous examples demonstrate the multiple-marginalisation's of many, notably here gender-nonconforming people, ranging from everyday oppressions to automated-decision making affecting gender-expansive people with potentially catastrophic and lifelong effects.

CHAPTER ONE CONCLUSION

In response to the question - *how do digital technologies and their infrastructures mutually co-construct and mediate daily experiences, and do these allow for minority-gender people exist in our technologised society?* - there is little evidence presented so far to confirm that nonbinary people can exist congruently with their gender in the current incarnation of digitised-society, alongside much evidence confirm the extent of digital technologies deeply intertwinements forming a significant part of everyday life. I elaborated upon these topics by introducing AR and ANT theory, acknowledged platform and profile boundaries, and discussed how various digitised-systems silently structure and shape everyday ontologies and categories of gender. By highlighting the profound entanglements of digital and automated technologies infiltrating nearly all aspects of daily experiences, coupled with examples of how digital and programmatic systems can do marginalised peoples harm, I acknowledged that digital technologies are a core element of societies socio-technical assemblage, shaping gender and digital identities in restrictive manners through limitations of systems, profiles, automated recognition, and algorithms.

Through these examples and exploration, I built an understanding and awareness about how digital systems mutually influence and co-construct everyday life, affecting and shaping identities, while upholding outdated notions of binary-gender and administrating programmatic oppressions. Importantly, I offered insights towards dropping cartesian notions of dichotomous human/machine separations, ceasing to think of humans and digital spaces as independent, divided entities, instead understanding them as holistic, living, moving, inter- and intra-acting entities with agency, with real-life consequences on society. In the next chapter, I offer a historical exploration of coloniality, exploring how binary-gender discourse and programmatic oppressions have come into being through modern applications of digital neocolonial discourse, and ask where they originate from.

CHAPTER 2. CONTEMPORARY DIGITAL AND DATA (NEO)COLONIALISM

In chapter one, I contextualised the role of digital-technologies co-constructing day-to-day life, highlighting issues gender-expansive people face as they are programmatically excluded from and by many digital technologies. I introduced core issues and concepts of data, technological mediation, and digital constructions. In this chapter, I question how these exclusions and ontological oppressions have come into being, and where do they originate? What is the history underpinning the social-models and data-exclusions already discussed? To answer this, I offer historically contextualisation and introduce digital- and data neocolonialism as key contributing agents in the construction and framework of a digital society, asking the research question; *What is digital and data (neo)colonialism and its binary-gendered discourse, and how is it applied in a digitally co-constructed world?*

I approach this firstly by examining mechanisms of digital neocolonialism and data colonialization, drawing on digital colonialism research of Michael Kwet (2019), Mohamed, Png, & Isaac (2020), and Abeba Birhane (2020). Theories of splintered occupation by Achille Mbembe and Libby Meintjes (2003) are examined in relation to patterns of domination in digital spaces, and the mechanics of digital neocoloniality are discussed through the conquest and control of digital landscapes, seizure and surveillance of properties (data, infrastructure), and the monopolisation that ‘big tech’ exercises and retains through hierarchical power structures and algorithmic control of markets and locations. Next, I explore the coloniality of data and its binary-discourse, the ‘whiteness’ of AI and technology, and draw upon Nick Couldry & Ulises Mejias work *The Cost of Connection, How Data is Colonizing Human Life and Appropriating it for Capitalism* (2019), and Shoshana Zuboff’s work on Surveillance Capitalism (2019). Overall, the chapter discusses how digital neocolonial discourses are deeply interwoven into daily experience, mining personal data, shaping human behaviour at scale, and upholding binary-gender frameworks.

DIGITAL AND DATA (NEO)COLONIALISM, AND THE HUMAN CLASSIFICATION SYSTEM

What is Digital and Data Neocolonialism or, Digital and Data Coloniality? Firstly, I wish to name the assets and locations I am referring to as ‘digital’ and ‘data’. *Digital assets* include, but are not limited to, digital information systems, software, hardware (such as mobile

phones, laptops, network infrastructure), algorithms, machine learning (ML), artificial intelligence (AI), platforms (think Uber, Bol.com, AirBnB), and importantly, personal data. *Data assets* include things like data relations, data appropriation of human life, social data, personal data, and data surveillance and monitoring. The ‘Big Tech’ companies like Alphabet’s Google, Amazon, and Meta’s Facebook that create, sustain, and enforce technological hegemony through regulatory rules, are also of paramount importance when considering in the role of digital and data neocolonial sovereignty. Additionally, we cannot forget the public sector’s role here too – Governmental technologies and datafied records equally contribute to the datafication, surveillance, and control of digitised humans.

Historically, Colonialism is understood as ‘the conquest and control of other people’s lands and goods’ (Loomba 2005, 8), however, colonial dynamics have been steadily translated and programmed into digital spaces, computer systems, databases, and algorithms, as technological superiority has long been built into colonial logic (Adas, 1989). While modern colonialism restructured economies to draw them into complex relationships between colonised and colonial countries (Loomba 2005, 9), digital colonialism mimics the flow of resources through technical infrastructure, with tech firms’ products (software, information frameworks, algorithms, hardware) rolled out as singular access points to digital ecosystems, further supporting the growth of companies which retain monopolising powers. Michael Kwet of Yale Law Schools Information Society Project, shares ‘digital colonialism is a structural form of domination exercised through the centralized ownership and control of the three core pillars of the digital ecosystem: software, hardware, and network connectivity’ (2019, 1). It relies heavily on centralised Big Tech companies controlling, maintaining, and designing key digital landscapes through their platforms, algorithms, and systems. Paraphrasing Michael Kwet (2019), their global monopolies reinvent colonialism through imperial control at an architectural level. This is facilitated through several methods:

- Resource extraction through surveillance: surveillance of online habits and the collection of (personal) data, leading to market control, a form of **economic domination**.
- Digital ecosystem control: facilitation of direct political, economic, and cultural control, a form of **imperial control**.
- Surveillance through big data: violation of privacy, concentration of economic power, a form of **imperial state surveillance**.
- Claiming technological leadership: persuading society they must use the products offered by ‘Big Tech’ as there are no comparable services or products, a form of **tech hegemony**.

Using these singular-market style tactics, the mechanisms of digital neocolonialism are uncovered as structural, conceptual, and far-reaching. Data Colonialism works in very similar ways, focusing on the seizure, control, and surveillance of personal data and data-relations. Paraphrasing Couldry & Meijers (2019), we see capitalist and colonial-style entanglements expanding to exploit new resources, transforming and appropriating human life into raw materials, as big tech's surveillance, monitoring, shaping, and seizure of personal and behavioural data through SNS and other large platforms and infrastructures capitalises upon human behaviour. By employing structural tactics of domination, global tech giants act as colonial powers of control with near-complete market monopolies, dictating online landscapes and enforcing their regulatory rules onto society. The control and seizure of goods - in this case personal data - is nearly always a mandatory requirement to access platforms, technologies, or browse websites. There is no option to abstain from handing over at least the very basics your data. This can be anything from analytics information (IP address, location, click-behaviour) to far-reaching personal and behavioural data (detailed online interactions, click-behaviour, browsing history, online purchases, and interactions with products, content, and people), to business information on sharing platforms (sales, conversions, user demographics, returning customers, customers interests). One could say this is definitely an invasion of 'goods' (personal data) - personal information aggregated through data-collection. This modern seizure of goods powers surveillance models, allowing tech companies to understand the needs, habits, behaviour, and desire of users through data surveillance, capture, and collection - a surviving mechanism of colonialism transferred into today's digital systems.

Through this seizure of information, big tech can predict user behaviour and needs at a large scale, take advantage of vulnerabilities, influence, track, and change user behaviour, sustain profit through the sale and use of data, and maintain control by restricting choices and directing user behaviour to suit their purposes. Couldry & Meijers (2019) note 'global flows of data are as expansive as historic colonialism's appropriation of land, resources, and bodies, although the epicenter has somewhat shifted.'(339) Such shifts of the forms of power and control are visible everywhere in daily surroundings. Political Philosopher Antoni Aguiló (2020) adds 'the colonialism of today isn't carried out with crucifixes and swords, but through much more sophisticated mechanisms and institutions. Drones, algorithms, big data, fake news, hedge funds.... These are some of the forms of domination and control deployed to safeguard the interests of the powerful.' (para 5) As noted earlier, whose powerful interests are at stake in the digital world, and who profits from its domination and control? Do we have any reason

to believe the interests of the gender-diverse are included? As mentioned earlier, gender-expansive people are a very marketable category, yet still largely excluded and ignored.

Mohamed, Png, & Isaac describe digital colonialism as the sphere of ‘modern data relations – the human relations that when captured as data enable them to become a commodity – that recreate a colonising form of power’ (2020, 5). They note AI as a digital technology is portrayed as something that will reshape modern societies and their relations, through self-learning systems that constantly adapt¹⁶. While this has some positive implications, it carries sizable risks for vulnerable and less-represented people, manifesting as ‘problematic applications that are instances of coloniality’ (2020, 1) perpetuating bias, unequal societal power structures, and other forms of harm programmatically. Abeba Birhane – a cognitive scientist specialising in ethical AI - echoes this in her article *Algorithmic Colonization of Africa*; ‘while traditional colonialism is driven by political and governmental forces, algorithmic colonialism is driven by corporate agendas’ (2020, 389). Birhane continues with ‘the West’s algorithmic invasion simultaneously impoverishes development of local products while also leaving the continent dependent on Western software and infrastructure’ (2020, 389), echoing Loomba’s words on colonial relationships restructuring economies to be dependent on the platforms and infrastructures of dominant companies. Using tactics to ‘liberate the bottom billion’ (2020, 393), Western companies like Google, Netflix, and Uber are exploiting their position to connect the ‘unconnected’ in Africa, ‘the same colonial tale... now under the guise of technology’ (2020, 393). Further worrying techno-solutionism designed to appease dominant social groups, include the recent development of ‘accent translation’ software designed to make call centre workers accents ‘sound white and American’. This was unveiled by Silicon Valley start-up Sanas in summer 2022, self-describing their software as ‘magical’ (Bote, 2022). The whiteness of technology, and particularly AI, is nothing new. Visual culture theorist Nicholas Mirzoeff’s (2020) work unpacks AI with special attention to the formation and deployment of artificial vision as longstanding feature of colonialism, rooted in practices of surveying and seeing erased territories, from ships and trains to drones today, producing a discourse of white spaces that claim white ownership. Cave & Dihal (2020) of Cambridge’s Leverhulme Centre for the Future of Intelligence, offer other thoughts on the whiteness of AI, observing AI reflects the normalisation of whiteness, to imagine autonomous machine intelligence is to imagine white people as intelligence is predominantly attributed to

¹⁶ E.G., Self-learning A/B testing systems for online advertisement delivery

them, and that AI erases people of colour through the white racialisation of AI. Further racialised, gendered, and sexualised categorisations through AI and algorithmic decision making are further imposed by search algorithms, as Safiya Noble uncovers in *Algorithms of Oppression* (2018). Noble reported Google's search algorithms preserve stereotyped, racialised, and sexualised search results. Examples include only attributing images of white people to white collar jobs, and offering sexualised, stereotyped, and pornographic results when searches for 'Latinas' or 'Black girls' were executed, reinforcing racist stereotypes and the 'male pornographic gaze and marginalizes women as objects' (58). As Google search upholds dominant cultural power and is also 'conceived of as a public resource, even though it is a multinational advertising company' (ibid, 132), we cannot forget its dominant influence on knowledge and culture. Information is shifting from libraries and schools to private companies, managed by algorithmic decision-making and data-surveillance for-profit. This has some positives, like allowing everyone access to information instead of only the privileged, predominantly white people who could traditionally access libraries and the university. However, we cannot forget the dominant position big tech upholds through services like Google, reinforcing unequal, cis-heteronormative, racist, and sexist representations through its algorithmic curation of search results.

As neocolonial frameworks continuously roll-out through big tech's solutionism and algorithmic mediation from north-to-south, it is pertinent consider the coloniality of the algorithm, that cannot be 'separated from the taxonomical order that set the basis for the human classification system underpinning the colonial enterprise' (Dzodan, 2021). Classification systems are crucial for infrastructure to function, becoming naturalised through usage, are often unquestioned until they cease to function or break down, and have significant consequences (D'Ignazio, 2020, 104). The human classification system's discourse of gender is arguably breaking down and unfit for purpose, reliant upon European, hierarchical, binary notions of gender, with a history of stamping out other gender identities and imposing western, binary ideas of gender onto the colonised. Maria Lugones (2010) discusses this as the colonial/modern gender system, a 'narrowing of the concept of gender to control sex, its resources, and products constitute gender domination' (27), and as something that only 'orders the lives of white bourgeois men and women'(31), as racialised hierarchies violently 'other' the subjugated, and everyone who did not belong to the white, European hierarchies of colonial identities. Interestingly, Lugones explores binary-divergent people through the case-study of intersexuality as an abnormality that must be fixed by the surgical inscription of binary sex

upon intersexed bodies, highlighting the fact legal institutions retain control of how bodies are assigned gender. However, as discussed earlier, algorithmic governmentality and some platforms arguably have greater power over human classification than any nation states legal system. Considering this, can we categorically say that nation's gender systems are the only or correct way to classify a body and its' gender? Lugones shares something not recognised is throughout history is around 1-4% of the world's population are intersex, while feminist biologist Anne Fausto-Sterling shares 'there is no single biological measure [to place humans] into one of two categories – male or female' (2000). It is clear there have always been multiple variations of gender outside the binary categorisation of sex, that have always been present but were simply undocumented. Returning to algorithmic identities, the colonial logic of oppressing the subjugated and enforcing binary-gender upon humans is visibly upheld colonialesque-algorithmic categorisation, as society and humans are programmatic shaped through profiles, platforms, and databases, and subsequently monitoring by surveillance capitalism, which I elaborate on hereafter.

PLATFORM AND SURVEILLANCE CAPITALISM

Arguably, Platform and Surveillance capitalism are one in the same, as their operational tactics function in similar manners and work hand-in-hand, and functioning as an adaptive modern mechanism of coloniality, demonstrating the hybridity of colonialism. To quickly summarise, *Platform Capitalism* operates through economic actors (e.g., platforms like Uber, Airbnb, Deliveroo, MrFix.nl, Amazon) and profiteer through platform users' labour. *Surveillance Capitalism* operates by claiming human experience (personal behavioural data) as a raw and free material that can be commodified for profit. Platform capitalism often functions through 'gig-economy' sites like Uber, Airbnb, YouTube, Amazon's MTurk, and Deliveroo. These are often termed as the sharing economy, yet function on purely-capitalistic values unrelated to sharing, as they profit from and function on the labour of others. Niels van Doorn (2017) discusses how by nature, platforms provide on-demand labour services, acting as hierarchical intermediaries, shifting racialised and gendered exploitative and degrading labour practises into the techno-solutionism of everyday tasks, 'supporting the nuclear, heteronormative, and white family form' (905), further upholding the cis-heteronormativity of binary gender roles, rooted in Euro-western colonial discourse. Racialised hierarchies are also prevalent, as 'today's data-based digital surveillance systems are deeply rooted in longer-standing norms of white supremacy' (Hoffmann 2021, 3542), further supporting unequal

labour distribution and exploitation. The mechanics of platform labour rely on the capture and domination of markets, something economic geographer Andrea Pollio's 2019 details in *Forefronts of the Sharing Economy – Uber in Cape Town*. The detailed investigation delves into Uber's reliance on local developmental entrepreneurship of taxi drivers, to embed its algorithmically-driven platform into local economies in South Africa, perfectly demonstrating market seizure, control, and profit through a platform. Kwet (2019, 4) echoes this, discussing Uber's 'devastating effects in Africa and beyond', as Uber takes approximately 25% commission for each trip, instigating a flow of income from the Global South to North, acutely penetrating and possessing the local market by ensuring they could 'operate at a loss – to the tune of billions' (ibid). By saturating local markets, a market and local-infrastructures monopoly is again exercised. How this is implemented must also be considered, which is where Surveillance Capitalism comes into play, a key mechanism of online platforms success.

SURVEILLANCE CAPITALISM

Surveillance capitalism and the surveillance economy extends further than platforms, digitally infiltrating, shaping, and influencing our daily habits and experience through the monitoring, analyse, and predictions gleamed from our data footprint by big tech. As it is a key element for directing platform strategy, development, and global-rollout, as the surveillance of users allows organisations to form complex and overarching digital strategies based on user-data and predictive analytics to gain and sustain market control. Shoshana Zuboff (2019), author of *The Age of Surveillance Capitalism – The Fight for a Human Future at the New Frontiers of Power* (2019), describes surveillance capitalism as 'a new economic order that claims human experience as a free raw material' and 'a parasitic economic logic' feeding and profiting on human 'data exhausts', aka our behavioural data-footprint. This is realised through ML processing data-footprints and transforming them into 'prediction products', before they are traded in new digital marketplaces that Zuboff terms behavioural futures markets, where datafied human voices, personalities, and emotions are sold.

You may be curious why I focus so much on surveillance capitalism, and what has that got to do with gender and neocolonial discourse? In chapter one I highlighted the interconnections of digital technologies and tools co-constructing identity and society. Here, I intended to illustrate the importance of being aware of these systems to offer insights into *how* such technologies influence and infiltrate everyday life, by elaborating on what happens with the information shared in digital systems, by returning to profiles and acknowledge the role of

User Profile Information (UPI) and personalisation. Profiles – whether created by a user or gleaned as UPI – are mined for behavioural data, creating the algorithmic identities I also covered in Chapter one. Using Google as a key example¹⁷, it is one of the biggest global players in human surveillance techniques. Google has a market monopoly on surveillance and as Zubroff coins it, behavioural futures markets (2019), powering their business models of predictive analytics and online advertising. Google makes around 90% of their annual profits from their online advertising network AdWords, and is an industry built upon UPI and predictive analytics. Google openly acknowledges their UPI are constructed from monitoring and mining online search queries, and vast other online behaviours and actions. However, this is where it gets interesting from a gender and intra-connectedness perspective. As Zubroff outlines, Google's UPI engineers share UPI are constructed from users and groups actions, and the information the user provides *through* their actions. UPI categorisation therefore becomes a social, instead of – or *as well as* - a technical challenge. We also know that UPI powers much of what a person sees online or through other digital experiences on mobile phones, in apps, etc, or in this case with Google as our example, search results and targeted advertisements matched to our UPI. Now we see the social and human influence on the digital experience as outlined by Latour, crafted through the hands (and influence) of Google engineers, predictive analytics, ML, and AI. Is it reasonable to imagine that UPI could be inclusive of varying genders, and would serve 'relevant' content to those categorised as binary-incongruent? Considering the huge array of genders outside the binary and acknowledging the fluidity of these, it seems impossible to reductively categorise genders in places like Google's UPI. It feels impossible to trust Google and other companies to accurately understand and categorise varying gender identities, as we know such systems work under purely capitalistic values, thinly-veiled as services offering users the best personalised experiences. Experiences of gender are also not universal; one non-binary experience is not the status quo, and the idea that Google's UPI and other similar constructions would decide what that experience is, feels deeply concerning. However, is it better to have no option and be categorised as gender neutral, or simply as withholding that information – an erasure of gender – or to be categorised into Google's idea of what a non-binary person is? What content would Google serve to nonbinary people, and how would this shape their experience in the world?¹⁸ We know the history of data

¹⁷ Other comparable platforms and companies of comparable influence include Amazon, Meta, and TikTok.

¹⁸ See section X in Chapter one; Google and Facebook's exclusion of nonbinary people / digital redlining

and human categorisation lies in a binary, dualistic logic of gendered colonial discourse, programmed into computer systems, algorithms, and databases for decades, demonstrating the hybridity of colonial mechanism of control. Already, for queer, transgender, nonbinary people, and the wider LGBTQIA+ society, the notion and judgement by their own communities (and those outside) of ‘passing’ or as being non-binary ‘enough’, or trans ‘enough’ is high, adding further societal pressure to individuals about their gender and sexuality, based upon wider societies construction of their identities, which are heavily influenced and co-constructed by digital elements like UPI structuring the boundaries of identities. While the LGBTQI+ and other community are well-established worldwide, representation and inclusion within the big tech world is incredibly difficult to attain.

NEOCOLONIAL OCCUPATIONS: EXERCISING CONTROL OF DIGITAL TERRITORIES

It is pertinent to note the lengths big tech will go to protect and enforce their domination of digital territories and infrastructure control, while using data and statistics to ‘preserve unequal status quo’ (D’Ignazio, 2020, 17). Recent examples include the ousting of Google worker Ariel Koren in 2022 for speaking out over Project Nimbus, and of Google’s ex-AI Ethics team co-lead Dr. Timnit Gebru in 2020, for her role in co-authoring a research paper criticising unethical data practise at Google (Hao, 2020). Koren was told to move from the US to Brazil or lose her job after protesting the \$1.2bn contract Google held with the Israeli military, providing them AI and cloud-services. Koren shared ‘Google systematically silences Palestinian, Jewish, Arab and Muslim voices concerned about Google’s complicity in violations of [Palestinian] human rights — to the point of formally retaliating against workers and creating an environment of fear’ (Grant, 2022). Gebru’s paper examined Google’s carbon footprint generated from training big data models directly impacting the global South, and data-model training practises resulting in ‘language [that is] homogenised, reflecting the practises of the richest countries and communities’ (Hao 2020, 13). Googles data- and algorithmic-models privilege dominant languages, reflecting the online linguistic footprint of rich western countries and their cultural behaviour, creating online spaces where countries with smaller online linguistic footprints are forced to adapt to English, Anglophonic naming conventions¹⁹, and ways of knowing,

¹⁹ Facebooks ‘real name’ algorithm reportedly flags Native-American names for naming violations as they do not follow Anglo-Western naming structure. (D’Ignazio, 2020, 118)

exercising a colonial linguistic and cultural occupation of digital territories. Mbembe & Meintje summarise this well;

‘Colonial occupation itself was a matter of seizing, delimiting, and asserting control over a physical area... the writing of new spatial relations... the production of boundaries and hierarchies... [giving] meaning to the enactment of differential rights to differing categories of people for different purposes within the same space... space was therefore raw material of sovereignty’

Mbembe & Meintje. *Necropolitics*. 2003, 25-26.

I draw further spatial parallels in digital neocolonialism practises and shifting digital structures of sovereignty with Mbembe and Meintjes’ discussion of the splintering of occupation in Palestine and Israel, in their text *Necropolitics*. They describe the physical infrastructural control of the late colonial occupation of Palestine, as ‘a splintering form of colonial occupation... characterised by a network of fast bypass roads, bridges, and tunnels that weave over and under one another’ (2003, 28). They note further that the conditions of splintering colonial occupation are not solely at the surface of the earth, but also in the air at varying levels, implementing a vertical sovereignty where boundaries are blurred and ‘battlegrounds... are not located solely at the surface’ (2003, 29). While Mbembe & Meintje refer to the shifting boundaries of physical locations melting into previously unconquered territories of the air and sky; digital neocolonialism has splintered by occupying virtually all digital spaces. Such splintering of landscapes and control is applied through the deployment of infrastructures like Ubers market saturation in Cape Town or Googles imperial control over search results globally. While all users technically occupy the same digital cyberspace, they are always separated and divided by the tech giants domineering control of digital-infrastructures mediating user experiences, access to information or services, and shaping online content. Through splintering occupation globally, this facilitates sneaky pathways out of accountability for systematic control and regulation of online territories, such as Google’s claim of innocence when producing frameworks that serve racialised and sexualised search results to users. One example includes Google’s claim that their algorithms reflect their user’s linguistic intents, wants, and needs, (Noble, 2018), enabling Google to wiggle out of accountability by claiming a splintered occupation of globalised space, passing responsibility onto their end users. By denying their role - providing an algorithmic infrastructure on their terms, to serve their purposes - the tech giants offering pathways to information are splinter responsibility to infinite locations, like user behaviour and independent algorithmic choices. Similarly, on-demand platforms rely on strategies that enforce their and their customers immunity (Van Doorn, 2017) to accountability

or the obligations of offering employment rights to workers making the platform profitable. This is realised through dissipating responsibility to the platform workers and using terms of service agreements which platforms reserve the right to change at any point with no notice, offering accountability loopholes, and ‘skew[ing] power relations to the advantage of requesters rather than workers’ (ibid, 902), at the mercy and control of the platforms. Operating on global scales, we must also consider the affect this has on our global data landscape, which I discuss more in the following section.

THE GLOBAL DATA LANDSCAPE AND COLONIAL BINARY-GENDER DATA DISCOURSE

European colonial expansion deployed gender and sexuality as technologies to categorize colonized bodies into distinct kinds, while sexual and gender diversity in non-European contexts was used as a rationale to support the removal, ‘re-education’, or wholesale genocide of colonized others. The traces of those histories of removal and dispossession remain, as do their imbrication in global sexual and gender politics.

Aizura et al., *Transgender Studies Quarterly*. 2014, 308

The global data landscape should also be accounted for when considering power-structures, hierarchies, and particularly representation; we are overloaded with dominant data groups of rich countries in the global North, while we barely have any data for poorer countries and People of the Global Majority (PGM). New inequalities such as the development of digital neocolonial dynamics enabling unequal flows of capital through platform capitalism, and PGM’s reliance on infrastructures of the global North, are already very prevalent in the global North/South digital divide. This is increasingly apparent in general data representation as well. Data inequalities between men and women, BIPOC (Black, Indigenous, and People of Colour) and white people, disabled and able bodied, and between different social classes reflect systemic and structural inequalities in the offline world, as inequalities are consistently programmed into the data-driven and regulated world. Further, there is an abundance of data that is heavily skewed towards men and masculine experiences, mirroring hegemonic and colonial patterns of domination that have occurred in the offline world for centuries, mimicking colonial and enlightenment-period humanist constructions of binary gender. Yet as society looks towards the global norths data protections (Taylor, 2017, 3) that are framed as a fundamental rights network offering protection, information privacy, free speech, and

communication, we must acknowledge this relies on the idea that individuals seek redress, and issues or violations are clearly visible so those affected can respond. As discussed earlier, even in the global north, issues like gender-expansive options in digital-systems reflecting non-binary genders are not always visible and hidden in back-end databases that most people do not have access to or understanding of, then reverted to binary-datapoints again. There are few, if any, legal protections for nonbinary people covering digital discrimination, making redress difficult or impossible to attain. This model also assumes persons affected can seek compensation for the wrongdoing, yet this is beyond the means of many marginalised people. Additionally, if the issue of a lack of representation is not resolved in the already-powerful western infrastructure, this will continue to trickle out through the digitisation of the Global South, stamping European binary-gender concepts onto their systems, and deepening gender inequalities globally.

But where has the static, fixed notion that gender is an immutable, binary element in digital system-design originated? To understand this, I examine the history of computer system and database design alongside the development of gender categorisation over the past few centuries. Colonial occupations that have long relied upon information-gathering and documentation to build colonies, as Farish Noor (2019) details the 19th Century occupation of South-East Asia. As locations and their inhabitants were ‘discovered’, they were written and ‘constructed by the men who wrote about [them]’.(15) Noor continues; data was collected to meet agendas, ‘but curated in a sophisticated and intelligent manner so as to frame Southeast Asia... as objects of knowledge that could be utilized or even weaponized in some instances’.(18) Data collection, record management, and categorisations have long relied upon European sciences’ ways of knowing and epistemologies (Quijano, 2000), rooted in Victorian scientific approaches to understanding societies based on human classification that classed native people as ‘savage’ and Europeans as the ‘superior race’ (Noble, 2018), and the subsequent implementation of the colonial / modern gender system (Lugones, 2010). System design principles and database logic can be traced back through colonial Library and Information Science (LIS) practices (Olubiyo 2022, Otike 2017), and museum, collection, and archive management techniques (Odumosu, 2020), as LIS principles are an ‘important part of understanding the landscape of how information science has inherited... biased practises in current system design’ (Noble 2018, 322).

Fast-forward to the 1950's when the first computer systems were designed, decades before nonbinary genders gained greater visibility, in a time when gender was only recorded and categorised as male or female. British and American social and societal perspectives influenced how gender was programmed into some of the earliest governmental computer systems supporting pensions, ID cards, and other social security benefits, as the same gendered logic trickled out into wider database and computer system design (Hicks, 2019). Gender schemas were encoded using binary code, a numbering system of 0's and 1's with two possible states, powering computer systems and when it is stored, it is data. Data is stored in databases, where it is sorted, stored by data-type, and given values of letters or numbers. To then do something with the data, it must be given a variable (these too also have types) and linked to a computer system for whatever chosen purpose. However, as Broussard (2019) points out in their essay on binary-logic in databases, the engineer building and maintaining the database has vast responsibility – choosing what data is entered into fields, deciding who can enter and change the data, what the limits of the fields are, if they can be edited or if they are fixed – we then see ‘human social values being superimposed on a mathematical system’ (ibid, para 9), reflecting my earlier discussions of human influence on data. Fast forward to the 2020's, and we see global infrastructures built upon decades of binary logic, influenced and maintained by humans and their biases, norms, and understandings of gender, demonstrating Latour's observations of engineers and data-collectors constructing human and non-human society alike.

CHAPTER TWO CONCLUSION

This chapter outlined and introduced digital- and data-neocolonialism, offering a genealogy of how colonial-logic has adapted to be programmed into digital systems powering and influencing contemporary society, underpinned by binary gender categorisation systems. I explored how digital neocolonialism is applied today through discussing platform- and surveillance-capitalism as key surviving mechanisms of contemporary digital-colonial discourse, that exercises control of the digital territories mutually co-structuring society. This provided an overview of how surveillance capitalism operates by monitoring and claiming human experience data as a raw, free material that can be commodified for profit, and is reliant on elements like UPI to categorise and sell human data. Lastly, I considered the global data-landscape, discussing how unequal representations from the global north preserves binary-gender human categorisation systems, that are rooted in colonial data-recording techniques that

subsequently formed the basis of LIS practises, collection, and archival techniques, and subsequently data-base management and computer system design rolled-out through binary code. In the next chapter, I discuss design methodologies and data practises that can begin moving away from the colonial-esque binary-gender categorisations that have come to be in digital entities.

CHAPTER 3: TOWARDS ETHICAL GENDER-INCLUSIVE SYSTEM DESIGN AND DATA-LED JUSTICE

LGBTQ lives require us to radically reimagine how we conceive data itself.

Ruberg & Ruelos. *Data for Queer Lives*. 2020

In chapters one and two I discussed interconnections of the material / digital world, contextualising the mutual constitution of digitalisation and human experience, followed by historical context and discourse of neocoloniality and its capitalistic, binary-driven discourse reprogrammed into various digital systems. Lastly, in this chapter I ask *What ethical considerations and methodologies can be employed for designing a fair, more gender-expansive world?* I approach this firstly considering inclusive design methodologies and data collection methods, examining Ruberg & Ruelos (2020) case that current demographic data-collection methods are insufficient for accounting for the complexity and in-flux nature of queer lives alongside recommendations from Hasinoff & Bivens for *feature analysis* (2021), and Sanches et al's AR design approaches (2022). Lastly, I approach data and design justice utilizing Costanza-Chocks *Design Justice Framework* (2020) that recognises design as a human activity and offers community-led principles, D'Ignazio & Klein's proposal of *Co-liberation* that moves beyond the idea of 'doing good with data' (2020) to a place where all can free themselves of oppressive systems, and Taylors work on *Data Justice*(2017) aiming to combat data discrimination by presenting three pillars of design methodologies for building a fairer society.

But how (and can?) a fairer, more just, and equal place for people of many genders to comfortably exist be designed? What considerations can be taken to ensure data is collected and used in ethical and non-discriminatory manners? Just because we can collect data, does not mean we necessarily should. The needs, wishes, and context of nonbinary people must be considered and included at all stages of data-collection and design practices, with data and design choices preferably led by gender-expansive people. Thinking in terms of AR and writing oneself into digital being, the potential (and long-term) consequences must be carefully considered as a matter of primary safety for nonbinary people, accounting for the lack of legal recognition and protection against discrimination. Being made visible has sizable risks - discrimination, structural oppression, unwanted attention, violence, or even imprisonment

(D'Ignazio, 2020,110). Limited data on can have other adverse effects, like potentially stigmatising and stereotyping already multiply-marginalised people through things like 'over-representation in statistics on depression, self-harm, suicidality, drug-use, unemployment, and homelessness' (Vivienne 2020, 95). This can feed things like unsavoury media-narratives of genderqueer people and focus on victimisation or other negative stereotypes, with stories dramatizing suffering for defaulting from dominant gender-norms, backed-up by slices of data sharing partial perspectives. Concurrently, increased media representation helps to normalise gender-expansive people's existence, creating pathways for greater rights, support, and recognition, and building space for a more fluid and accepting world for gender-diverse people to comfortably exist in, but must be handled in a conscientious and ethical manner. Next, I discuss several inclusive design methodologies to discover how and if a place of more gender-inclusive design can be achieved.

INCLUSIVE DATA AND DESIGN PRACTICES: DISCUSSION AND POTENTIAL METHODOLOGIES

Much coverage on oppressive digital practises focus on harsh outcomes, biases, and discriminatory practices embedded in design and data-collection practices. This is precisely not what I wish to focus on, enough scholarship and media narratives centre negative accounts. Instead, I look towards constructive methodologies that account for and challenge societal, systemic, and culture discourse to navigate different approaches to design-thinking and data-collection.

In chapter one, I discussed the role data producers it is imperative to focus on the designers and data-producers themselves, to realise any of these recommendations. This is something design researcher Sasha Costanza-Chock focuses on in her work *Design Justice: Community-Led Practises to Build the Worlds We Need* (2020). Costanza-Chock details we must recognise design as a human activity and acknowledge design jobs are disproportionately given to those occupying high(er) privileged-positions in The Matrix of Domination. This term, coined by social theorist Patricia Hill Collins in her 1990 book *Black Feminist Thought*, refers to a series of interlocking oppressions (race, class, gender), helping to understand how oppression, harm, resistance, power, privilege, benefits, and penalties are systemically distributed. Returning to a lack of representation in the tech workforce with dominant social groups ruling tech spaces, Costanza-Chock notes this produces a 'spiral of exclusion as design industries center the most socially and economically powerful users'(9), systematically

excluding others across multiple levels, and prioritises ‘real-world users’ rather than ‘the full breadth of potential users... [as] designers tend to unconsciously default to imagined users whose experiences are similar to their own’ (ibid, 9). Here, key ANT concepts are prominent, as design choices are assembled under the umbrella of [a] society’ (Latour, 2005), reflecting workers and big techs agendas, rather than the rich variations of wider society and nonbinary people. Therefore, to realise gender-inclusive design, small-scale design-solutions alone are not enough and societal power-frameworks must be accounted for to address deeply-rooted cultural and systemic exclusions.

But what methods can be employed to counter systemic-exclusions in existing technologies? Identifying cultural and societal norms embedded in systems, is one way to approach understanding how such things become programmed into digital systems, and a first-step for reducing this. One proposal addressing this is what Hasinoff & Bivens (2021) term *feature analysis*, a methodology to answer *how* designers’ choices reflect cultural norms, assumptions, and ideologies. Highlighting the vast array of scholarship focusing on the impact of discriminatory technologies, they focus on understanding design choices underpinning discriminatory outcomes. They suggest a four-phased approach for analysing this, with a notable last focus on speculative design to imagine alternative ways of conceptualising design practises, harnessing ‘new imaginative instantiations – of what might be’ (103). Ultimately, feature analysis offers a way to make politics and social-discourse in design visible and can be employed as a tool to unpick social and gender-ideology in system design. On its own, this does not help design more inclusive worlds, yet could be used as an important tool for educating future-designers on best practises for lessening bias. As with Googles ad discrimination case, and Facebook and Tinders’ gender system design issues demonstrate, it is possible to identify some programmatic discriminatory behaviour through methodologies like feature analysis, yet very challenging to prevent and protest it when little legal recognition of gender diversity exists.

A recurring recommendation is directly involving diverse-communities in all stages of design, and ethical training for design and engineering students, something Shelton et al (2021) also recommend. They advise:

- Transgender and marginalised communities must be ‘directly involved in technology development, testing, implementation, and evaluation’
- A core part of primary education includes anti-bias training
- Design and engineering students must receive compulsory ethics training

- The communities most impacted must be involved in design processes to build safer, less data-violent digital spaces that do not reinforce societal structures of power and dominance, reflecting Costanza-Chocks' focus of centring the voices of those directly impacted.

Leaning into centring queer and gender-diverse people, a key recommendation presented in Ruberg & Ruelos article *Data for queer lives: How LGBTQ gender and sexuality identities challenge norms of demographics* (2020) is unsurprisingly to collaborate with LGBTQ people, as they have 'the best understanding of how to respectfully represent and describe their own experiences'(10). Notably and very importantly, they present ideas for reconceptualising how we work with 'queer' data, arguing the norms of demographic data collection are insufficient for accounting for the complexities of queer lives, due to the often multiple-identities and flux-state many queer people possess. Queer people may also have multiple, contextual, and fluid online identities, possibly as mechanisms to protect themselves (Haimson & Hoffman 2016) however, as demographic data collection often relies on the idea of gender as fixed and immutable, singular, and discreet; *it fails to account for genders fluidity, temporality, and nuances*. This observation is crucial to acknowledge, as by nature, LGBTQ+ lives 'require us to radically reimagine how we conceive of data itself' (Ruberg & Ruelos 2020, 3), and to lose the assumption that data can accurately reflect identity. These are uncomfortable acknowledgements to make; that data as we know it today may never be sufficient for recording gender well or accurately. Knowing that data and digital systems generally uphold binary, monogamous, cis-heteronormative frameworks of identity, family, and relationships, and that LGBTQ+ lives do not necessarily follow these frameworks at all - often diverging greatly from and fragmenting dominant gender, relationship, and family constellation standards - it is not strange to call for a reconceptualization of how queer data is treated and understood. However, while there are many considerations and ultimately, reconceptualization's, of how to approach demographic and gender data, there is an urgent need and want to 'make that data better' (ibid, 4), and fruitful to reconsider how we think about identity-data, viewing it as an interesting philosophical element to ponder.

This is something professor of information & data, Anna Hoffmann, discusses in *Data, Technology, and Gender: Thinking About (and from) Trans Lives* (2017), referencing issues of identity, data, and information systems. She notes gender-expansive people 'expose the urgency of recognizing the very real and lived challenges these tensions and the rapid rise and adoption of data-intensive technologies and platforms generate for already vulnerable trans and

queer populations’(11). Hoffman terms this as a data-violence or data-harm against transgender and nonbinary people, inflicted by the ‘information systems that permeate our everyday lives’ (1), perpetuated by a lack of data representation and digital systems disallowing their existence. However, is it even necessary to record gender in such systems? An uncommon take on sex or gender-recording is David Hester’s question, posed in response to intersex people:

‘Is it even an ethical obligation to have a sex? The obligation to have a sex is so deeply entrenched that when one is faced with a body that does not conform to the self-evidentiary ground upon which gender performance is said to take place, a sex will be surgically inscribed upon it, manufactured for it.’

David Hester, *Intersexes and the End of Gender: Corporeal Ethics and Postgender Bodies*. 2004, 222.

The same idea of gender inscription upon users is found in system-design as incorrect identity-categorisation data are inscribed onto gender-nonconforming people, often dissolving identities and fracturing internal senses of self through a lack of relevant gender-options. Drawing on intersex debates offers useful insights into how gender is culturally and societally enforced through its roots in historic ideas of gender categorisations as immutably and binary, as discussed in Chapter two. However, we know it is certainly possible to make gender-representation and recording in data better²⁰ and possible to gather more gender-diverse data, yet how do we ensure it stays diverse and is not *reprogrammed* into binary notions? Is it possible to find methods to make gender-recordings less static or fixed? The temporality and shifting nature of gender (and sexuality) results in queer people challenging and exploring social defaults of cis-heteronormativity, going against ideas of ‘set’ identities. Ruberg & Ruelos discuss this extensively using their gender and sexuality demographics data collection methodologies, where they allow respondents to answer gender and sexuality questions with multiple answers. Their results demonstrated for sexuality, 41% of respondents selected multiple sexual identities, and for gender, 12% shared more than one gender identity. They openly acknowledge their survey-design limitations, which offered more sexuality-answer options than gender-answer options, which could be responsible for why the number of responses of multiple gender identities were lower. Their subsequent recommendations for more nuanced, inclusive, queer data collection focus on three pillars:

²⁰ E.G., Facebook and Tinder’s 50+ genders, noted in Chapter one

- Allow respondents to check multiple boxes for gender identity
- Understand identities change over time, and are temporal, dynamic, and contextual.
- Collaborate with LGBTQI+ people to understand their needs and respectfully represent them.

So far, it appears a reconceptualization of how we comprehend and work with data is necessary for approaching fluid and nuanced lives, directly working from LGBTQ+ perspectives, and providing broader options for self-identification.

Returning to AR, another position to consider is Sanches et al's (2022) approach to design through the eyes of AR, offering 'an alternative to representationalism' (3). Their reconceptualization of data focuses on resisting treating data as an object or as neutral, instead treating data as ambiguous, open-ended, and holding space for it to be messy. This enables multiple interpretations and possibilities to open, while working with data in slower, long-term fashions, allowing temporal discoveries of difference, supporting Ruberg & Ruelos's reconceptualization of data approach. By using AR in design, the focus is shifted to 'how design materials, people and the environment intra-act with each other' (ibid, 3), rather than capturing a datapoint at a singular, fixed moment in time, as they ask what would happen if designers 'stopped treating data as an abstract, insight-laden "thing" and... turned their focus to phenomena of continually transforming materials and meanings?'(4). They note AR has been proposed as a way of theorizing and designing a world where technologies (data) and bodies (or identities) are increasingly integrated. This approach offers a premise for temporal and genderqueer-first approaches to navigating gender in system design and data-collection, for example, enabling designers and systems to program in questions at timely intervals checking if users' gender has shifted since it was last recorded, offering space for broader gender expressions. Concurrently, design choices like these can be understood as agential cuts, and must have ethical mechanisms to ensure they are not abused as marketing opportunities if they are to embrace AR thinking, and are 'act[s] of responsibility... that makes some worlds possible and others impossible' (ibid, 4). How differently would the digitised world look if designers, engineers, and 'tech bros' received ethical training to understand the impact of data, design, and digitisation on society as part of their education, or as professional development within the nation-state-like tech giants? While we can dream of such developments, it is not yet commonplace, although through advocacy, visibility, and robust policy, shifts like this may slowly start materialising. To wrap-up, it is clear shifts in data-collection and increased

community-inclusion need to be realised to offer nonbinary people space to freely exist. The next section explores several potential approaches for achieving gender inclusion through design- and data-justice theories.

DESIGN AND DATA JUSTICE

There is a distinct need for more diverse inclusion and justice frameworks supporting inclusive design practises for genderqueer people, but what methodologies can facilitate this, and in what scenarios are they successful? I approach this utilizing three theories: Costanza-Chocks design justice framework, D’Ignazio & Kleins proposal of co-liberation, and Linnet Taylors’ work on data justice, as potential approaches towards digital justice for genderqueer people.

A central theme of Costanza-Chock’s (2020) Design Justice is inclusion, pressing that it requires the ‘full inclusion of people with direct lived experience of the conditions that the design team wants to change’(16), focusing heavily on community control and knowledge, and marginalized communities leading design practises to produce ideas and approaches other could not. Design justice recognises design as a human activity, calls for dismantling the matrix of domination, challenges structural inequalities, accounts for the needs of the users from intersectional perspectives, ultimately calling for community-led approaches. It embraces elements of participatory design (PD) and human centred design (HCD), yet as Costanza-Chock highlights, PD offers ‘concrete mechanisms for community control’(30), while HCD has ‘little to say about values, community accountability... or distribution of benefits’(29) like profits. She notes that design justice can help to ‘guide us in the long-term struggle to transform institutions’(30), like universities, professional associations, and standards boards. Design justice principles appear to offer nice solutions to dismantle the matrix of domination and offer marginalised communities a greater say in design processes, yet only in the non-commercial sector. I question if these principles translate into big tech spaces, which as I discussed earlier, are intent on exercising sovereign control of digital territories and have no reason (other than profit) to include more diverse communities. However, operationalising design justice principles through nonbinary-inclusion in engineering teams offers exciting opportunities for realising concepts like Sanches and Ruber & Ruelos’s takes on embracing AR and reconceptualising how queer data is handled. While I question if Costanza-Chocks methodologies could be successful in commercial sectors, it could support the implementation of D’Ignazio and Klein’s proposal of *co-liberation* (2020). Co-liberation shifts away from the

idea of doing good with data to designing for *co-liberation* to reach a state where ‘dominant and minoritized groups free themselves from oppressive systems. With this, technical workers must understand their role of participation in their own liberation from dominant groups by acknowledging their own partial-perspectives, positionality, and embrace transparency and reflexivity to be explicit about project-methodologies, and deliberately invite data-subjects and marginalised people into projects. The main advantage co-liberation seems to offer over simply including data-subjects in projects, is the conscious acknowledgement of and wish to depart from oppressive systems by all involved in a project. However, the trickier part comes to selling the idea to workers, for they must first understand and acknowledge the power-dynamics and hierarchies they must try to shift, and they must wish to do something with this. This passes responsibility onto individuals rather than tackling hierarchical systemic inequalities, and could present problematic situations for individuals, as highlighted earlier with examples of Gebru and Koren taking individual stances against Google, subsequently losing their jobs. Like Design Justice, co-liberation offers wonderful approaches yet appears unlikely to work outside of community, governmental or non-profit sectors.

Lastly, I examine Professor of data governance Linnet Taylor (2017) Data Justice framework for ethical routes through data-centric worlds, responding to the data revolutions social and politic power to ‘sort, categorise, and intervene’ (1) by agencies and authorities using such data, and don’t necessarily acknowledge or understand their positions. The affects of datafication are significant, ‘determining how individuals become administrative and legal subjects through their data’ (3), increasing possibilities of data-discrimination. Taylor stresses that while awareness of data-discrimination is ever-increasing, mechanisms for combatting it are not, and to share to secure ethical pathways, there must be ‘fairness in the way people are made visible, represented and treated as a result of their production of digital data’(1). She proposes three pillars for data justice integrating positive with negative rights and freedoms, which can be harnessed as tools to achieve greater visibility, representation, and rights:

1. **(in)visibility** focusing on privacy and access to representation, key for gaining greater data- and digital-representation and visibility.
2. **(dis)engagement** with technology and the freedom not to use certain technologies, underpinning ‘the power to understand and determine one’s own visibility’(9).
3. **Non-discrimination**, indicating ‘the power to identify and challenge bias in data use, and the freedom to not be discriminated against’ (9).

As such, the pillars could provide a grounding framework to establish to non-binary design inclusion and increased rights around data usage, leading to greater agency enabling the

‘freedom to control the terms of one’s engagement with data’(9), an imperative element in any representational case. All three approaches covered offer pathways towards more inclusive design, yet appear to provide solutions mostly in non-commercial sectors, presenting challenges for attaining these concepts of justice on a broader scale.

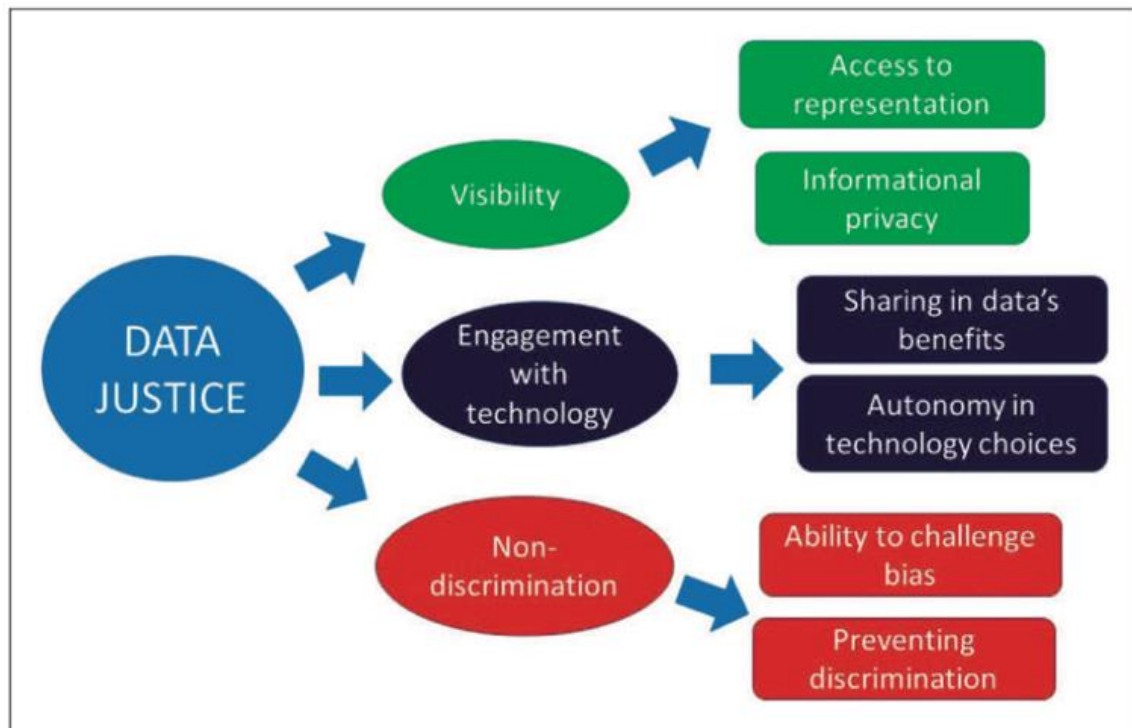


FIG 2. LINNET TAYLORS DATA JUSTICE FRAMEWORK

IS ‘INCLUSIVITY’ AN ANSWER?

Lasty, I question if striving for design- and data-inclusivity is helpful or likely to lead to impactful changes? Numerous inclusive approaches offer inspiring ideas for equalising design processes yet seem challenging to roll-out at scale, or importantly, in commercial sectors. Ruha Benjamin, author of *Race After Technology* (2019) contests design-thinking as an approach to design-inclusivity, noting instead that addressing deeply-rooted systemic inequalities could be a better approach, simply changing *how* we design does not change the overarching systemic oppressions and barriers for inclusivity, and inclusion often stops in ‘happy talk’ of diversity statements acknowledging and revelling in differences without challenging structural inequality (148). Anna Lauren Hoffman (2021) agrees, citing how inclusion in data ethics ‘perpetuate(s) the unequal and often violent relations that inhere between data technologies, their purveyors, and different situated social groups’(3540), as the growing field of tech ethics and social responsibility ‘centre the designers and design instead

of attending to the underlying conditions that make ethical guardrails necessary in the first place' (3545). The underlying conditions of homogenous, hierarchical, white, heteronormative workforces are often addressed by HR statements of increased workforce diversification, something Hoffmann believes leads to conversations about inclusivity stopping, rather than addressing systemic frameworks perpetuating oppressions behind the hired workforce. Without changing systemic frameworks, workforce diversification does not necessarily mean any changes happen at the technology strategy or designer/engineer level, subsequently rolled out through databases and infrastructure globally.

CHAPTER THREE CONCLUSION

I presented several methodologies in response to this chapter's focus, asking *what ethical considerations and methods can be employed for designing a fair, more gender expansive world*. I foresee the most critical interventions to inclusive design practises as the reconceptualization of data into a more fluid, shifting entity that has space to develop temporally, coupled with greater inclusion of genderqueer people in design teams. Alongside this, it is imperative to focus on systemic change within global, commercial enterprises to instigate meaningful change to data- and design inclusivity practises, rather than focusing on individual responsibility of engineers in teams, or relying on workplace diversity statements and inclusivity manifestos, often performatively penned to reach corporate diversity targets. Many inclusive design methodologies offer inspiring approaches, yet largely focus on community, non-profit, and other accountable institutions. This is an important start, yet the power held by commercial organisations is arguably much greater, operating on global scales, and shaping societies in binary cisgender-normative manners, therefore concrete methodologies for infiltrating commercial spaces are crucial for designing and embracing gender-inclusive futures.

OVERALL CONCLUSION

By asking if nonbinary people can exist congruently with their gender in a binaried, digitally co-constructed society, I have presented a wide array of topics unpicking global digital discourse, history, and thoughts towards design for gender-inclusive futures.

I first argued that digital technologies and their systems are a key constructing element of contemporary existence, affecting and shaping the boundaries of daily life. I specifically considered the position of nonbinary people, questioning if and how they are represented in a digitally driven, binary-normative society rarely catering for nonbinaried genders. I questioned this with the sub-question *How do digital technologies co-create, and mediate daily existences, and do these allow for minority-gender people exist in our technologised society?* Drawing inspiration from Barad's Agential Realism, I considered it is almost impossible to dis-entangle off- and on-line realms from one another, as algorithms and digital technologies mediate and silently shape everyday life. I explored notions of algorithmic governmentality, data as socio-technical assemblages, and the role of data-producers and automated-gender recognition sculpting gender and identities through the boundaries of digital profile categorisations. Lastly in chapter one, I shared examples of programmatic discrimination upholding binary-gender, racial stereotypes, and oppressing marginalised peoples. Through exploring these theories and examples, I demonstrated various elements of how digital technologies profusely infiltrate and mediate everyday life, concluding that current applications of technologies do not commonly facilitate non-binary peoples digital existence for a myriad of reasons, ranging from infrastructure and the boundaries of categorisation systems to lack of legal recognitions. Building on Chapter one, the second chapter asked *what is digital and data neocolonialism and its binary-gendered discourse, and how is it applied in a digitally co-constructed world?* I answered this by historically contextualising how dominant binary discourse has come into being by presenting digital- and data-neocolonialism as a core element written into the technologies structuring society, underpinned by binary-gender human categorisation systems. Considering modern applications of digital colonialism, I discussed the whiteness of AI and racialisation of search results, and the coloniality of the algorithm upholding tired and outdated classifications systems, rooted in colonial classification techniques and subsequently transferred in library and information sciences and early computer system design. Lastly, I examined platform and surveillance capitalism, as operational tactics profiteering from human-experience data, big techs domination of global digital infrastructure, and the global data

landscape upholding binary-gender discourse. Thus, I offered an overview of digital- and data-neocolonialism, and an explanation for how binary-gender has been systematically programmed into digital systems to this day. Lastly, to wrap-up and offer more positive departure points for designing more gender inclusive futures, I asked *what ethical considerations and methodologies can be employed for designing a fair, more gender-expansive world?* Here, I considered ethical and inclusive design methodologies as philosophies for imagining gender-inclusive futures where gender is a less static, immutable, and fixed ideology, as it has come to be. Through exploring various design-methodologies, I argued that critical interventions centre on embracing AR techniques and reconceptualizing data to design more gender-inclusive and gender-fluid futures.

By placing these three chapters alongside each other, my intention was to share a comprehensive story detailing how society is silently structured through algorithmic and programmatic systems that are rooted in colonial classification systems upholding binary gender. The last chapter aimed to discuss more inclusive futures, questioning design concepts, calling for a reconceptualization of how data is treated and understood, and questioning if inclusivity is a fruitful approach. In answer to my research question, I arrived at the conclusion that yes, it is certainly possible for gender-expansive people to congruently exist with their gender through differently-programmed infrastructure, yet society has not yet reached a place where this is yet commonplace. Ultimately, I hope to use this this thesis as a basis for future PhD research, building on this to develop concepts further and conduct action-research with gender-queer people, writing their voices into being, and with designers and engineers to reconceptualization understandings of data to cater for gender-expansive people's existence.

ACKNOWLEDGEMENTS

Firstly, I wish to thank my supervisors throughout this MA, firstly Dr. Christine Quinan and Miriam Wickham during my internship, and Dr. Koen Leurs throughout my thesis. Your support, patience, and help has greatly allowed me to develop my ideas, research, ways of thinking, and approaches to topics. I particularly appreciate your support of my interdisciplinary interests, where I have often felt my research angles do not fit into any of the fields I work with, my heartfelt thanks.

I wish to extend a huge thank you to my dear friends and loved ones who are a foundational element of my life and my ability to complete this MA. Thank you Alba, Chloe, Christina, Daniel, Inga, Jenny, Jessica, John, Lexis, Marieke, Maya, Mislav, my family, Rowana, Ruby, Rula, Suzanne, and Toby, for believing in me, your encouragement and friendship, lending your houses for to me to write in, listening to my thoughts and views, and your ultimate belief and encouragement in my abilities to do this. Without you it would not have been possible, my eternal gratitude.

APPENDIX

1. RESEARCH PRACTISES AND DATA COLLECTION: ALTERNATIVE METHODS OF MEASURING GENDER EXPERIENCE IN SURVEY DATA QUESTION DESIGN

It is difficult to collect data on nonbinary gender experiences, when many people have never questioned their gender beyond the common binary title's they have been allocated at birth. During my master's program I undertook a research internship with Social Psychology PhD student Miriam Wickham, where we asked the question *Are nonbinary people dehumanised because of their gender?* This study consisted of two research methods, interviews with 10 nonbinary people, and a wider online research survey to measure experiences of dehumanisation in relation to gender, with more than 250 participants, which was open to people of all genders.

To measure study participants gender, we chose to ask indirect questions about gendered-experiences, rather than directly asking people what their gender was. Many people have never questioned their assigned gender, but still may not experience it as something they fully identify or associate with. By asking indirect questions, a deeper understanding of their experiences could be recorded. For example, we asked questions like 'I identify with men/women/third gender people a lot', and 'I have a lot in common with men/women/third gender people' using a Likert scale of 1-7 to gauge their dis/agreement with the statements. This allowed us to record people's associations with and feelings about gender to understand their level of congruence with binary or other genders. We could then measure these results against our dehumanisation scale to understand if peoples whose gender was less binaried, experienced greater levels of dehumanisation or not.

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Figure 1: Screenshot of dating App Tinder's gender options for inclusion in Tinders dating pool. Author: Rhian Farnworth

Figure2: Screenshot taken from Linnet Taylors article *What is data justice? The case for connecting digital rights and freedoms globally (2017)*.