"But Where Would I even Start?" – Developing (Gender) Sensitivity in HCI Research and Practice

Sabrina Burtscher
Human-Interaction Group, TU Wien, Vienna, AT
sabrina.burtscher@tuwien.ac.at

Katta Spiel
Human-Interaction Group, TU Wien, Vienna, AT
eMedia Research Group, KU Leuven, BE
Centre for Teacher Education, University of Vienna, AT
katta.spiel@tuwien.ac.at

ABSTRACT

Funding bodies increasingly require researchers to address gender in their proposals —often framed around binary notions. With power structures emboldening inequality highly prevalent and persuasive in Western societies, these seep into current practices of Computer Science and Human-Computer Interaction (HCI) research. Hence, developing an increased awareness of our societal responsibility towards equity can be challenging without an appropriate starting point. We present a close reading of literature discussing gender sensitivity in HCI research to provide *practical* guidance in the form of recommendations for the design, proposal, conduct and presentation of research. Our analysis provides a starting point for HCI students and interested researchers to explore questions and issues around gender and to identify how gender relates to their research. This sensitisation may aid them in further reflecting on how they might better serve marginalised populations through their work.

CCS CONCEPTS

• **Social and professional topics** → **Gender**; • **Human-centered computing** → *HCI theory, concepts and models*; Empirical studies in HCI.

KEYWORDS

gender, sensitivity, methodology, intersectionality

1 INTRODUCTION

In recent years, Human-Computer Interaction (HCI) research has developed increased sensitivity towards marginalised populations (e.g., [17, 19, 53, 59]). The implications of inclusive efforts are tremendous (see, for example, related discussions in the context of machine learning and artificial intelligence [38]), particularly when technological artefacts and algorithms operate on scale and permeate infrastructures [56]. Subsequently, public and private funding organisations ask people to position their proposals with regards to equity concerns, particularly focused on gender.[1] As academic funding is increasingly driven by third-party money [64], this also relates to research areas not primarily concerned with equity. However, researchers in specialised fields often lack concise and actionable guidance in how they might unlearn [28] dominant paradigms and develop a sensitivity that allows them to assess these impacts with confidence.

Given the ever-increasing amount of work published on issues of equity and marginalisation, especially on topics of gender [60], that confidence is difficult to acquire. A query for "gender" in paper abstracts within the Guide to Computing Literature of the Digital Library of the Association for Computing Machinery (ACM DL) matches almost 7500 papers.[2] Such an amount of potential papers can be in itself overwhelming for researchers unfamiliar with the topic who might struggle to identify *relevant* works. Our contribution lies in offering an analysis of different approaches to consider gender in HCI research with the intent to guide readers in developing sensitivity as to *how to explore* the relevance of equity within their work.

To synthesise and summarise specialised knowledge regarding gender and technology in HCI, we conducted a close reading of selected papers that function as an introduction into how the field thinks about gender. We analysed these papers according to the implications for HCI research and knowledge production and derive a set of recommendations. While we, in line with current funding requirements, focused initially on gender, we expanded our lens to account for the intersectional characteristics (i.e., notions of multidimensional oppressive factors having specific effects on gendered experiences such as class, race, sexuality, dis/ability etc. [16, 52]) contextualising the specificity of marginalised experiences. Hence, our efforts, while focused on gender, are intended to spark HCI researchers' curiosity on what else they might have to consider to adequately address equity in their research.

This paper is intended to provide guidance around developing (gender) sensitivity for researchers not previously engaged with the topic and to serve as a starting point for further, more situated deliberations in the acquisition, design, conduct and presentation of our

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[1]For example, the European Commission requires H2020 applicants address gender: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/support/faq/977, accessed 2020-03-11.

[2]7 380 matches, queried on 2020-04-17 : https://dl.acm.org/action/doSearch?fillQuickSearch=false&expand=all&field1=Abstract&text1=gender

inquiries. It offers a synthesising document that combines theories, empirical findings and recommendations for gender-inclusive research practices as related to *designing research protocols, acquiring funding, conducting research* and *presenting* it.

To this effect, we start by introducing theoretical contributions to understanding gender stemming from outside as well as inside HCI and revisit existing recommendations for the field. After detailing our methods, we present a close reading of ten HCI publications implicitly or explicitly addressing gender in their work. We then discuss how gender relates to different research contributions in HCI [65] and derive a set of recommendations for gender-inclusive practices. The paper closes on the limitations of our work with a look towards potentials for future research.

2 BACKGROUND

Within Gender Studies, diverse conceptualisations of gender and how it permeates societies are continuously negotiated. We briefly introduce some of these before attending to related work illustrating how HCI conceptualises and deals with gender.

2.1 Identity & Intersectionality

We can broadly identify three approaches to gender focusing on *essentialism*, *performance* or *identity*. The most prevalent popular view on gender within society draws on *essentialism*. It assumes a strictly binary, immutable, complementary and fixed set of genitalia that neatly align with gender, learned behaviour and social roles [5]. In rejecting this alignment, scholars have started to distinguish between sex (assigned at birth) and gender, with gender becoming a mostly aligned reiterated *performance*. However, the sexed body still determines how gender is supposedly performed and any performance not following suit marks deviant behaviour [43].

Both of these views provide a biologically deterministic perspective on gender where the assignment of genitalia to a specific sex implicates gender. More recently, theorists have started understanding gender (and sex for that matter) as a social construct going far beyond a simple binary [21]. Assuming a gendered *identity* consciously constitutes an exercise of self-determination [32]. Due to the "sexing" of the body [21], there is no clear distinction between presumably 'biological' sex and 'performed' gender; instead, both are continuously and consciously upheld within societal practices and customs. Our work is informed by an understanding of gender as self-determined and independent of genital makeup.

Inequality, though, operates not exclusively on gender. The concept of *intersectionality* articulates how different marginalised identities might overlap and amplify specific modes of oppression. Crenshaw illustrates this vividly for black women. "Feminist efforts to politicize experiences of women and antiracist efforts to politicize experiences of people of color have frequently proceeded as though the issues and experiences they each detail occur on mutually exclusive terrains" [16]. Hence, beyond gender, further markers of identity are likely similarly relevant and important. If gender and other factors remain implicit, researchers risk operating within *unmarked norms* of, e.g., masculinity, whiteness, ableness and (often upper) middle-class [7].

2.2 Related Work in HCI

With the recent surge of publications discussing how gendered dimensions shape HCI research, we see increased activity regarding gender recommendations in the forms of *analytical reviews, software analysis* and *guidelines*.

2.2.1 Analytical Reviews. Roig-Maimó and Mas-Sansó show how researchers conducting user studies need to be aware of problematic generalisations if they focus solely on mathematical parameters of significance without also accounting for the distribution of gender among their participants [48]. Albeit limited itself by a binary conceptualisation of gender, the authors suggest researchers address limitations due to participant samples. With this binary view, their work aligns with most of traditional HCI research. Stumpf et al. recently published a conceptual review on gender-inclusive HCI research with a specific focus on cognitive and behavioural works as well as dangers of stereotyping in technological design [60]. However, even though the authors explicitly attend to issues surrounding a dominant binary notion of gender, their approach risks essentialising gender (cf. [36]) and does not operate from a notion of self-identification.

Our work takes a prior literature review by Schlesinger et al. as its foundation point due to its intersectional approach [52]. The authors identified how existing research is narrowly focused on single markers of identity without structurally attending to overlapping and amplified modes of oppression. The authors studied how HCI research identifies and/or classifies target populations and research participants in a large corpus of 140 papers published between 1982-2016 at the ACM CHI Conference on Human Factors in Computing Systems (CHI). Particularly, they investigated diversity and intersecting categories of identification along gender, ethnicity, race, class, and sexuality (though leaving out, e.g., age, localisation and disability).

2.2.2 Software Analysis. As gender comprises a generally pervasive structure within Western societies, Burnett et al. identified it as a relevant factor in software [10], even if not explicitly concerned with gender [23]. The authors and further collaborators created an application that systematically steps through source code to identify instances in which gender bias occurs [63]. The approach relies on gender-inclusive personas [39] while trying to avoid stereotyping [31]. Recently, some of the authors were also involved in an attempt at generalising the method to other issues of equity [41]. However, this approach requires not only that researchers are already aware and understand gender (or other) identity factors appropriately, it also assumes that these issues can be feasibly addressed by a cognitive walk-through. This can comprise a first step in aiming at (gender) equity in software, however, it presents a formulaic approach to an issue that requires situated sensitivity. Our work presents a potential starting point to developing knowledge relevant to use such methods critically and effectively.

2.2.3 Existing Guidelines. In the context of qualitative settings, Rode calls for more reflexivity (also on gender) in HCI research [47] and Brulé and Spiel developed considerations on how to negotiate gender (and disability) between researchers and participants in participatory design [8]. Jaroszewski et al. conducted research in two different contexts, tumblr members and fantasy football

Paper	population	locale	context	focus	treatment	contribution
Blackwell et al. [4]	LGBT parents	USA	social media	implicit	self-identification	empirical
Karuei et al. [34]	general	CA/DE	wearables	explicit	binary/biology	artefact
Otterbacher [45]	general	CY	crowdsourcing	explicit	binary/external	empirical/dataset
Clarke et al. [12]	DA survivors	UK	photo-sharing	explicit	binary	empirical/method
Ahmed et al. [1]	general	BD	online platform	explicit	binary light	empirical/method
Haimson et al. [25]	men having sex with men	USA	dating ads	implicit	ambiguous	empirical
DiSalvo et al. [18]	black men	USA	game development	explicit	ambiguous	empirical/theory
Keyes [35]*	trans people	USA	gender recognition	explicit	self-identification	survey/argument
Metaxa-Kakavouli et al. [42]*	general	USA	web interfaces	explicit	self-identification	empirical
Fernandez and Birnholtz [22]*	trans people	USA	dating platforms	explicit	self-identification	empirical

Table 1: Characteristics of papers part of our close reading corpus. Contribution types have been identified according to [65]. Papers indicated with * have been added outside of Schlesinger et al.'s corpus [52]. DA stands for domestic abuse.

players, using the same form to inquire into participants' gender: a free form field [33]. The first group provided a range of unique genders and praised the approach whereas the second group was hostile towards the freedom of expression. From that, the authors derive a generalised approach for how to inquire into gender, which has been further refined, including a call for situated nuance [55]. The *HCI Gender Guidelines* [51] stem from a grassroots initiative of several HCI researchers and provide hands-on guidance for gender equity in writing, research and the organisation of academic events. Our work supplements this approach based on lived experience and activist knowledge by analysing existing works and drawing higher-level recommendations from peer-reviewed publications as different modes of assessing these issues lead to stronger recommendations across them through triangulation.

2.2.4   Research Gap. All of these approaches show that researchers have started attending to gendered issues in their research. However, we could not identify work aiming at researchers to *develop* their sensitivity as it comes to equity around gender and other markers of identity with an intersectionally informed lens. Hence, our work offers a starting point allowing them to probe their research for relevant matters of (gender) equity.

3   APPROACH

We selected a smaller subset of seven papers from Schlesinger et al. [52] as selective instances covering a range of topics concerning gender and HCI while also exhibiting geographical diversity as it relates to authors' institutions and research environments. Augmenting these, we added three further papers published since 2017. We have not specifically selected papers addressing methodological guidance regarding gender sensitivity for HCI research (such as the ones in the Related Work Section) but instead aimed to develop our recommendations from works that have implicitly or explicitly dealt with populations which made gender sensitivity relevant to their research and covered a range of different contribution types [65]. Hence, our final close-reading corpus includes the ten papers shown in Table 1.

We analysed these papers using *close reading* as our method [40]. This is an *interpretive* and *qualitative* approach with which we, contrary to systematic reviews, do not aim to illustrate the breadth of what is available. Instead, we sampled papers according
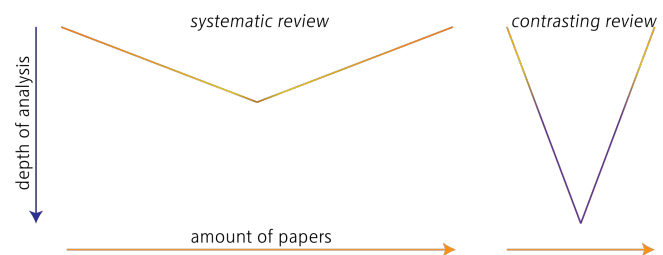

Figure 1: Comparison between systematic and contrasting literature reviews.

to diversity criteria and engaged with them deeply to provide a coherent contextual analysis. This allows us to analyse distinctions between different approaches and the motivations behind a smaller range of publications (see also, Figure 1). Hence, we conducted a *contrasting review* with an in-depth analysis of a decidedly non-exhaustive list of selected papers chosen to represent difference among them.

Each of the instances within the corpus was analysed regarding gender aspects in research questions, methodologies, and language used. In that, we were guided by the overall question: *"What can we learn from this?"* to ensure our work remains relevant for HCI researchers and practitioners not yet familiar with the topic.

As our work is *interpretive*, the rigour of our work can be established within a notion of *partial perspective* [29], meaning that we do not claim generalisability of our findings, but rather present an informed analysis leading to a set of situated recommendations. Both authors inhabit marginalised positions within gendered power dynamics (as woman or nonbinary person), which implicates our analysis [14]. Additionally, all authors are white and culturally tied to majority perspectives within central Europe, rendering our analysis one that remains outside of a lived experience of, e.g., race [44] or forced migration [61]. One of the authors further identifies as disabled and neurodivergent. Making these positional markers visible allows readers to reflect on the potential limitations of our analysis and contrast their position. We also invite and encourage further work from different perspectives [30].

4 HCI AND GENDER

Here, we discuss each of the corpus papers in detail to illustrate our close reading. We have set *best practices* in italics.

4.1 Complexities of Disclosure in Blackwell et al., 2016

Blackwell et al. were interested in social media use patterns of LGBT[3] parents [4]. They asked which platforms their participants engaged with, which details they shared and how they restricted their audiences. While this work contains no explicit focus on gender (e.g., by choice of keywords), gender is implicitly relevant. In a series of interviews with 28 participants, they identified three themes relating to (1) continuously gauging safety of disclosure around particular audiences (p. 614), (2) the external attribution of activism to lived experiences (p. 615) and (3) detailed deliberations regarding privacy of self and family members (p. 616).

Methodologically, the authors point out the relevance of respecting participants' choice of *self-identification* regarding gender and sexual orientation. Their participants were *recruited through peer groups* on a range of social media platforms (e.g., Twitter, Facebook). Even though the context was social media use, the authors refrained from seeking out their participants' online profiles to respect their individual *privacy* and dignify the desired representation towards the researchers. From their results we additionally take that researchers should communicate a *non-judgemental safe environment* to participants, create a space in which it is comfortable to share personal experiences and *refrain from probing* deeper where participants do not readily disclose aspects of their lives.

4.2 Diversity of Embodiments in Karuei et al., 2011

Karuei et al. were interested in the sensitivity of different body locations to vibrations, how they are affected by movement and whether visual workload, participants' expectations or gender played a role in task performance and preferences during the use of tactile displays [34]. The authors identified differences in the rate of signal detection as well as response time when analysing according to participants' gender (which they take as an indicator for body fat distribution). In this, they follow a biologically essentialist understanding of gender which becomes further convoluted as the authors point out themselves that the results are neither consistent nor significant.

While the authors attend to gender explicitly, they miss out on fundamentally gendered issues. For example, they identify that the "thigh was among the least effective and least preferred stimulus site we tested; and yet, front pocket is a common location to stow a mobile device, particularly for men" [34, p. 3274]. In this context, differences in gendered clothing (such as the lack of or diminished size of pockets in clothes aimed at women [9]) and their influence on preferences are not reflected upon. As different embodiments

are not specifically discussed, we assume that they operate from an unmarked norm of presumably able-bodied participants.

Methodologically, the authors ensured that participants wore the *same type of close-fitting clothes* (sportswear) to reduce the effect of different clothing styles. However, they do not disclose how they inquired into gender and only report it for eight participants as male. From their results, we can take that gender only poorly transfers to a concept of specific embodiment and that *body characteristics should be explicitly and directly analysed* instead of inferred from identity characteristics.

4.3 Development of Gender Bias in Otterbacher, 2015

To crowdsource textual metadata for images, Von Ahn and Dabbish developed *ESP*[4], a Game With A Purpose (GWAP). Players are randomly paired and challenged to agree (under a time constraint) on as many labels as possible for a given image [62]. The game requires players to create more and more specific labels once a label has reached a threshold of popularity within the broader player community. Hence, players contribute to the accumulation of big database structures, but also introduce their personal and collective biases into the systems and the algorithms learning from them.

Within this context, Otterbacher studied how bias, particularly gender bias, might be introduced and piped into biases in automated decisions drawing on the data [45]. They operate from a binary notion of gender that can be externally assigned and focus on adjectives, especially strongly subjective ones, and their polarity and frequency in over 33.000 images of people [45, p.1958f.]. They state that descriptive adjectives are commonly used for 'women', whereas active nouns refer more to 'men', with a heavy tendency to assign heteronormative descriptors in both cases [45, p.1961].

Methodologically, the author cautions readers towards a *pre-existing bias* in online pictures of people as they are pre-shaped by gendered societal expectations. Further, Otterbacher reflects on the *limits of assigning gender* to pictures, particularly reduced to binary labels. From their results, researchers can take guidance on ensuring equivalence in describing people regardless of gender, i.e., using the same type of words (adjectives, nouns etc.) and classifiers (e.g., jobs, colours etc.) to *consistently articulate the same information* across participants, case studies, personas or example stories.

4.4 Agency around Trauma in Clarke et al., 2013

Domestic violence is often conceptualised as a gendered problem within a binary concept, where 'women' are dominantly seen as survivors and men as perpetrators [3]. However, as class [2] and culture [13] play an additional role, disabled people are overall more at risk to abuse [15] and LGBTQ2IA* people face additional barriers to access services [11], researchers increasingly call for an intersectional lens (see Section 2.1) [46].

On that backdrop, Clarke et al. worked with six women who had recently left an abusive partner [12]. Specifically, they investigated

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[3]The acronym stands for Lesbian, Gay, Bisexual and Trans. We use this term to stay close to the text, although more expanding abbreviations are available, e.g. LGBTQ2IA* (Lesbian, Gay, Bisexual, Trans, Queer, Two-Spirit, Intersex and Asexual with * indicating incompleteness of these identities). For further information, see, e.g., the glossary in [6].

[4]The name refers to the abbreviation for 'extrasensory perception' as an indicator for the distributed collaborative nature of the game [62].

the potential of photographs as a means to (re-)gain agency over survivors' narrative through storytelling. Their work was conducted over the span of several months and design iterations.

Methodologically, the authors opted for *building careful relationships* with participants. This included *attending to participants' needs and availability*, i.e., not holding workshops during times schools were closed as many of their participants had care duties for young dependants. Additionally, they collaborated with *topical professionals* to ensure that their research was safe and appropriate. They also *disclosed their perspective* and motivations on the topic during the sessions to create a trustworthy setting. These close relationships were embodied within the prototypes and deemed essential for the designs to be meaningful and relevant.

4.5 Attending to Everyday Violence in Ahmed et al., 2014

Ahmed et al. created a platform where everyday experiences of sexual violence and harassment could be reported, shared and collectively discussed [1]. They employed user-centred design including surveys, interviews and focus groups. Participants indicated a strong need to share their experiences and find community to work through feelings of shame, sadness and regret as well as defiance and anger to facilitate positive change.

Methodologically, the researchers *acknowledge the high prevalence of sexual harassment* and violence as well as their gendered impact. Understanding the damaging effect repeated violations might have on some participants can contextualise, e.g., work discussed previously [34]. Hence, Ahmed et al. specifically sought out more *privileged participants* who might feel safer sharing experiences associated with shame. Attending to *economic factors* shaping research participation allowed the researchers to more critically reflect on the limitations of their work.

4.6 Language on Sexual Health in a Haimson et al., 2014

Haimson et al. studied the language men who have sex with men (MSM)[5] use to pass on sexual health information in online personal ads [25]. Their intent was to inform linguistic choices within system architectures as well as shedding light on representations of "health conditions, preferences, and activities" [25, p.1622f.].

Methodologically, the authors use self-identification for sexual preference (analogous to [4]). As they did not directly work with participants, their *positional disclosure* of two coders identifying as gay men aids the contextualisation of their findings. Additionally, they *categorised age groups along life experiences* instead of conventional age clusters. However, they do not explicitly disclose how they operationalise gender. As they only talk about 'men' without further specifying, they implicitly rely on the dominant binary model.[6] Hence, we suggest that even in cases where the focus lies on one gender only, researchers should briefly *reflect the inclusion and exclusion criteria* for their understanding of which populations they refer to.

4.7 Intersectional Identities in DiSalvo et al., 2011

DiSalvo et al. developed *Glitch Game Testers*, a program introducing low-income high school students to computing through video games [18]. Their focus lies on African American[7] men, who are less likely to be interested in technology even though they are passionate about video games. DiSalvo et al. root this in stereotypical representations of "geek" or "nerd" as white young men disregarding personal appearances, whereas African American men tend to construct their identity through athleticism and body work. After participating in a summer programme interning in the games industry, participants were more likely to see themselves and their peers as technically adept.

Methodologically, researchers can take from this research an awareness of how *racialised and gendered stereotypes amplify* intersectionally (see Section 2.1) [16]. The work (together with more recent examples, e.g., [44]) challenges us to reflect on the *unmarked norm of Whiteness* in computing. DiSalvo et al. also show how computing professions are not just inaccessible for (white) women. Hence, in thinking about equity and gender, researchers need to *critically interrogate their viewpoints* and allude to their standpoints [30] to appropriately contextualise the knowledge they produce including the limits thereof.

4.8 Automating Stereotypes in Keyes, 2018

In a theoretically driven analysis, Keyes identified how Automated Gender Recognition (AGR), the "automatic computational identification of a person's gender from photographs or videos" [35, p88:4] is inherently trans-exclusive due to the presumption that gender could be assigned externally. More recent work has subsequently shown how computers fail to assign gender in a way that aligns with a person's gender reliably [50]. Keyes "found a remarkably consistent operationalisation of gender within AGR research. Almost every paper with a focus on gender, and many of those without, treated gender in a way aligned with the traditional [exclusively binary, immutable and physiological] view" [35, p88:7]. According to Keyes, such findings likely hold for racialised contexts as well [35], rendering such approaches inherently prone to risk ampifing pre-existing inequalities.

Methodologically, this paper suggests to generally *avoid automated identity assignment*. Researchers should not externally define aspects of a person's self-representation. They also suggest to *frame gender explicitly and trans-inclusively* and call for *appropriate resources for researchers*. Since then, some such resources have been developed, for example, the HCI Gender Guidelines [51] or specific recommendations for accounting for gender in survey design [55].

4.9 Interfacing in Metaxa-Kakavouli et al., 2018

Metaxa-Kakavouli et al. created two webpages for an introductory course in Computer Science with differing design and layout. In an experimental setup, men did not distinguish much between 'masculine' and 'gender-neutral' designs, contrary to women [42]. Subsequently, women had lower degrees of belonging in the context

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[5]Here, again, we chose to use the same language the paper employs.
[6]Given other work involving Haimson (e.g., [24, 27, 49, 57]), we deem this an instance of inadvertently adhering to a binary model due to ambiguity.

[7]Again, we use the term the authors are using, though more recent works appear to prefer 'Black/African Descent' as denominations [44].

of stereotypically masculine designs. The authors explicitly mention that no participants reported to be nonbinary.

Methodologically, the paper operates weakly within a gender model of *self-identification*. As cited related work predominantly uses a binary model of gender, the authors take care to *denaturalise previous work* and *point out different conceptualisations of gender* across cultures, though participants were restricted to US residents only. From their results, researchers can reflect on how their designs of prototypes and software for studies might be perceived as stereotypical within their test population to *appropriately control for gendered impressions*.

4.10 Identity Disclosure in Fernandez and Birnholtz, 2019

Trans people (particularly trans women of colour [22, p226:6]) can rarely be certain whether it is safe (i.e., not leading to slurs, harassment, hate speech and/or violence by another (cis) person) to disclose their gender in online contexts and have developed strategies that allow them to assess the safety of a given situation. In one-on-one interviews with 20 trans people using dating platforms in the United States of America, Fernandez and Birnholtz identified two forms of disclosure: direct (clear and open) and indirect (with the option of plausible deniability) [22].

Methodologically, the authors recruited through several *community-based platforms* (e.g., an LGBTQI2A* community centre, trans-specific mailing lists) but also employed targeted Facebook advertisements. However, this strategy lead to a disproportionate representation of White trans people volunteering. *Participants' preferences* were taken into account for the *interview setting*. Additionally, Fernandez and Birnholtz explicitly *asked about the pronouns* each participant had and made clear these would be used in publications. The authors also reflect on their status as cis researchers and *identify themselves as allies*.

5 DISCUSSION: GENDER IN DIFFERENT HCI CONTRIBUTIONS

Through our analysis, we illustrated how gender can affect research in many forms regardless of whether gender comprises an implicit or explicit research parameter. We could show that across a range of different publications, an essentialised binary model of gender still is prevalent with the model of self-identification becoming more prominent in recent works. We welcome this drive towards self-identification in research and expect it to carry over to the implementation and actualisation of (gendered) technical infrastructures. This becomes all the more relevant seeing how digital infrastructures increasingly encode gender (quite literally) and are substantial – if volatile – resources in finding and articulating gender identities [26]. We now illustrate how gender might play a role in different types of HCI research contributions and delineate a set of recommendations for the design, funding, conduct and presentation of research.

In HCI, we produce a range of research contributions [65], and not all of them involve direct interaction with people. Still, gender plays a fundamental role as the field concerns humans and their inherent messiness at the core. This can either implicitly be the case (e.g., through representation) or explicitly articulated (e.g., in

tackling a gender issue). We now step through contribution types identified by Wobbrock and Kientz [65] and provide brief examples on how to attend to gender in each of them respectively. In doing so, we reference back to the papers within our corpus to illustrate how they inform our analysis along contribution types.

- In *empirical research*, gender influences who can participate in experiments, and who is excluded. This affects, for example, gendered care responsibilities (cf. [12]), or gendered differences in recruitment strategies (cf. [4, 18, 22, 25, 42]). Participants and their gender then also limit generalisability (in post-positivist research) or transferability (in constructivist approaches).

- The *artefacts or systems* developed in HCI projects may be easier or harder to understand for people with different levels of affinity for technology, or varying previous topical knowledge in an area - both possibly influenced by gender roles and gendered stereotypes. Artefacts or systems also might record gender (e.g., through forms). In such cases, it becomes relevant to reflect on how gender is encoded and operationalised (cf. [34, 42]).

- For *methods* to be applicable by others, it is paramount to report on how gender was operationalised and included over the course of development, and why. Such deliberations should extend to reflections on how appropriate a method is for otherwise marginalised populations, e.g., disabled people. Some methods inherently exclude, for example, people with a low or no income due to the reliance on technical infrastructures (cf. [1]).

- *Theories*, according to Wobbrock and Kientz, are "not simply observing *that* but explaining *why*" [65, p.41]. As we have discussed previously, gendered roles and intersections of identity have extensive effects on people, and technologies. Theoretical contributions need to be aware of potential gendered influences, to stay relevant to practical applications. If work does not directly apply gender theory (cf. [35]), marginalised populations may be casually included, e.g. in providing imagery with diverse body types (compare e.g., outside of our corpus, [54]).

- Following Wobbrock and Kientz, *datasets* ought to be representative to be useful for testing, measuring, analysis and knowledge construction [65]. Gaps in datasets as they pertain to gender, race, disability and economic status may not only cause nuisances due to incompleteness, but lead to and further support systemic discrimination (see for a further discussion on these tendencies, [20]). Hence, in creating a dataset, researchers can improve its usefulness by reflecting across these dimensions (cf. [45]).

- One of the goals Wobbrock and Kientz describe for *meta-analyses and survey contributions* is exposing trends and gaps in current literature. Here, authors can explicitly reflect on several reported characteristics of participants in given studies, including gender (cf. [35]). Even in cases where the focus does not lie on a specific population, analysing how different people are included in the production of knowledge is paramount to identify exclusionary research practices and existing research gaps.

- Finally, in *essays and arguments*, the rigour lies in probing the argumentative flow for edge cases and strengthening it by thinking those through. Gender and other identity factors can provide an edge case on which to contrast an argument and increase its cohesion. This is not relegated to constitute an "interesting starting point" but should be seen as a productive engagement with being accountable towards marginalising tendencies within existing research (cf. [22] and, outside of our corpus, [44]).

As our source material touched, at least partially, on all of these contribution types, we argue that an analysis of these works offers the opportunity for recommendations that can guide HCI researchers, students and practitioners further.

6 RECOMMENDATIONS

From our results and the ensuing discussion, we have derived a set of high level recommendations on accounting for gender while *designing research*, *acquiring funding*, *conducting research* and *presenting research* within HCI. Before we go into the details, we caution readers that creating sensitivity to matters of oppression falls into the realm of *slow science* [58]; it takes time to attune to experiences that might not resonate with our own. We encourage our readers to dig further, read some of the texts presented here or others in depth and continuously reflect on their practices. Knowledge production attending to power imbalances, oppression and marginalisation comprises a process of ongoing atonement and negotiation.

6.1 Designing Research Protocols

Before funding can be sought, before research can be conducted, researchers have to design their research protocol. To build a strong basis for all subsequent work, researchers should reflect on gender sensitivity early on and be aware of power mechanics affecting potential participants, target populations or informants.

6.1.1 Articulate Gender Explicitly. In our background section (Section 2.1), we detailed three different approaches to understanding gender, namely *essentialist*, *performative* and *identity based* models. Similar to Keyes [35], we encourage researchers to articulate their understanding of gender upfront. This allows them to later communicate ensuing implications more clearly and allows them to reflect on otherwise potentially implicitly made inferences of gender on their work.

6.1.2 Plan for Individual and Collective Reflection on Positionality. To identify potential presumptions and stepping stones influencing a given research project and its proponents, we suggest planning for individual and collective reflection on positionality and personal perspectives early on. Such a plan can be understood as a living document that adapts to emerging needs and practices. Examples for such ongoing reflection can be the plan of a shared or private diary for every individual involved, regular meetings with documentation, or informal check-ins with an accountability structure [47]. Different modes might be suitable for different researchers. However, thinking about potential ways to capture the research process from a personal perspective early on makes disclosing and discussing positionality in the presentation of research easier later on (compare [4, 13, 22]).

6.1.3 Probe Methods for Accessibility and Sensitivity. Researchers often build their work on prior concepts and research. However, all predecessor technologies have been developed in and for certain contexts, so sometimes adaptations are necessary. This may relate to gender in that body related work might have been tested only on a homogeneous population, e.g. able-bodied cis men. While mishaps may happen and can be met with an honest interest to do better, reflecting on how accessible methods are in a specific context allows researchers to also understand more about the limitations of their work. As an example from within the corpus, Karuei et al. ensured that participants wore the same type of clothing as to not occlude bodily characteristics by gendered clothes [34]. We suggest to take deliberations on gender as a starting point for identity factors more broadly to further develop and sharpen one's sensitivity for marginalising tendencies in research.

6.1.4 Deliberately Assess Exclusions. Any research will exclude some participants and include others. Deliberately assessing exclusions upfront can mitigate situations where this might happen inadvertently and in opposition to a given research question. For example, Ahmed et al. acknowledge that the participant base which felt safe and secure enough to talk about topics associated with stigma was fairly small and privileged in comparison [1]. Another way to think through this might be by attending to unmarked norms as DiSalvo et al. did this for Whiteness [18].

6.2 Acquiring Funding

To fund research activities, researchers need to engage more and more with funding bodies awarding finances competitively. Especially those tied to political or governmental entities, e.g., the European Union or national science funds such as the Deutsche Forschungsgesellschaft (DFG), distribute available funds according to several criteria. Being themselves funded largely through taxpayer money, they also need to attend to the usefulness of research to advance societies to become more just and equal. Hence, they often ask researchers to allude to impacts on gender norms, rules, or stereotypes, if relevant. Here, researchers have the opportunity to not just push funding bodies into a more progressive position (while simultaneously presenting their projects as progressive as well) but also to extend knowledge about more substantial issues regarding equity to reviewers and boards.

6.2.1 Check Expectations and See How They May Be Extended. When calling for submissions, funding bodies often publish a request to attend to gender issues, often with stereotypical binary ideas tied to an essentialist view on gender (see Section 2). Researchers might inspect the proposal and review limitations thereof. In constructing a statement that attends to issues of intersectionality and equity more generally, researchers will need to argue how their expanded attention to these issues falls under the umbrella of what the funding body expects. Such an understanding makes, e.g., the work on Black men in computing detailed above possible [18].

6.2.2 Understand Proposal Writing as a Teaching Opportunity. As proposal reviewers might not be entirely familiar with gender as a self-determined identity, such approaches need to be communicated accessibly across disciplines. As such, proposal writing becomes an opportunity for educating on these topics by providing an excellent

example. Hence, in detailing one's assumptions on gender and equity, clarifying specifically why and where this matters within the proposal creates a best practice. In that regard, being precise in language and acknowledging potential biases in data sets (whether pre-existing or created; cf. [45]) guides reviewers' understanding of the subject matter.

6.3 Conducting Research

Making research practices more inclusive requires passionate labour and comes in many different shapes and sizes. However, by conducting research accessibly and in line with the needs of otherwise potentially marginalised participants, the resulting knowledge has the potential to be more thorough and reflected along its limitations.

6.3.1 Follow Participants' Choices In Identifying Them. As Fernandez and Birnholtz and Haimson et al. illustrated, it is a basic sign of respecting participants to explicitly ask for and use their pronouns [22] (even if not directly interacting with them [25]). Valuing their choice on how they want to self-identify without judgement [4] implies staying close to the data and honest towards participants. For this, researchers need to provide participants with the space and freedom to express themselves in the manner they please. In interviews this can be managed during dialogue, and smaller scale studies can provide free form fields for disclosing gender. In larger scale studies it then becomes relevant to know the dominant approach to gender within the target population in order to appropriately design questions into gender identity [55]. We also urge researchers to explicitly offer participants an option not to disclose their gender [55].

6.3.2 Attend to Different Needs and Preferences. Starting with recruiting, researchers can familiarise themselves with the cultural environment a target population might have. This can also help in recruiting through peer groups [4] or community-based platforms [22]. While it is understandable that researchers are focused on their questions and tasks, it helps to be mindful about participants' lives outside of a given project context. This begins by actively including marginalised groups and goes all the way to offering lunch during workshop days and tweaking the project schedule to accommodate for care responsibilities [12], as well as making counselling available for participants [1, 12]. Additionally, flexibility in the choice of research setting (e.g., conducting interviews either through chat or via telephone) creates an inclusive research environment [22]. To further create a safe and non-judgemental environment, we suggest to refrain from probing deeper into topics where participants do not readily disclose aspects of their lives.

6.3.3 Seek Critical Feedback. Critical feedback can be sought in three ways, as seen in the work by Clarke et al.: by building long lasting engagements and careful relationships with participants (to encourage opposition to ideas), collaborating with topical professionals and actively disclosing one's own perspective and motivations to participants [12]. However, all of this takes time to appropriately account for where we can do better [58].

6.3.4 Actively Look for What's Missing. One of the hardest things to do is to be aware of the gaps in ideas, data, and plans we have developed ourselves, and then set out to mend them. Finding those gaps can be difficult if only discussed within one's own domain; in lieu of (or addition to) critical feedback, researchers can also attune themselves to actively attend to what is missing in their research (akin to hunting software bugs in engineering practices). Sometimes, this may result in the realisation that, e.g., not using gender as a variable, might be more appropriate and a different, more nuanced, view on people (cf. [35]) or their bodies (cf. [34]) could be more meaningful to a given research question or context.

6.4 Presenting Research

In writing and talking about research, we need to exercise reflexivity and thoughtfulness on the implications of our research as it pertains to gender and other identity factors.

6.4.1 Provide Appropriate Context Information. To allow readers and fellow researchers to build on existing work, detailing and explaining choices is paramount to provide appropriate context. This pertains motivating choices to include and operationalise gender within a given research context (cf. [35]). We also suggest to discuss the origin of pre-collected data, if present, and analyse it for incompleteness – for example, workplace environments likely change across large enough time spans. Here, we further recommend to acknowledge the specific locale for knowledge, understanding the limits inherent in this and extending solidarity to diversify knowledge constructed in different geographical contexts (see also, [37]). Disclosing positionality can also be relevant contextual information (see [4, 22, 25]). As we pointed out above in referencing prior work [8, 29], disclosing identity allows readers to contextualise the viewpoint of given works, which – contrary to dominant practices – remains relevant for post-positivist as well as constructivist approaches. Additionally, if researchers are themselves part of the groups they analyse, this comprises another point of explicit representation and provides an additional level of lived expertise with a given subject matter [35].

6.4.2 Reflect on Representation and Prior Work. Representation can refer to examples, pictures and imagery used. Here, researchers can reflect on unmarked norms embedded in their visualisations and textual examples and diversify where possible. As most prior work operates from a binary, essentialist understanding of gender [60], denaturalising prior work can also mean broadening representation and attending to cultural differences where appropriate (see [42]).

6.4.3 Choose Mindful Language. The use of inclusive and precise language may avoid perpetuating exclusionary stereotypes. For example, we suggest to use singular they when referring to "abstract" individuals (as done e.g., by [35]) and to state all options and choices when presenting statistics (e.g., "45 % identified as women, 44 % as men, 7 % as nonbinary, 4 % chose not to disclose their gender; participants could select multiple options"). Further we recommend asking for and using participants' self-descriptions and pronouns [4, 22, 25], as well as gathering feedback regarding language used by representatives of the target population.

7 CONCLUSION

We conducted a close reading of ten HCI papers across a range of contribution types with a primary or secondary focus on gender. Through using an interpretative and qualitative approach, we

thereby engaged deeply with the material to provide a contextual analysis. We contrasted different approaches and the motivations for different modes of knowledge production. Each paper from the corpus was analysed for gender aspects in research questions, methodologies, and language used, guided by the overall question *"What can we learn from this?"*. The recommendations we derived from this contrasting review can be applied to various contribution types as described by [65], and span the whole life cycle of HCI research from designing research protocols to acquiring funding, and conducting research to presenting research.

Our view on marginalisation is specific, and can never be all-encompassing. As white members of academia, culturally tied to majority perspectives within central Europe, we can hardly talk about marginalisation due to e.g. race or forced migration. However, our view on the world and existing HCI research is informed by our personal experiences of marginalisation, which have implicitly informed our analysis of existing works, and should be taken into account by readers and fellow researchers.

All papers we reviewed were published by SIGCHI or in ACM journals on HCI. This means that while we were able to gather an impression on what is mainstream regarding gendered issues in HCI, we might have missed some developments already addressing our critique in parts or fully. We encourage fellow researchers to pursue this angle from their perspective, amplifying voices, views and requests that, to date, remain unattended to.

By conducting a close reading, we engaged only with a limited set of (mostly empirical) papers. While the papers were selected to represent a diverse set of contribution types and issues, they also only represent a limited set of individual instances on these parameters. Hence, our subsequent recommendations are derived not only from the situatedness of our reading of these papers but also by the specific make-up of our corpus. Other analyses of the same or different sets of papers might come to different conclusions in what they might deem important to focus on. Hence, we suggest to our readers to not take these guidelines as a monolithic entity, but as a potential (starting) point inviting critical engagement and a continuous process aiming at developing adequate (gender) sensitivity for us to be adequate HCI researchers and practitioners.

As of writing, the recommendations listed here have not been tested in practice. To provide researchers with more support materials in this area, we are currently developing a set of informative cards communicating these recommendations more succinctly and plan to create another set that allows for playful exploration of gender issues in HCI. The cards can be used as teaching materials or as management tools in most phases of HCI projects. They may assist with (1) identifying and developing more specific and intricate research questions; (2) planning and organising a project's sessions and meetings to be inclusive and supportive of marginalised individuals (no matter their level of participation) and (3) creating project materials that provide users and readers with a deep understanding of the project's context.

We determined a gap in the existing body of work on gender in HCI (analytical reviews, software analyses and guidelines), namely a lack of guidance for HCI researchers interested in how to conduct research in a (gender) inclusive manner to develop their sensitivity. With our analysis and recommendations, this gap has been narrowed. To all the HCI researchers asking themselves, "Where do

I even start?" we want to affirm that the most important part is trying and actively learning from mistakes.

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