"Why are they all obsessed with Gender?" — (Non)binary Navigations through Technological Infrastructures

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ABSTRACT

Gender is encoded in multiple technological infrastructures, most prominently in digital forms across educational, commercial, medical and governmental contexts. To illustrate the pervasiveness of (binary) gender ideologies and the impact this can have on non-binary individuals – like me – encountering them, I conducted an autoethnography. For more than a year, starting with me receiving a legal non-binary status, I documented systems that did not allow me to register my gender correctly. The findings indicate how technological infrastructures predominantly encode gender as a fixed, immutable and static binary variable with limited options for non-binary people to adequately register self-determined choices for gender and/or (gendered) titles. I further analyse the range of reactions that I received when pro-actively asking for workarounds, fixes and updates, indicating how pointing towards those issues can trouble the status quo, identities and power hierarchies in unintended ways. I close on suggestions for the refactoring of existing and design of new technological infrastructures around gender and reflect on the value of lived experience in knowledge production – as well as the cost it comes with for those doing this research.

CCS CONCEPTS

• **Theory of computation** → **Incomplete, inconsistent, and uncertain databases**; Data modeling; • **Social and professional topics** → **Gender**.

KEYWORDS

gender, non-binary, data, databases, webforms, autoethnography, infrastructures

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1 INTRODUCTION

I grew up during the late 80ies and early 90ies in a small, rural village in Lower Bavaria. The 'boys' played soccer, the 'girls' joined dancing groups. Everyone could play tennis, if they were able to

afford it. There were several reasons as to why I never felt like I fitted in, but questioning gender, gender roles and the binary concept thereof certainly contributed to it. While in some larger cities in Germany, queer people can find their personal and collective pockets of freedom, rural areas in my birth country are governed by strict expectations on gender and associated behaviour [31] – though this is somewhat less the case in the parts of the former GDR (German Democratic Republic) [98]. As recent as 2017, though, the public discourse started to change with the Federal Constitutional Court (Bundesverfassungsgericht) regulating that a legal option for non-binary people must be offered in personal documents issued by the government such as birth certificates and passports [20] with courts in Austria, where I live now, following suit in 2018 [102]. Hence, intersex and non-binary people are finally given legislative attention, recognition and validation on a structural level, albeit only based on disclosing an official intersex diagnosis signed by medical doctors and submitted to the registry office – despite the calls for self determination even within legal studies [52].

During my studies, I lived in Weimar, which is nestled within one of those more egalitarian parts of Germany (i.e., former GDR). I studied gender theories in my media culture seminars while wrestling with the implementation and theory of databases in my computer science courses. My studies were interwoven with the complexity and indeterminacy of gender concepts as well as statements such as "Gender is the easiest parameter. Just use a Boolean." – both of which taught at the same institute. Armed with arguments from the former, I started challenging the latter slowly but steadily creating awareness for the complexity of gendered identities within the small locale that I lived in. At a conference in 2017, a previous mentor would state to another researcher during a reception that due to my persistent intervention, he still uses free form gender fields in all his research. Together with others, I later developed more general guidelines [81], survey recommendations [86] and introductions into gender for HCI researchers and practitioners [18]. However, while I could celebrate smaller, personal victories, with an increasing amount of required account creation and commerce done online, those felt like an uphill battle against a similarly increasing number of web forms asking for my gender without giving me an option to adequately register it – for as meaningless a reason as buying cat food [87].

The personal frustration of persistent erasure of my identity particularly in social contexts mediated by digital forms together with the long-awaited legal recognition of my gender giving me a legal right to be recognised fuelled this research endeavour of investigating 1) *how digital infrastructures encode, shape and articulate gender* and 2) *what happens when key players in creating and maintaining these infrastructures are made aware that change is*

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warranted. The embodied and continuously lived experience of this sustained exposure to discrimination puts me in a position where such work comes at a personal cost. Yet, with this work I write in solidarity with my peers and invites others to conduct such research from their perspectives in a manner of feminist objectivity [45]. The cost it takes for me is mitigated and heavily cushioned by my Whiteness, my social status as an academic, and the option to pass as able-bodied. Hence, conducting an autoethnography appeared as the most viable and honest approach to answer these questions as a non-binary researcher without exposing my peers to potential and actual harm.

To illustrate my process within an expected academic writing format, I will first delineate related work regarding gendered infrastructures. I then further detail my background and understanding of gender generally as well as encoded in databases. Before going into the specifics of challenging infrastructures and discussing the multi-faceted implications thereof, I introduce autoethnography (and my particular interpretation of the methodological stance). I conclude with a call for database designers and developers as well as an encouragement for marginalised HCI researchers to consider autoethnography as a tool for addressing the embodied part of our lived experiences with technologies, the oppressive aspects we encounter, and the specific insights individual perspectives can bring.

2 INFRASTRUCTURES AND GENDER

As databases and the associated data entry (i.e., by hand, web forms, other digital forms) ask for gender in a classifying manner, I understand gender in databases as a classification system which is “integral to any working infrastructure” [14, p.17]. In return, gender itself can be conceptualised as an infrastructure where databases are just one of the “many tools” [14, p.34] that sustain dominant ideologies as tied into specific technologies and routines. However, for the remainder of this text, I use the term infrastructure to refer to *digital mechanisms and tools governing access to resources along the options they offer*.

To situate this definition and the wider argument of this text within existing work, I now revisit HCI research around digital infrastructures before introducing recent theoretical approaches to gender. Finally, I provide the context for gendered infrastructures as relevant to my project more generally.

2.1 HCI and Infrastructures

Even though *infrastructuring* as a part of (particularly participatory) design steadily and increasingly comes into the focus of HCI work [57], the investigation of infrastructures themselves has received less attention [96] so far. Edwards et al. has argued that HCI research should put more attention to infrastructures to meaningfully understand people’s experiences with technologies within different digital environments and landscapes [33]. This is a somewhat curious call given that infrastructures, particularly within the notion of ubiquitous computing systems, are usually desired to be hidden or, if unavoidable, remain ambient at best [48]. However, [48] delineates how it can be relevant to develop *infrastructural awareness* for people engaging with systems to be able to fully reflect on their technological interactions. To some extent, my work can be

understood as raising awareness for how gender governs digital infrastructures we engage with through forms and databases.

Other works have aimed at an understanding of how interaction design can be tied with the design and development of infrastructures while also focusing on environmental impact and sustainability [12]. Similarly, Shehan and Edwards suggest that due to the limited attention towards usability in the design of (networking) infrastructures in the home, these become essentially unusable [83]. Hence, they suggest to HCI researchers to take up more responsibility in shaping these around the desires and interests of the people engaging with them on a nigh-daily basis. Korn and Wagenknecht illustrate how hacking and repair are a part of infrastructural negotiation around mobile phone networks in Germany [62]. This echoes prior work emphasising the necessity of trust in the maintenance civic infrastructures within public discourses of multiple stakeholders [47].

All this to say that, although there are repeated calls for an increased attention to infrastructures from the perspectives of HCI and Interaction Design researchers, little critical attendance to these has been spent within these fields. While within Science and Technology Studies (STS) infrastructures are a kind of bread and butter topic for researchers, the generative potential of such investigations remains largely unexplored, particularly in the context of comparatively ‘dry’ topics such as the development of databases and the interfaces thereof. Given how I showed above how gender in this context has been addressed in my own education around databases, I first introduce theories on gender before detailing associated work on gendered infrastructures.

2.2 Theories on Gender

With Gender Studies and associated research areas such as Women’s Studies, Queer Theory and/or Trans Studies being a comparatively young topic for researchers, negotiations on what gender constitutes, how we may understand it and which concepts describe this aspect of identity best is hotly debated within as well as outside of the core fields. Stemming from developmental psychology, early understandings (that also govern most Western societies to date) align bodily characteristics (e.g., genitals) with a definite, immutable and binary gender [59]. Here, bodily make-up and subsequent binary gender assignment are understood as indicative for social behaviours, roles and even sensory processing [34]. Such an approach to gender is commonly referred to as *gender essentialism* [85]. This is not just problematic due to the strict inherent binary understanding, but people subscribing to a high degree of gender essentialism react negatively to those they perceive as transgressing even if those are cisgender¹ [85]. This behaviour of ‘gender policing’ is considered a threat response by those who benefit from a deeply patriarchal society [67], even though the immediate threat level regarding bodily integrity is much more pronounced for trans and/or non-binary people [100].

¹“The term cisgender (from the Latin *cis-*, meaning “on the same side as”) can be used to describe individuals who possess, from birth and into adulthood, the male or female reproductive organs (sex) typical of the social category of man or woman (gender) to which that individual was assigned at birth. Hence a cisgender person’s gender is on the same side as their birth-assigned sex, in contrast to which a transgender person’s gender is on the other side (trans-) of their birth-assigned sex.” [2, p.61]

A more modern and increasingly popular understanding of gender separates between *sex* and *gender*, gender being the proverbial coat draped on the rack that is the sexed body [69]. This notion has been further investigated and refined towards a concept of gender as continually performed and actively upheld [19]. However, trans theorists have illustrated how such theories keep on ignoring the specificities of being trans in a cis-dominated world [68], particularly the dangers of “conditions in which it becomes imperative to take up, for the sake of one’s own continued survival as a subject, a set of practices that precipitates one’s exclusion from a naturalized order of existence that seeks to maintain itself as the only possible basis for being a subject” [93, p.92]. Further, it entirely contributes to the sustained erasure of non-binary people, who are in language (and in infrastructures as I will show below) continually ‘folded’ into the dominant binary [84]. Nevertheless, the concept proved to be persuasive particularly in studies investigating identity in early developments of virtual worlds, where gender was seen as somewhat performed in a disembodied form and gender as co-constituted through technology [37]. This came with a lot of excitement for the disruptive potential seen in those practices for ‘real-world’ patriarchal societies [76], though even early on, more nuanced analyses illustrated the complexity of gendered dimensions of online personae as deeply influenced by the patriarchal structures which structure our lives [92].

More recently, though, prominently through the works of Fausto-Sterling, gender as well as sex have been less understood as a binary and more as a spectrum [34]². With this, intersex people have finally been attributed a theoretical and non-medicalised place within academic discourse [97]. Given that medical disciplines still negotiate the appropriateness of infant genital mutilation for intersex babies (see, for example, [5]), such approaches are still largely overdue. Theorists within Trans Studies more and more postulate a notion of gender as self-determined. “Gender self-determination is a collective praxis against the brutal pragmatism of the present, the liquidation of the past, and the austerity of the future” [88, p.89]. Particularly within social and legislative contexts, theorists have increasingly called for a right to self-determination regarding gender [4].

Despite the somewhat chronological linearity presented here, we find ourselves at a time, where all these understandings of gender exist in parallel, being constantly negotiated and clashing against each other – though also shaping our everyday experiences. While my work here follows an understanding of gender as fluent and self-determined articulation of identity, an exclusively binary conceptualisation is by far the most dominantly present in the mainstream societies in which I live. If we follow an understanding of gender as a structure [74], the question then becomes what happens with non-binary, intersex and/or trans people falling through the cracks as these structures are predominantly shaped by essentialist and performative approaches to gender, those who ‘don’t count’ [60].

2.3 Gendered Infrastructures

Data bases tend to be the back-end to web forms and other data management or processing interfaces. Within this text, I understand

databases as a form of text. If they record gender, the way they articulate this data entry is commonly subtle, but ever present. Predominantly, gender is then encoded as the data type of a Boolean, a purely binary representation of gender, represented as either 1 (true/female) or 0 (false/male)³ [15]. Even within seemingly progressive systems allowing people to self-identify along an extensive range of categories or even through an open text field, non-binary individuals might still be inauthentically represented in a reductionist binary to advertisers to maximise profit along gendered assumptions [11, 16].

Another aspect of gender in databases is how the disclosure of gender is more often than not mandatory. This might stem from how database design is taught with gender being a common example, for instance, to explain derived attributes in relational databases. With that I refer to explanations detailing how to infer a gendered title for addressing individuals from the gender provided or vice versa. This information is then used for one- or bidirectional communication (i.e., confirmation emails, bills etc.) particularly in automated text construction. Even though the titles for address are not necessarily binary, even within a notion of binary gender (consider the difference made between Ms. and Mrs.), they are still conceptually tied to gender as binary and, more importantly, taught as a binary.

In that, it is even more curious to me, that when discussing database modeling, textbooks seem to be more interested in discussing the difficulties they see in ensuring that there is a reliable and consistent difference made between animal and human genders (see, e.g., [42]) than acknowledging any kind of complexity around gender. Instead, authors tend to assume the notion of gender as an essentialist and naturalistic given based on a common folk understanding silently shared between authors and readers, lecturers and students, developers and populations providing their data – or so it is presumed.

Subsequently, interfaces to databases, most commonly (web) forms, communicate gender to the audience having to engage with them. A binary only form forcing gender disclosure indicates that gender is an inherent attribute of a person that can be captured by one of two given categories. However, people are more diverse, making these forms particularly disliked by non-binary and intersex individuals but also seen as deeply uncomfortable by cis allies [79].

Even though, in all this, more directly associated fields concerning themselves with databases are increasingly aware of gender bias in data (and even within a solely binary understanding) [63] and the gap between modern theories on gender and computing practices [30], automated gender assignment from pictures [40], text [10], names [58] or other data are at an all-time high. Most research in this area then tends to ignore intersecting issues regarding how gender is assigned differently depending on assumed race – a bias seeping into ‘gender recognition’ as it is mostly developed on material coming from white people [17]. In line with what Keyes has identified to be the case for automated gender recognition [59], all these approaches are inherently unfit to identify gender. They understand it as an identity aspect that can be assigned from the

²Vielma offers a visual representation of a spectrum of genitals.

³The irony of course being that, with that, databases reinforce the notion that (within a binary understanding) women have a gender, men do not; akin to what Gerhard Schröder, a former prime minister of Germany, so openly proclaimed.

outside looking in instead of seeing it as self-determined negotiation of knowledge dependant and shifting as disclosure becomes more and more safe as interpersonal relationships develop [35]. Following from this, it is no wonder that non-binary genders are commonly either not accounted for or not detected reliably as most training data assumes binary genders [43, 80].

Hence, gender as a necessary, immutable and binary aspect of a person's identity that can be externally assumed is the dominant *modus operandi* for most digital infrastructures. As a counterargument illustrating the experiences non-binary people make in living with these, an autoethnographical approach might just be the strongest contrast to current practices that I can offer.

3 METHOD(LOGY)

As I position myself and my personal experiences at the core of this research, my methodological approach relies on principles as articulated by the concept of autoethnography. I specifically understand autoethnography as a methodology instead of a clearly defined method as it "[...] strikes me more as a broad orientation toward scholarship than a specific procedure" [38, p.298]. What comes with it is not the attempt to remove myself from the processes of knowledge production in a split of subject and object [45], but rather an approach that embraces my personal subjectivity with the intent to reflect on my individual experiences "not only for others but also for myself" [13, p.53]. In that, I acknowledge that not just my identity plays into the research, but that it is shaped back in return. Hence, I particularly work within a paradigm of queer autoethnography, which "embraces fluidity, resists definitional and conceptual fixity, looks to self and structures as relational accomplishments and takes seriously the need to create more livable, equitable and just ways of living" [56, p.211].

Even though autoethnographic approaches refuse to be neatly delineated as a single method, they share certain commitments leading to a set of vigour [73], rigour and quality criteria. For one, autoethnography "comprises [a] commitment to retrieving subjugated knowledge" [38, p.312]. This does not mean that autoethnographic approaches might not be useful from privileged perspectives as well, though the methodological standpoint taken on assumes marginalisation. Further, I do not understand oppression as a singular dynamic. Following Samuels and Ross-Sheriff, I understand that "what is oppression in one context may be a privilege in another" [77, p.6]. For example, while the non-binary gender marker in my passport puts me in a marginalised position at border crossings and (as I will show) along many other digitised gendered infrastructures, it also allows my gender a legal visibility many longingly desire. Hence, while I understand this work as speaking from a marginalised standpoint, in some regards, by being written in the first place, it illustrates the privilege coming with doing this work as well. Additionally, I need to allude to my transformative agenda in doing this work as "reflexivity entails taking seriously the self's location(s) in culture and scholarship, circumspectly exploring our relationship to/in autoethnography to make research and cultural life *better* and *more meaningful*" [9, p.212, emphasis in the original]. This work does not find motivation "out of nowhere" [45], but is rather motivated by personal frustration and pain shared with my peers and a recognition of possibility

in addressing my academic colleagues in collectively doing better, i.e., acknowledging non-binary individuals in their existence⁴ and accounting for them in the digital infrastructures we co-shape.

Within the larger field of HCI, autoethnographical methodologies similarly rise to increasing popularity within the last few years. Earlier work introduced these approaches as 'ethnography lite' [26], though the unique potentials thereof have become more and more apparent to the community. Höök illustrated how personally embodied experiences can be generative for design [50], an aspect which is more explicitly articulated as a space for autoethnography by Chamberlain et al., who understand this to be particularly conducive for design aiming to be personal, emotional and meaningful [22]. More recently, Desjardins and Ball identified options for autobiographically guided design – a notion adjacent to autoethnographic approaches –, which comes with tensions along needs, participation, intimacy, reflexivity and authorial stance [28].

To support students exploring autoethnographical methods, Lockton et al. developed tools for them to investigate sleeping patterns [64], though this work comes with increased ethical constraints adding a layer of complexity along professionalism and privacy in settings between lecturers and students. Similarly to the work I present here, autoethnography has been used in HCI to explore the situated living experiences of marginalised people, e.g., that of being a hard-of-hearing [54] or blind traveller [91] or personal accounts for being (educated as) a member within the field(s) of information technologies as a black man [21], as disabled people [55], as a non-binary individual [87] or "living disability theory" [49] (see also, [101]). However, personal accounts have also been used to construct insights into the non-routine use of technologies beyond their intended contexts [70] or living without a mobile phone and the lived implications for non-use coming thereof [65].

The work here investigates a marginalised engagement with gendered digital infrastructures through web forms and databases. I use the notion of infrastructures to step outside individual responsibility and take on a perspective that understands gendered web forms and databases not as singular instances of a given interaction, but as an interwoven web in which the labour to uphold a binary norm is entangled with practices and material consequences for those not fitting (analogous to Star [89]). In that regard, my interactions could be understood as non-routine use [70] at least from the perspective of designers and developers given that, for me, this is a fundamentally ordinary everyday and routine engagement. The *purpose* of my inquiry lies in increasing awareness of these non-routine routine engagements of marginalised people with digital infrastructures. I chose the *topic* of gender in web forms and subsequent databases as this was a unique opportunity to investigate myself augmented by my lived experiences with the potential to garner insights into the implications of such digital infrastructures for marginalised people. *Methodologically*⁵, I started in August 2019, when my gender marker changed legally, to record any interaction with gendered web forms asking for gender directly or gendered titles that would not allow me to register my correct legal gender – with the intent to conduct this research for the span of a full year.

⁴I'm not even saying this in jest given how "you don't exist" is a common strategy to dissolve cognitive dissonance trans and/or non-binary people cause in some folks [25].

⁵This presentation of purpose, topic and methods follows the suggestions by Chang regarding how to transparently report on autoethnographic inquiries [23].

Usually, this involved a screenshot of the situation and a recording of all interactions. Additionally, I forced myself to add a brief personal note to every entry in my notes collection to trace the emotional development and status of my feelings towards the topic. Upon March 2020, with Europe going into lockdown due to the COVID-19 pandemic, I struggled to keep up with the project due to the additional stress factors this situation added to my life. Hence, since then, I did not fully cover *every* interaction with a web form or database, I had, but most of them. Due to this circumstance, I extended the documentation of my engagements further into January 2021. This allowed me to collect a number of instances across several areas governed by such gendered databases (see Section 4.2). I understand this process as an autoethnography, because I focus not necessarily on myself only (as would be done in a self-study) but on the cultural context in which I make these experiences. “Autoethnographers include cultural elements of personal experience. They situate themselves, contesting and resisting what they see” [44, p.22].

4 CHALLENGING INFRASTRUCTURES

When starting this project, I called it, somewhat jokingly “Challenging Infrastructures” assuming that that would be what I was doing. What I did not expect is that they would challenge me back in ways that I had not expected. While I will discuss this more extensively at a later point, I would like readers to keep in mind that this research was always (and continues to be) personal and required me to put my whole self into it. Due to this personal aspect, I start my presentation of ‘results’ with providing additional personal context that might be relevant to understand my perspective before detailing the different infrastructures I encountered and the conversations stemming from me challenging their challenging setup.

4.1 Individual Context

Traditionally, positionality statements and reflections on individual implicitness are part of either methodological delineations or a discussion of results. In this case, where I ground my work in autoethnography, however, it seems fitting to review my personal context as part of the analysis⁶. It is largely weaved through the entire manuscript regardless, though here, I offer what one might call more intimate details not as a matter of exhibiting the self, but as a way to allow readers to critically position themselves to my perspective and to understand where their perspectives might differ.

As far as I can recall, my gender identity was always clear to me in terms of ‘not being a girl nor being a boy’. I vividly remember watching other children do things that were ‘expected’ of them and not feeling like I belonged to either. One of my early memories is waiting in front of a primary school bathroom and finding the split silly. I still wrestle with bathroom access. It took much longer though, to find a term for my identity. During my study years in Germany, I was exposed to feminist and queer theory and found a way to talk about gender as a flexible identity marker. Politically, I engaged with trans rights groups, but found myself similarly out of place between the binary dominance I encountered. Only when

interacting with intersex groups, I felt like I belonged but also that I could not articulate my belonging as I was not yet aware that my own bodymind would be equally assessed as intersex even if not necessarily with these terms. I was 28 when I realised that the hormones I had been prescribed even before I entered my teens and took so diligently were meant as a way to harmonise and streamline the impression of me as a woman. In that, I often talk about having an inverted trans experience, one where I could embrace my own identity after rejecting taking involuntarily prescribed hormonal treatment – and yet, a trans experience regardless, one that diverges from what had been assigned to me at birth [99]. I experimented with terminology around agender/nonbinary in my late twenties and am now fairly comfortable with being referred to as intersex and nonbinary, even though my gender expression changes over time, also due to the intertwined notions of androgyny and fatphobia. These days, I wear mostly plain dresses while also taming a small beard, which I only occasionally shave, for example when visiting the village where I grew up in or when I assess situations to potentially be unsafe for me to be ‘visibly nonbinary’.

After the High Court in Germany made it possible for intersex people to change their gender marker in passports and birth certificates [20], they also set a date for policy change for January 1st, 2019. Mid 2018, I contacted the ‘Aktion Standesamt’⁷, a collective arguing for a self determined approach to gender markers instead of the prescribed biologically argued. However, I knew I had a case for going the route with the latter as well and not living in Germany made my case more complex, which is why we jointly decided that I would just go the intended route. I wrote the first letter to the registry office in Berlin which was responsible for Germans living abroad in October 2018. The letter was returned in November 2018 with the comment that it should be resent to the registry at my place of birth, a small town in Lower Bavaria. I did so in December, but had not heard back from them until February, where I called them up to enquire about the process. The person on the phone clarified that I was the first case so far and that the head of the department will have to do it himself, but that he is currently on vacation for another three weeks. In the middle of March, I received a letter which instructed me to gather a signature from a medical doctor verifying my intersex status and then conduct my paperwork with the embassy. The first appointment I could get there was in July 2019, after which the process was comparatively fast. I received my birth certificate in early September 2019 briefly followed by a renewed passport and ID card. Whenever I doubt myself on whether I misunderstand my own gender identity, I think back on the day I held the renewed birth certificate in my hand and the pure joy it provided me for days and weeks and, really, still at this point to read neither male nor female on my birth certificate. Due to German legislature, it now says ‘diverse’, which is not my preferred choice of wording, but beautifully open in interpretation.

However, in all this, I do get angry that others are kept from such euphoric [6] experiences. Not only did I have the patience, financial privilege and medical diagnosis to endure this process, which was over a year long⁸, I simply had access to such a legislative procedure at all – something that at that point was not even available to the

⁶Though, as some might argue, a practice of personal vignettes might enhance any kind of qualitative research [51].

⁷<https://aktionstandesamt2018.de>

⁸Making statements from April 2019 stating that there was little uptake on this option [32] somewhat infuriating.

Table 1: Characteristics across the 55 cases along type of institution, context of interaction, and contact medium recorded.

Type		Context		Contact Medium	
Company	27	Commerce	17	Support email	18
University	11	Living/Residency	7	Direct email	12
Academic (oth.)	11	Transit	7	Web form	7
Government	6	Job Applications	6	Social Media	6
		Funding Applications	5	Personal email	5
		Human Resources	4	Phone	3
		other (less than 3 each)	9	None	7

citizens of Austria, where I live(d). Part of this impetus to start an autoethnography on infrastructural issues regarding non-binary identities hence comes from using the privileges I have regarding relative financial security, socio-academic status and whiteness to take up the task of systematically challenging the infrastructures, I engaged with. As my academic privilege crosses my marginalised gender identity, I am uniquely attributed to assess gendered infrastructure not just in the abstract, but in the concrete, specific and individual. Subsequently, my intent is simultaneously to illustrate the widespread use of technological infrastructures cementing a binary and immutable notion of gender, and to affect a little change allowing more of my non-binary peers to embrace their identities and feeling like they belong in their everyday lives – be it with or without legal recognition of their genders.

4.2 Infrastructural Context

Figure 1: Timeline of initial engagements for each case.

Overall, I documented 55 case studies between August 2019, when I received legal recognition of my gender, and January 2021. All cases are listed in Tables 4, 5 and 6 as part of the Appendix. Table 1 illustrates a range of characteristics describing these cases in summary. Please note that I only list the date of the initial encounter; several interactions spanned across a time-span of a couple of

months, one lasted for more than a year (see also, Figure 1). At the beginning of this project, I entered into it with quite some enthusiasm, however, after March 2020, when Europe went into lockdown procedures due to COVID-19, it became more difficult for me to not just record all the instances for this research project but also follow up on actually addressing my exclusion given all the additional stress factors that I, quite suddenly, had to attend to. Hence, the 55 cases comprise a subset of all the encounters I had, heavily slanted towards late 2019 and early 2020.

Figure 2: Overview of different types along cases.

Most instances across the 55 cases are drawn from private or public company contexts, largely around commerce and transit (cf. Table 1 and Figure 2). The comparatively high number of universities (and with that, job applications and academic funding bodies) stems from my personal context as an early career academic who was on the job market during that time. Several institutions did, for that matter, not expect gender to be reported either by not asking for this information or making it optional. I chose to only present high level information for each case to protect 1) the people who unknowingly by engaging with me (if they chose to do so) became part of my research and 2) myself from potential retaliation by publishing about my experiences. Further, I am convinced that even in this fairly abstracted form, my results are meaningful enough for database designers, developers and administrators to reflect

Table 2: Response time from institutions together with their line of argument and the outcome when challenged on their binary only infrastructures and my feelings doing this work.

Response Time		Argument		Outcome		Feelings	
Promptly (< 24h)	16	None	16	No change	26	Exhaustion	19
Delayed (>24h)	12	Deference to unknown future	12	Systemic change	9	Frustration	10
None	9	External constraints	7	Individual solution	5	Gratitude	7
Misgendering	8	Need for discussion/documentation	6	Incomplete change	5	Anger	5
Phone	5	Apology	3	Silent change	2	Defeat	5
		Ignored	2	Voucher	1	Anxiety	4
		Nice thought, thanks	2			Excitement	2
						Confusion	2

on their use of gender without the need of calling out individual instances explicitly.

In 72.9% of all cases, I contacted the institution through email, either via an official support or contact address, direct emails to specific members of staff or to individuals I already was acquainted with. In seven cases, I used web forms, most of which required active misgendering of myself. The instances referring to social media are in cases where this was either deemed an official line of contact or in cases where I could not find an official way to register the issue – not even via telephone (three cases), which I generally dislike as a mode of communication.

4.3 Intriguing Conversations

Of the 55 instances I recorded, I contacted 48. In one case (18, Table 4), I was contacted by the institution to let me know that an update of my documents was now available to me. Of the ones where I initiated a conversation, only nine never responded and in two further instances, the matter was ignored in a response (see, for an overview of responses, Table 2), leaving me with 39 cases in which there was any kind of answer beyond automated responses. While no change was registered since I started this project in 54.2% (26/48) of the cases, almost half of them resulted in some kind of tangible outcome. In nine cases only, systemic change was implemented, largely by me prompting the issue. This means, that the infrastructure was changed to include a non-binary form of representation and/or address for all people engaging with it from that point on. Individual solutions, though, included willingness to organise access for me by circumventing the existing system, for example by sending in my application materials via email instead of using the institutional platform. In two cases, the responses I received indicated appreciation for my remark, though did not contain any actionable commitment for change. In Table 2, this is referred to as ‘Nice thought, thanks’.

If any argument was given for refusing a change, most commonly respondents deferred implementing it to an unknown future or tried to resolve the matter by forwarding my query to the relevant department (without specifying which one). Considering that systemic change was achieved in less than 20% of the cases with individual solutions and incomplete changes together just about

comprising another fifth of these cases, any individual person just having to do this work to argue for their right to be recognised by digital infrastructures faces a Sisyphean task with little reward. Instead, I was (even repeatedly) misgendered (i.e., addressed with a gendered title that was not congruent with a non-binary gender) in eight instances – almost as many as resulted in systemic change. Given that the issue I brought forward was precisely about the infrastructural misgendering happening to me, this is generally violating. In case 30 (Table 5), though, the service worker was persistent in misgendering me in replies despite being explicitly called in on that. Only when I went to Twitter, the company’s social media team presumably intervened on my behalf resulting in an initial individual solution, that somehow was reverted a few months later – and a spiteful greeting in the last email from the service worker, but at least not a gendered one.

What I found particularly interesting though, was the notion of *technical* or *legal* constraints that were cited. In some contexts (e.g., cases involving universities), respondents had to be aware that I was knowledgeable on technological matters. Regardless, the persuasiveness of rhetorics detaching personal responsibility and assigning it to an external, untouchable and unalterable technology seems so infallible in general communication that it was also used towards me. Even making the disclosure of gender optional was met with such an argument (e.g., in case 55, Table 6). For example, in case 3 (Table 4), I inquired with a EU funding body, how I could correctly submit my application. Assuming this pre-emptively, to be a technical issue, I contacted the IT department. Initially, I was referred to the general guidelines for the funding scheme. So, I specified: “*What I’m saying is that the form (see screenshot [in Figure 3]) only offers ‘Male’ and ‘Female’ as options for gender. But I am none of those Please advice how I should proceed.*” Internally, the institution then marked this as a ‘non technical issue’ and replied “*The gender is indeed a mandatory field (...), you’ll have to pick one of the two options to be able to submit the proposal.*” After several rounds back and forth with different parts of the institution who kept on referring to each other for contact, it was deemed ‘technically impossible’ to solve for my application. Instead, I was asked to indicate one gender and clarify why it was impossible

Last Name*	Spiel	Last Name at Birth	<input type="text"/>
First Name(s)*	Katta	Gender*	☒ Male ☐ Female
Title	<input type="text" value="Dr."/>	Country of residence*	<input type="text" value="Austria"/>

Figure 3: Partial screenshot of the EU Funding Form in 2019.

to me to submit the application with my actual gender in an additional supplementary document. Not just does this require me to do all the work for recognition and proper representation of myself, it is further curious that the technical argument was made, not just here, but also in light of other contexts in which a legal obligation requires public and private entities to address every person according to their gender. More involved changes in data management, such as required by the EU General Data Protection Regulation (GDPR) were addressed quicker and more publicly than accounting for gender minorities simply by not *enforcing* the disclosure of intimate and personal details pertaining to one’s identity.

These disclosures can come with material consequences. In hiring contexts, my gender has been treated differently by different universities asking specifically “women” to apply to their postings as to increase the diversity in their computer science and/or design departments. Some made individual exceptions in the spirit of supporting applications from un(der)represented genders (case 13, Table 4), others claimed that I was categorically excluded due to not being a woman. This is particularly intriguing given that the same person, responsible for gender awareness at that university, then invited me to a ‘women’s breakfast’ and months later published the foreword to a ‘report on women and men’, which encompassed “*all members of the university*”, for a period where I was employed with them in a different role (case 36, Table 5). Here, recognition of and accounting for my gender has been used as an argument for discrimination and actively removed working opportunities that were available to women (who, despite being underrepresented in computer science departments, are arguably more represented than non-binary people). I bring this example to show how things can escalate from a simple inquiry into how I can report my gender accurately and how binary categories might be reinterpreted to account for my existence – and that of my peers. However, in some cases, complaining about the lack of representation was not an option due to the power, e.g., governmental agencies can hold over individuals and their families. Readers will forgive me that I cannot go into more detail here.

Beyond academia, there were indications that access to insurances would have to be delayed until (in some unknown future) companies would account for those (see case 32, Table 5) in their digital forms and interfaces with suggestion platforms. This essentially means that living as a non-binary person in a world governed by binary infrastructures requires me to live with more risk than required of people with a majority gender. It also requires me to just have more money at my disposal, as suggested in case 33 (Table 5), where a public transit company suggested, I book a single compartment in a night train to avoid having to provide a binary gender

and risking being “found out” by train staff. In another case (25, Table 5), I attempted to travel between the United States of America (USA) and Europe via a Canadian airport. I could register my gender with the Canadian border control congruent to my passport (X). However, due to missing legal recognition of non-binary genders in the USA on a federal level, the automated passport control at the US airport registered my gender as a U (for undefined). Due to an information mismatch between what the US system reported to the Canadian system, Canada automatically rejected my entry. I was stranded at a US airport for several hours until this could be resolved, barely making my flight⁹.

Figure 4: Mapping of my feelings as recorded along the 55 cases.

During this research, I sarcastically started jesting to friends that through this research I became exceedingly aware that every ‘technical’ constraint is better described as a *socio-technical* constraint given that it is the unwillingness of people to engage with an issue that constrains gendered data. There is no particularly convincing reason why a gendered title would not be similarly a free text field (akin to name) – particularly when it comes to interactions between companies and customers. This observation is confirmed by several instances, where small companies but also involved funding submission forms managed to rectify their “constraints” within a day (case 44, Table 5) or within a week (case 53, Table 6). Systemic change in these contexts appeared to really come down to individuals advocating for change from

⁹Of course, for German speakers this is hilarious as Canada literally followed a common proverb: Sie ließen sich kein X für ein U vormachen.

a place of power or personally implementing it – and with that actively unlearning [41] their education in how to model (gender in) databases.

And this brings me to the most difficult part to write about, which is the set of feelings and emotional states I experienced while conducting this work. While the tables of cases in the Appendix (Tables 4, 5 and 6) show more nuanced aspects of my feelings as taken directly from the commentary in my recordings, I abstracted them for a more at-glance overview in Table 2. Taking inspiration from the work by Gourlet [39], I decided to visualise them as can be seen in Figure 4. To differentiate them roughly along positive and negative emotions, the overwhelming majority (48/55, 87.3%) of cases resulted in a range of negative emotions for me – some of those sustained over the entirety of the interaction, which could span several months. Even in cases where systemic change might have been achieved, I was sometimes still left with feelings of exhaustion, frustration or defeat. To start with a more positive development, let me refer to case 9 (Table 4). I received an email indicating I should check my name and title for a German language joint publication with others. I was frustrated to find a generic masculine used to refer to the group of men, women and me. I replied and accidentally used 'reply-all'. Initially, this left me worried: *"It was meant as a call-in, not a call out. That person probably feels attacked now and then goes in defensive mode."* Though, another author immediately wrote back to me and indicated their support, making me somewhat relieved: *"Oh well, at least it was not a total [screw up] if it did something for other peeps as well."* Further, the responsible person came back to me indicating that they would just alter it to more inclusive language and hope no one higher up in the publication chain will mind. This left me exhilarated: *"Actually, I'm quite happy that this is going this way. It might be that the dudes don't care and then there is a little change that sets a helpful precedent. exciting!"* However, these cases were rare. In November 2019, I noted down for case 10 (Table 4), that *"This is getting draining beyond compare and I thought at the start that I [was feisty enough] to challenge this on the level I am, but oh [expletive] this is super hard."* The newspaper publisher never responded, but just seeing myself writing these emails over and over again seemed to take its toll early on. I share the emotional labour so explicitly not just to illustrate the very personal effect on my mental health this research has on me. It also serves as a data point that might be extrapolated to the shared pain sustained by non-binary populations at large. Following Jaggar, I want to account for the notion that "[e]motions and evaluations [...] are logically and conceptually connected" [53, p159] and subsequently, making my feelings also have epistemological consequences. Jaggar claims further "that the emotional responses of subordinated people in general [...] are more likely to be appropriate than the emotional responses of the dominant class. That is, they are more likely to incorporate reliable appraisals of situations" [53, p.168]. The sustained negativity this research project amplified in my life by my choice to actively engage with the contexts in which I was not accounted for might also provide an answer to those claiming they 'never met a non-binary person themselves' or that their 'non-binary friends never complain'. The cost of complaint tends to be much larger for us than for those the complaint is directed at [1].

5 DISCUSSION

In making sense of my experiences, I now revisit them along their implications for how we might understand gendered infrastructures and how we might understand them going further. I further reflect on the increased role *socio*-technical maintenance plays in upholding a gender binary within common database systems I encountered. Finally, I consider the methodological implications coming from this work with a call to the HCI community specifically and computing largely to attend to marginalised experiences in ways that mitigate epistemic exploitation.

5.1 Beware the (Gendered) Infrastructures

Analogous to prior work by Korn and Wagenknecht, my pro-active engagement with gendered digital infrastructures can be seen as an act of forcing renegotiating [62]. Even though I do not consider my work in the context of 'hacking' (not even 'social hacking'), I deliberately sought out conversations around the maintenance and improvement of the forms and, subsequently, databases, I encountered. Seeking out these conversations meant deliberately choosing to enter a playing field in which I could not anticipate how others might react. This caused feelings of frustration, exhaustion, tiredness, and, only rarely, surprise and delight. While the initial interaction was started by me, it was other's choice (and agency) in how to engage with me if at all.

In contacting stakeholders, I probed the "infrastructural awareness" [48] of the entities, I addressed. This also shows how infrastructural awareness can be unequally distributed as the structuring functions of binary gender ideologies in digital forms and databases are mostly apparent to those who do not fall within the given strict boundaries whereas others may remain in blissful ignorance about them. With this, I mean to say that infrastructural awareness, while useful as an abstract concept to urge reflection, can comprise a negative quality in marginalised people's lives. We are constantly and often violently reminded that existing infrastructures are not made "for us" or even consider us as viable populations engaging with them. We cannot make a conscious choice to engage with infrastructural awareness, it is involuntarily hoisted upon us. Hence, the oppressive and violent aspects of (digital, gendered) infrastructures (see also [75]) can be seen as born out of ignorance of those developing them¹⁰ not accounting for differently lived experiences in their designs and the societal implications thereof. Benjamin has vividly illustrated how the ignorance of systemic inequalities serves nothing but upholding them further [7]. Hence, not accounting for nonbinary people could result in mere irritation in some cases, but leads to fundamental material consequences in others as illustrated with my lack of access to a range of insurances. Subsequently, *developing infrastructural awareness* could be an early step in accounting for (gendered) oppression within given (sets of) infrastructures.

5.2 On Socio-Technical Maintenance

The maintenance of existing systems can be approached in a similar way. However, here I see an increased need for an awareness of

¹⁰It is not a necessary given that a more diverse workforce including marginalised people would change this due to factors like internalised oppression [27], but it offers a potential to do better if systematically and consciously integrated into work and development practices.

socio-technical factors in how changes are negotiated and implemented. Such a view is not new; Pettersen et al. have illustrated the contributions of social interactions in the context of aviation maintenance [72] and Mens has proposed to understand the maintenance of software systems more generally as an amalgamation of social and technical factors [66]. This does not mean that these factors are always clearly separated from each other – quite the opposite. Database developers might subscribe to a folk ideology of gender, but they are also confirmed in practices sustaining that model as taught within textbooks for database modelling [42]. Recognising that there are social aspects within database design and maintenance, though, comprises a first step towards developing a sensitivity for the complexity the notion of gender requires to be modelled appropriately within digital infrastructures.

Engaging in these negotiations I acted as an individual, though my partners were representatives of institutions. As I delineated above with case 30 (Table 5) and any other requiring discussion, however, these negotiations also happened among individual actors *within* institutions. While I was not privy to these discussions, the moments I encountered open or subtle hostility are best described with the concept of *microaggressions*. Sue et al. have defined in the term in the context of specifically racial microaggressions as “brief and commonplace daily verbal, behavioral, or environmental indignities, whether intentional or unintentional, that communicate hostile, derogatory, or negative racial slights and insults toward people of color” [94]. Chang and Chung specifically state that for non-binary people¹¹ microaggressions appear in the form of “societal expectations (...) that undermine and discount the reality of genderqueer-identified individuals” [24]. I have encountered these expectations along different reactions ranging from blatant disregard of the validity of my inquiries to apologetic excuses (as also echoed in [25]). Given the material consequences that some instances of systematic exclusion on the level of digital infrastructures entailed, these microaggressions are a prime example of how the prefix *micro* does not refer to the size or impact of the aggression, but rather points toward the interpersonal articulation of systemically oppressive factors [94]. In that, the encounter with the digital infrastructures as well as the encounter with the individuals upholding the exclusive binary form thereof form a range of socio-technical microaggression in which both may go hand in hand.

For institutions in the process of refactoring and maintaining existing infrastructures around gender, I suggest to start by developing sensitivity also from actors not necessarily directly involved in the technical minutiae. While developers sit at a neuralgic point where change can happen, management can similarly drive (or prohibit) progressive changes. Otherwise service staff, as the ‘human interface’ to the entity maintaining a given database, should be educated in matters of gender sensitive approaches in engaging with customers, citizens or just any person they encounter. Further, they should be given an appropriate platform to register incoming complaints not just in terms of the direct context they occur, but also the practices and tools enabling the sustained exclusion of customers.

Mostly, though, I argue that the legislative recognition of non-binary genders in governmental documents is not enough,

particularly if those governments themselves do not account for the (legal!) gender diversity in their own databases. In Austria, there are currently no consequences for stakeholders ignoring my requests or not accounting for non-binary genders – other than if individuals (or collectives) decide to sue them. However, as I have shown above, expecting this work of a gender minority to affect the adherence to legal requirements, seems impossible given how much work it entailed to simply *mention* that given infrastructures exclude non-binary people in general, but also me as an individual person in the specific.

5.3 Methodological Reflections

In the production of these insights, I drew on autoethnographic methodologies to ground my work in a specific set of epistemological commitments towards situated knowledges [45]. While observing others is more common in Human-Interaction Research, observing the self comes with unique opportunities to explore marginalised perspectives (see also, [21, 55, 91]) that might otherwise be classified as ‘outliers’ in research looking at larger populations. In this work, though, I did not only observe the self, I deliberately took an aspect of my identity and put it to work for this investigation. Instead of solely documenting events, I proactively shaped them by addressing my personal exclusion when possible.

In that, the resulting insights can be understood as autoethnographic design exploration – not necessarily in the direct sense proposed previously [28], but rather inviting the designers and developers of presumably less interactive infrastructures such as web forms and databases to consider some of the tensions around needs, participation, intimacy, reflexivity and personal authorial stance. I could show how my *needs* are only slowly attended to and need active prompting. Databases being often seen as a somewhat neutral element of implementation, they are often ignored even in deliberately *participatory* engagements as an opportunity for co-creating the logics behind it. Designers could also consider how *intimate* certain personality aspects are. Not all of the places who asked for gender (or a gendered titled) really needed them for a good reason; rather a gender field seemed customary, the thing to do. Without actively and continually *reflecting* on how a database might act within dominant power paradigms, designers and developers take an absolute and oppressive *authorial stance* precisely by not acknowledging their personal self and the influences of (presumed) societal norms.

However, the potential situated insights into marginalised experiences come at a cost. For one there was a lot of emotion work [3] I had to bring to the work itself, in managing the feelings of the people and institutions I addressed without knowing their stance beforehand and occasionally with differing viewpoints within a single company or office. In addition, conducting this research took an emotional toll on me that reaches far beyond the immediacy of the work. As part of the writing process (and potentially thereafter), I had to reiterate over and over on experiences and statements that kept on reminding me how within dominant mainstream cultures, I either do not exist or if at all only as an afterthought. It also keeps on reminding me how my mere existence is used as an excuse to harmfully react to the cognitive dissonance some people experience [25] upon encountering me. This work is mine to bear,

¹¹ which they refer to as “genderqueer-identified individuals”

Table 3: Summary of recommendations made to work towards more gender sensitivity in technological infrastructures

Recommendation	Why
Protect gendered information	Gender comprises personal and private information
Minimise on gendered data	Private information should only be allocated on a need-to-know basis
Refactor existing databases	Account for the flexible, changing and open aspects of gender
Educate upcoming developers on gender	Future developers should be able to model gender adequately (if at all)
Update existing textbooks	Counteract the persistent reification of a gender binary as a default

but has implications for what we demand of marginalised researchers in researching and writing about aspects of their marginalisation. We/they have to put in the effort, have to expose themselves even to potential harm and argue for change by themselves. All the while having to write to an audience which is largely not their peers.

I am unsure how to approach this dilemma, but I would like to encourage the HCI community specifically and Computing disciplines writ large to sit with it [46] and acknowledge these trade-offs. Epistemic injustices take on many shapes and forms [36] and part of a strategy to do better here, might be not to require legibility of marginalised perspectives to dominant groups but rather engaging with us/them on our/their terms, validating their (often painful) experiences instead of demanding proof or justification (comprising a mode of epistemic exploitation [8]) and acting upon them to minimize the sustained harm we/they encounter within the (socio-)technical networks that govern our/their identities and lives.

6 IMPLICATIONS FOR THE DESIGN OF GENDERED DIGITAL INFRASTRUCTURES

Essentially, my research implies to treat gender as a complex data entry beyond a simplifying binary entry. While an intermediary solution might lie in accounting for non-binary genders, I see implications reaching further into how we fundamentally *model* gender in databases. All recommendations are summarised in Table 3. Fundamentally, though, I suggest the adoption of three principles that should be considered when modelling gendered information in a database, namely 1) protection, 2) data minimisation, and 3) refactoring interfaces.

6.1 Treating Gender Identity as Personal and Private

I argue that gender should be treated and *protected* as deeply personal information, that – similarly to age, height, weight, or medical status – should only be asked for when fundamentally necessary. Going with recent understandings of gender as a self-determined aspect of identity [88]. In that, no suggestion made as to ‘how to ask for gender’ can be sufficiently acknowledge the personal and individual nature as to how gender expresses itself. From this follows that earlier attempts of allies [29] or myself [86] are somewhat futile as an appropriate strategy to account for nonbinary and/or intersex people in databases. Further, if the information is deemed necessary, sharing such information about others should be restricted in the same vein as similar deeply personal information.

Treating gender as sensitive and private data requires us to think with privacy principles such as *data minimisation* [82]. As digital infrastructures ask for gender in many arguably unnecessary contexts, such as purchasing cat food [87], developers should not see asking for gender as the default, but rather as an exception¹². A practice oriented on data minimisation could subsequently minimise the instances in which non-binary people are exposed to microaggressions in living our/daily lives. I have not documented the (few) instances in which I expected forms to ask for my gender, particularly in e-commerce, though they did not. Each one of those was a welcome positive variety to me – and presumably irrelevant to people with a binary gender. Hence, where data minimisation around gendered information is already practised, it makes no change to the service provided for most customers, but avoids negative experiences for those falling outside the default binary so ubiquitous at present.

Regardless, there are cases where asking for gender might be relevant, for example to document systemic bias in hiring practices. Here, I suggest not only *refactoring* specific database instances, but also use such refactoring as an opportunity to think through backwards compatibility while communicating to other databases interfacing with a given system that an update will be necessary. Fundamentally, though, we need to move away from the concept of a boolean representation (whether this is actually the case in a given instance or not) and model gender not as a static, immutable and binary but as a flexible, changing and open aspect of one’s identity [61].

6.2 The Role of Education

To account for gender in digital infrastructures, a self-determined understanding of this identity aspect needs to be developed also as part of Computer Scientists and practitioners. While Dillon and Collett have already noted that the gap between computing practices and gender theory is impracticably large and leads to sustained exclusions [30], little work is available allowing researchers to build up a sensitivity towards such issues. Here, Burtscher and Spiel make some recommendations [18] and community sourced guidelines offer researchers a compendium to consult [81]. However, these approaches still require individuals to realise that they might need to attend to these issues in the first place. They provide a next steps towards a *how* once there is some initial awareness.

¹²In fact, I never understood why people were so obsessed with constantly wanting to know my gender. I do not really like talking about it. And yet, I constantly have to.

These approaches need to be fundamentally augmented by lecturers' awareness and require their contextualisation for us to tackle this gap. This would mean, for example, that whenever gender is the topic in a database textbook, it is not treated as a comparatively simple matter of a categorical instance [42] but instead as a deeply personal and intimate piece of information that requires careful attention and treatment. Until this is required on a policy level, this again, requires individual lecturers to take action, and thus my work offers a range of examples detailing the harmful potential that comes off of not treating gender with the nuance it requires.

7 CONCLUSION

I started this research and writing about it as a personal account of my navigation of gendered digital infrastructures. Beyond navel gazing, the work was conducted as a means to apply research methodology on my personal life while simultaneously bringing my personal life as a site of knowledge production into research. Specifically, I conducted an autoethnography of my experiences encountering and challenging the infrastructures which did not allow me to register my legal non-binary gender appropriately. In doing so, I can lay out the persistence with which gender is (literally) encoded as a fixed, immutable and static variable relating to norms so far seemingly not reflected upon in the development of digital forms and databases. When made aware of the exclusive character of these norms, it is largely individuals who can hinder change or make a difference, though institutional backing can support or avert these processes, rendering equity in the implementation of databases a *socio-technical* issue despite the repeated emphasis on *technical* issues by service staff. What was most surprising to me was the emotional toll the work took. I consider myself to be a strong person who can take on a lot in terms of personal attacks and yet this work has had and potentially still has damaging consequences. By removing the option for plausible deniability as I forced myself to continue work that ultimately meant to over and over again bring myself into conflict with other people whose well-meaning I was not only dependant on but also relied on in terms of affecting the desired change.

Such an approach comes, like any, with a range of limitations not just for the knowledges it produces, but also in terms of the implications that can be drawn from it. First of all, the strengths of the methodology particularly in the personal and deeply embedded approach means that the experiences I can draw from are limited as they are only my own. Additionally, the context for this work stems largely from within German and Austrian institutions (with few exceptions). Hence, the legislative and infrastructural implementations and practices regarding gender in forms and databases outside Europe will require separate investigations. Further, in aiming at a broad picture across multiple institutional stakeholders (as they present themselves to me), I could not delineate a more in-depth account of the institutional particularities that might be conducive to some of the reactions I received. An institutional and infrastructural ethnography (cf. [90]) might help uncover in more detail the perspectives and specificities of the actors defining their web forms and databases [95]. Subsequently, the implications I identify are largely informed not by the technological needs, requirements or constraints given within abstract or concrete database implementations,

but rather stem from a very particularly positioned perspective and are influenced by my personal desires, expectations and expertise.

Beyond conducting investigations like this in other localities and institutional ethnographies, future work could benefit from further accounts across infrastructures with different perspectives regarding class, racialisation, disability and location. But I imagine that not just how web forms, databases and surveys ask for gender might be relevant here; ways in which to ask for other categories of identity might be equally contestable along different socio-legal contexts (e.g., for race [71, 78]). Additionally, I expect the investigation and observation of the facilitation of such a change within an institution or company to provide meaningful guidelines for such a transition on a social as well as technological level. Ultimately, though, I see future work in the education of computer scientists and programmers to enable them to reflect on the choices they make (and the power dimensions within) in encoding the world and shaping it in return.

However, my autoethnographic exploration provides a personal account of the microaggressions that infrastructures can bring to those who do not 'count' [60] within the categories their digital structures offer. The work illustrated not just my individual navigation of these (binary) gendered infrastructures, but also provided a taxonomy for understanding the responses institutions (as per the workers that represent them) bring towards being challenged. My discussion offers tentative guidance for database designers and developers as well as an encouragement for marginalised HCI researchers to consider autoethnography as a tool for addressing the embodied part that our research brings to the table and the specific insights stemming from disclosing personal perspectives. There is a certain kind of power in reflecting on our experiences in solidarity. I hope to read from you soon.

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A LIST OF CASE STUDIES

Table 4: Overview of Case Studies Contributing to this Research. Please note that individual categories have been summarised for the sake of presentation.

Case	Date	Type	Contact	Response	Argument	Outcome	Feelings
1	09/19	University	Email to friend	Promptly	Apology	Individual solution	Appreciation
2	09/19	Company	Phone	n/a	Deference	No change	Exhaustion
3	08/19	EU funder	European & national support	Promptly	Lack of power	Individual solution	Frustration
4	09/19	Airline	Web form	Promptly (w misgendering)	Deference	No change	Anger
5	09/19	Public Database	Support email	None	n/a	Silent change	Exhaustion
6	09/19	University	Email from superior	None	n/a	No change	Desperation
7	09/19	National funder	Phone & email	Mostly promptly	Discussion needed	Systemic change	Curiosity
8	11/19	Foreign office	Support email	Automated (w misgendering)	n/a	No Change	Defeat
9	10/19	Scientific organisation	Direct email	Promptly	Can try	Silent change	Excitement
10	11/19	Newspaper	Support email	None	n/a	No Change	Drained
11	11/19	Public Transit	Support email & Twitter	Delayed (w misgendering)	Ignored	Incomplete change	Anger
12	11/19	Company	Support email	Promptly (w misgendering)	Deference	No change	Spited
13	11/19	University	Email to staff	Delayed	Discussion needed	Individual solution	Anger
14	11/19	University	Email to staff	Promptly	Apology & Deference	No change	Anxiety
15	11/19	Company	Contact form	None	n/a	No change	Defeat
16	12/19	University	Email to staff	Delayed	n/a	Systemic Change	Thankful
17	12/19	Company	Tweet	None	n/a	No change	Tired
18	12/19	University	Staff contacted me	n/a	n/a	Systemic Change	Surprise
19	12/19	University	Email to staff	Promptly	Needs documentation	Systemic change	Thankful
20	12/19	Airline	Web form	Delayed (w misgendering)	Ignored	Voucher/No change	Confused
21	12/19	Government	Email to staff	None	n/a	Incomplete change	Anxiety
22	12/19	Airline	Facebook Messenger	Promptly	Deference	No change	Tired

Table 5: Overview of Case Studies Contributing to this Research. Please note that individual categories have been summarised for the sake of presentation (cont.).

Case	Date	Type	Contact	Response	Argument	Outcome	Feelings
23	12/19	Company	Service email	Immediately	Nice idea	Individual solution	Puzzled
24	12/19	Health data-base	Contact email	None	n/a	No change	Defeat
25	12/19	US Customs	US & German government contacts	Promptly	Shrug	No change	Anxiety
26	01/20	Government	Web form	Delayed	Thank you	Systemic change	Disbelief
27	11/19	University	Email to staff	Promptly	Technical constraints	No change	Drained
28	09/19	University	Email to staff	Promptly (w misgendering)	Documents needed	Incomplete change	Exhaustion
29	01/20	Research project	Email to contact	Promptly	Technical constraints	No change	Annoyed
30	09/19	Public transit	Service email & Twitter	Promptly (w misgendering)	Deference	No change	Defeat
31	01/20	Conference submission	Direct contact to friend	Promptly	none	Systemic change	Amusement
32	01/20	Company	Service email	Delayed	Deference & Technical constraints	No change	Tired
33	01/20	Public transit	Web form	Delayed	Deference	No change	Infuriated
34	09/19	Bank	Phone	n/a	Documentation needed	Incomplete change	Weary
35	01/20	Booking site	DM on Twitter	Delayed	Deference	No change	Annoyed
36	01/20	University	Emails to staff	Delayed	Deference & Legal constraints	No change	Frustration
37	02/20	Government	No contact	n/a	n/a	No change	Fear
38	03/20	National Funder	Contact email	None	n/a	No change	Frustration
39	03/20	Company	No contact	n/a	n/a	No change	Tired
40	03/20	Company	No contact	n/a	n/a	No change	Tired
41	03/20	Company	No contact	n/a	n/a	No change	Exhaustion
42	03/20	Company	No contact	n/a	n/a	No change	Exhaustion
43	03/20	Company	No contact	n/a	n/a	No change	Exhaustion
44	03/20	Company	Contact Email	Promptly	None	Systemic change	Surprise

Table 6: Overview of Case Studies Contributing to this Research. Please note that individual categories have been summarised for the sake of presentation (cont.).

Case	Date	Type	Contact	Response	Argument	Outcome	Feelings
45	10/19	Health insurance	Phone & Email	Delayed	Deference & Technical constraints	No change	Resignation
46	05/20	University	Email to staff	Delayed	Deference	No change	Exhausted
47	05/20	Union	Personal contact	Promptly	Deference	No change	Tired
48	06/20	Company	Service email	Delayed	Deference	No change	Exasperated
49	08/20	National funder	Contact email	Promptly	Apology	Systemic change	Annoyed
50	10/20	Government	Twitter	n/a	n/a	No change	Frustrated
51	10/19	Scientific organisation	Emails to staff	Delayed	Deference	Systemic change	Exhaustion
52	12/19	Company	Web form & emails	Delayed	Deference	Individual solution	Exhaustion
53	11/20	National funder	Web form	None	n/a	No change	Irritation
54	11/20	Company	No contact	n/a	n/a	No change	Exhaustion
55	08/20	Newspaper	Service email	Delayed (w mis-gendering)	Technical constraints	Individual solution	Frustration