ECSCW CONTRIBUTION

Humor and Stereotypes in Computing: An Equity-focused Approach to Institutional Accountability

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Abstract. We propose equity-focused institutional accountability as a set of principles to organize equity, inclusion, and diversity efforts in computer science organizations. Structural inequity and lack of representation of marginalized identities in computing are increasingly in focus in CSCW research – and research institutions as well as tech organizations are struggling to find ways to advance inclusion and create more equitable environments. We study humor in a computer science organization to explore and decode how negative stereotypes create unnecessary and avoidable barriers to inclusion and counter efforts to creating a welcoming environment for all. We examine the humor embedded in sociomaterial artefacts, rituals, and traditions, and uncover the stereotyped narratives which are reproduced in formal and informal spaces. We argue that these stereotyped narratives both pose a risk of activating stereotype threat in members of marginalized groups, and of normalizing and reproducing ideas of who belongs in computer science. We situate and discuss the complexity of institutional accountability in the context of a traditionally participatory and collegial model of governance. As a way forward we propose three principles for an equity-focused approach to accountability in computer science organizations: 1) Examine organizational traditions and spaces to critically evaluate challenges for inclusion; 2) Normalize critical reflection in the core practices of the organization; 3) Diversify and improve data collection.

1 Introduction

CSCW scholars have been investigating the underlying structures which have produced technology development as a field and profession with a narrow set of narratives and ideological resources (Turner 2009; Ames 2019) – leaving out and devaluing alternative narratives (Irani 2019; Sun et al. 2015). Research has demonstrated not only how technology is actively producing conditions which constrain and re-produce problematic societal inequalities e.g., in respect to race

(Benjamin 2019; Noble 2018), but also how embracing critical paradigms highlighting systems of power in computing will actively produce better and more inclusive technology designs (Spiel et al. 2020). The increased interest in unpacking racialized and gendered agendas of computing has in the last few years made important contributions to CSCW (Ogbonnaya-Ogburu et al. 2020). It is vital that we include marginalized researchers into CSCW academic discussions as well as marginalized user-groups into technology design research to ensure that we do not miss important voices and perspectives (Tuli et al. 2020). In recent years, we have witnessed an increasing number of CSCW scholars who center non-Western or non-white perspectives and contexts into their research (Boulus-Rødje 2018; Bjørn and Boulus-Rødje, 2018; Wulf et al. 2013a, b; Bardzell et al. 2017; Boulus-Rødje and Bjørn 2021; Lindtner et al. 2014; Martin et al. 2016; Jensen et al. 2022; Harrington et al. 2019). This stream of research establishes the fact that we are missing equity in terms of access and representation in technology design and development (Harrington and Dillahunt 2021; Menendez-Blanco et al. 2018) in the workplace (Albusays et al. 2021) as well as in educational settings (Borsotti 2018).

As researchers invested in both understanding and actively challenging inequity in computing, we examine the elusive challenges to inclusion and equity in a Computer Science department in Denmark. It is important to state that the department has initiated several initiatives towards gender diversity since 2016 and managed to increase the percentage of women students in the bachelor programs from approximately 8% before 2015 to approximately 20% in 2021. However, elusive challenges continue to exist and we must understand these challenges to be able to act and improve our department and successfully develop an equitable environment for all.

One of the elusive challenges we discovered was the ways in which stereotyped narratives surface in the departmental enactment of humor and jokes embedded into traditional institutional practices and everyday interactions. We decided to turn our attention to these traditions of humor and jokes to unpack the stereotyped narratives and explore the complexity of institutional accountability as related to equity.

We ask the following two research questions: 1) Which stereotyped narratives emerge from traditions of humor in computing, and 2) What are the challenges these raises for the institutional response and accountability where they are produced?

We studied traditions and rituals of humor and jokes through artefacts, ethnographic studies, observations, and interviews. Based upon this material we identified three strands of emerging stereotyped narratives which we trace in both formal and informal educational contexts. We reflect upon our findings in relation to the concept of stereotype threat (Aronson et al. 1998) and discuss the complexity of taking appropriate action giving the contextual circumstances. We propose

equity-focused accountability as an analytical strategy assisting organizations in critical reflections upon equity challenges related to historic traditions and rituals, and ways to address the complexity of balancing participatory engagement and inclusive efforts.

The paper is structured as follows: First we situate our research in prior work on the social and ethical dimensions of humor; on stereotyped narratives in computing and within the conceptual framework of stereotype threat. Then we introduce our methods, data sources, data collection methods, as well as our data analysis methodology. This is followed by a result section, structured in two main parts. First, we present the results of our analysis of the stereotyped narratives emerging from the empirical material examined. Second, we discuss current challenges for institutional accountability by contextualizing the computing department in focus, including its tradition of student participation in shaping social activities and in decision-making processes at the university. In the discussion, we reflect our empirical findings in relation to prior work on stereotype threat and humor and propose an equity-focused approach to institutional accountability related in three principles. Finally, we conclude the paper.

2 Background: humor & stereotype threat

To be able to explore the nature of the stereotyped narratives emerging from traditions of humor in computing, we need to first understand the multifaceted ethical, social, and cognitive dimensions of humor. To do so, in this section we start by highlighting relevant literature describing the role of humor in expanding human knowledge; the ways it shapes and it is shaped by social contexts and dynamics, as well as studies discussing ethical considerations on how specific types of humor can amplify stereotyped narratives and thus might counter efforts of creating more inclusive and welcoming environments for all. The concept of stereotype threat can help us to better understand this risk – especially to understand how historically constructed narratives might negatively impact underrepresented groups and contribute to normalizing and reproducing ideas of who belongs in computer science, raising concrete challenges for institutional accountability. We also review literature specifically analyzing the historical construction and social impact of biased narratives in computing and technology development, both in education and in the industry.

2.1 Humor, parody and jokes

Literary theorist Mikhail Bakthin – who wrote extensively on parody, humor and satire—argues that laughter frees human imagination and opens up for new ways to imagine what is possible (Bakthin 1984). Humor can open up to new ways of seeing and decoding the world. Humor expands human understanding, allowing

us to perceive a situation from multiple points of view (Hsu 2016). Humor allows us to consider the 'unknowable' in a situation and thus "reveal the known that cannot be said" (Hsu 2016, p. 58). The role played by the jester and fools at the royal courts in presenting their perceptions in clever and humorous ways after having observed from their peripheral position in society was important (Otto, 2001). Fools would be expected to tell the truth but in a way which allowed the privileged powerful (like kings or emperors) to consider multiple perspectives before making decisions. Jokes and parody invite playfulness and exploration as a mean of inquiry into specific phenomena, which otherwise would be difficult (in some cases maybe even impossible) to address directly. Parody can be an effective tool in interventionist strategies: Fox, Lampe, and Rosner use design parody to open up for new ways to engage with issues of social justice, creating design interventions to elicit reflection on themes of equity (Fox et al. 2018).

Social anthropologists have analyzed how jokes and humor shape—and are shaped by—power relations. Jokes can play a role in supporting and maintaining social roles and dynamics, as in the case of standardized "joking relationships" defined as relations in which one is permitted, or even customarily required, to make fun of another with no retaliation, in a "combination of friendliness and antagonism" (Radcliffe-Brown 1940, p. 196). Mary Douglas observes that "the social dimension enters at all levels into the perception of a joke" (Douglas 1968, p. 365), and that social control shapes which jokes are valued and permitted, typically on behalf of specific values and hierarchies. Jokes can denigrate and devalue dominant values – subverting hierarchies and establishing unofficial values (Douglas 1968). Jokes and humor can build community and social cohesion. In her study of hacking culture, Gabriella Coleman reflects on the cultural peculiarity of hacker humor, in some cases deliberately esoteric (meant to be understood by few) to create in-group membership: "Like many instances of joking, hacker humor is so culturally coded (which here means technically inflected) that the only people who can routinely receive, and as such appreciate, their wit, are other hackers" (Coleman 2012, p. 104–105). The esoteric features act as a reference key which can expose outsiders (Lundbjerg et al. 2017; Bjørn and Rosner 2021). Implicit referencing is a part of the computing culture cemented by the practice of 'easter egg' where programmers hardcode their name or other features into digital technologies (Bjørn and Rosner 2021). Only real insiders can find the easter eggs and thus crack the cultural code – as the protagonist Wade in the cult science fiction book and movie Ready Player One (Cline 2011). Further, humor can also be used to build community around an appreciation for being ridiculed by others, reframing inappropriate behavior as acceptable and funny (Allison et al. 2019).

What counts as 'good' humor is connected to the social milieu and background and differs between groups, people, situations, and moments in time (Kuipers 2015). Satire and humor might embed abusive or stereotyping elements,

raising ethical questions. Freud distinguishes between non-tendentious humor, which manifest in clean jokes, puns and wordplay, and tendentious humor, which contain lust (dirty jokes) or hostility towards specific groups of people (ethnic jokes) or both (Freud 1963). Researchers studying the ethics of humor have long debated on moral positioning towards tendentious jokes. Some, like Rappaport, contend that laughing at ethnic jokes does not necessarily mean taking a moral stance, or buying into discriminatory beliefs (Rappoport 2005), because humor works as a suspension of belief.

Other contend that tendentious jokes are harmful because they reproduce and amplify existing prejudices "for fun" without letting them really be questioned (Bergmann 1986). Philips stresses that in the context of the power unbalances and structural inequity characterizing our society, ethnic jokes are not only harmful but divisive, because they can create social dynamics in which people failing to laugh at the joke are seen as outsiders (Philips 1984). Psychological research into sexist humor – the type of humor that stereotypes and denigrate people based on their sex or gender – validates the perspectives of those who correlate ethnic jokes with negative social outcomes: Sexist humor can have negative effects on people's perception of others based on their gender, and on their willingness to discriminate (Ford et al. 2008, 2015). Thus, the consequences of sexist humor can have direct effect on how the target group perceive themselves in the social setting where the humor is produced. Specifically, the self-objectification produced through humor can narrow target groups own self-perception and risk occupying cognitive resources and thus reducing available resources for processing interactions or new information (Ford et al 2015, p. 265). Thus, college traditions of humor risk alienating students from historically underrepresented groups by marginalizing them (Van Jura 2010), for instance when derogatory humor, harmful narratives and stereotypes become part of institutionalized rituals and social practices.

2.2 Stereotyped narratives & stereotype threat in computing

In the early 1990s Wajcman contended that "technical competence is central to the dominant cultural idea of masculinity, and its absence [is] a key feature of stereotyped femininity" (Wajcman 1991, p. 159). The construction of this stereotyped narrative has a recent history and stems from biased institutional practices and structural gender inequity. Historian of technology Mar Hicks explores how the top-down structural discrimination and devaluation of women's skills and abilities in British computing contributed to the construction of the narrative of women as less technically competent. In the late 60 s, computer marketing campaigns in the UK often relied on images of sexually attractive young women to sell the idea that using the computing system would require low skills and cheap labor – both exemplified in the recurrent image of the young female clerical worker (Hicks 2017). Ensmenger documents how aptitude tests and personality

types developed to hire programmers by US companies in the 50 s and 60 s "created a gender-biased feedback circle that ultimately selected for programmers with stereotypically masculine characteristics" (Ensmenger 2010, p. 78) excluding many potential female candidates and creating the foundation for "the establishment of a highly masculine programming subculture" (Ensmenger 2010, p. 79).

Stereotyped narratives about computer scientists are pervasive, particularly in the US and Europe, and they can have negative effects on both broadening participation in computing education and on the sense of belonging of those who do not conform to the perceived norm (Margolis and Fischer 2002; Cheryan et al. 2015). According to the "geek mythology", the archetypal computer science students is a white male geek whose life revolves around computers so much so that he is "dreaming in code" (Margolis and Fisher 2002). Data from studies on media representations of computer scientists suggest that the dominant stereotype is that of a male computer genius lacking social skills – a stereotype which is incompatible with common perceptions of the female gender role (Cheryan et al. 2013). There has been a significant amount of research on how such gendered and racialized stereotyped narratives produce negative outcomes on an individual and societal level. The presence of stereotypical cues in computing study environments can negatively impact the sense of belonging by underrepresented groups in those contexts (Cheryan et al. 2009). Sexism and devaluing attitudes towards underrepresented groups in computing have negative impact on targeted students, their well-being and their persistence (McGrath Cohoon et al. 2009; Rankin et al. 2021; Cain and Trauth 2013). The interplay of structural barriers and stereotyped belief systems about abilities and "natural" preferences in turn inform new stereotyped narratives and assumptions about who is most likely to succeed in computing (Margolis 2008). In the professional domain of global software development, widespread essentializing stereotypes along cultural and ethnic lines—and concurrent efforts to actively challenge them and attend to them—have been recently documented (Matthiesen et al. 2020). While clear stereotypes exist within computing education as well as in the professional domain of computing, it is important to understand the impact and consequences such stereotypes have for underrepresented groups – and for that we turn to the concept of stereotype threat.

Stereotype threat describes situations where a person's awareness of negative stereotyping related to their social group causes increased stress and impair their performance due to the awareness that they might be judged in accordance with a negative stereotype (Aronson et al. 1998, Steele et al. 2002). Aronson et al. (1998, p. 86) conceptualize stereotype threat as a situational pressure and not as evidence that the target person accept the stereotype. They explain: "targets need not see the stereotype as valid in order to experience stereotype threat. Mere awareness of the stereotype and its alleged relevance to one's performance in a

given situation is sufficient" (Ibid, p. 86). Further, Aronson et al. argues that "stereotype threat is likely to have its strongest effects among those who are least likely to internalize or accept the stereotype—those who are heavily invested in the domain. Those who are most invested—most "identified"- are also most likely to be concerned about poor performance in the domain" (Ibid, p. 86). This means that underrepresented groups in computing, when encountering stereotyped narratives, might experience more pressure and anxiety, risking internalizing stereotype-related doubts about their abilities. Finally, stereotype threat risk that underrepresented groups disidentify and disengage with the field and domain. *Disengagement* is a coping mechanism, where underrepresented groups experiencing negative stereotypes to maintain self-esteem walk away from the domain when success seams elusive and there is an unpleasant struggle to succeed (Aronson et al. 1998). The concept of disengagement based upon stereotype threat thus point us to the concrete risk of alienating and losing qualified members of underrepresented groups within the computing domain, thus disrupting current institutional efforts to truly increase participation and foster inclusivity.

When we in this paper ask which *stereotyped narratives emerge from traditions of humor in computing, and what are the challenges these raises for the institutional response and accountability where they are produced;* we need to explore the ways in which traditions and rituals of humor risk iteratively re-producing negative stereotypes of underrepresented groups in computing and identify new strategies for inclusivity.

3 Method

To explore the stereotyped narratives emerging from traditions of humor in computing, we conducted an in-depth qualitative study on how humor is produced and enacted in the traditions and rituals of a department of computer science at a large Danish University. Our overall research approach is interventionist by nature (Zuiderent-Jerak 2010; Zuiderent-Jerak and Jensen 2007), in that we both study and qualitatively explore our area of concern (humor in computing traditions and rituals) while using the insights to make change and execute interventions (Bjørn and Boulus 2011; Mumford 2001). We examine our own institution as we are actively involved in diversity and inclusion service work within our organization. While we focus locally on a specific department of computer science, our results echo a much larger concern for the computing community (Margolis and Fischer 2002). Thus, by unpacking the traditions of humor in the specific department from the vantage point of our own situated position, we also speak to larger concerns in computing.

We identify and analyze the sociomaterial practices and artefacts as they are performed and enacted within the environment (Bjørn and Østerlund 2014).

In our work we refer to artefacts as meaning-making devices, which organize the mutual engagements between cooperative actors (Bjørn and Hertzum 2011; Hertzum 1999; Schmidt and Wagner 2004). Through interaction with artefacts, meaning circulates and is reproduced. Artefacts bear traces of past traditions, manifest norms and values, and current traditions and social practices. In this way, analyzing artefacts allows us to capture often overlooked traditions and organizational practices – and highlight how biased humor can manifest itself. We use the multi-sited CSCW approach (Blomberg and Karasti 2013; Bjørn and Boulus-Rødje 2015), which is inspired by anthropological re-conceptualizations of ethnography as a strategy for understanding places and people through knowledge emerging from different intersecting social and political locations (Gupta and Ferguson 1977; Marcus 1995). In this paper, we designed the multi-sited space of research by following strands of humor as they are encoded in spaces, artefacts, and sociomaterial practices. As it has increasingly become the norm for research on inclusion, we choose to self-disclose our intuitional and academical positioning in this research. Being part of the organization – acting respectively as PhD student and diversity chair and as full professor and deputy head of department for research – makes the research effort of conducting such a qualitative study something delicate, as the humor in historic rituals and traditions can be difficult to tackle institutionally and present a risk of jeopardizing important relations across students, faculty, and staff. Something we by no means have as our intention. Therefore, spending some efforts in explicating the methodological reflections which we bring to this work is important (Bjørn and Boulus 2011). First, it is important to state that we find the creative and engaging participation of students in the department critically important and strongly believe this is something we need to nourish and support. Second, we as the main drivers of inclusive efforts in the department since 2016 have come to notice how stereotyped and tendentious humor risks countering our efforts, and thus we need to find ways to approach this difficult subject. Third, we do like to laugh and are not against having fun. However, if we do not address the excluding dynamics embedded in traditions and rituals, we risk, as a department, to lose creative and clever people who otherwise would have become excellent computer scientists. While the department has taken major steps towards inclusion in the last five years, we can still learn and improve. Sometimes this requires us to address difficult subjects head-on, rather than shy away from controversies. We are very privileged to be in a department which allow us to research such topics and views the results as opportunities to grow and improve. We are also very aware that this is not the case for many, and we hope that other computing contexts would view the braveness of our institution and follow by example. We hope this research will not only help our diversity efforts locally – but also have a larger impact in the computing community both nationally and internationally.

3.1 **Empirical context**

Successful and systematic research-based equity initiatives in computing institutions are few, and they are mostly not European-based (Alvarado and Dodds 2010; Margolis and Fischer 2002). While we can be inspired by initiatives such as those implemented at CMU (Frieze and Quesenberry 2015) in the US, we must also pay attention and unpack the specific nature of equity challenges and efforts as they emerge in the contextual setting we want to transform. For example, online sexual harassment in workplaces in Brazil is contextualized differently than it would emerge in e.g., Denmark or France (Tenório and Bjørn 2019).

Our work took place in Denmark, a Scandinavian country known as highly egalitarian, providing universal healthcare and equal right to free education. It might come as a surprise, but Denmark is *only* no. 29 on the World Economic Forum Global Gender Gap Index (World Economic Forum 2021), where all other Nordic countries consistently score at the very top of the list. Less surprising is that the gender disparity within computing is high in Denmark, like other Western countries (Borsotti 2018) with men being overrepresented in the field. Clear data on the intersection between gender (in non-binary terms), ethnicity and social economic status is not officially available in Denmark. Thus, while we are aware that understanding equity in our department cannot only be captured by a gender perspective, but instead is produced in intersectional relationships (Crenshaw 2018) our attempt so far has focused on gender.

The computer science department where we conducted the study was established in 1970 and was the first department of computer science in Denmark, with Professor Peter Naur appointed as the first chair in Computer Science – or "Datalogy" as it was named from the beginning in the Danish context (*datalogi*). From the very start, Naur established an environment based on democratic collaboration across functions and roles and "invited teachers, administrative staff and a number of students to take part in an open discussion of the theme "what do we think is essential for the institute we are about to create?" (Sveinsdottir and Frøkjær 1988). At the time of writing, the department has approximately 160 academic employees (faculty full professors, associate professor, assistant professors, post.docs, external lectures, and PhD students) and just under 1200 students enrolled in three study programs (Computer Science Bachelor and Master program; Computer Science and Economy Bachelor program; Machine Learning and Data Science Bachelor program). Besides these programs, the department is also part of interdisciplinary computer science programs with the Department of Communication, the Department of Health sciences, and is currently in the process of developing additional interdisciplinary programs across the university. The department has had a huge growth in the last five years and continues to play an important role in bringing computing research across the whole university both in terms of teaching and research. In this time of growth, new types of initiatives have been created to work actively with diversity and inclusion (Bjørn

and Menendez-Blanco 2019; Menendez-Blanco et al. 2018), and there have been an increase in the participation of women in the bachelor programs (from approx. 8% women in the whole bachelor program prior to 2015 to 17–20% women being accepted each year since 2016) as well as in the faculty hiring (the first woman full professor was hired in 2015 and now there are four—three full time—women full professors in 2021). Thus, we have witnessed much progress, but there is still work to be done – especially when we expand our focus to look beyond gender (binary) statistics and focus on exploring organizational cultures and traditions. In recent years the department has witnessed an increase in international faculty and PhD students. It is hoped that this research will contribute to a better understanding of the importance of considering how biased and inappropriate humor might affect the experience of both staff and students in diverse cultural contexts.

Humor and jokes have long been crucial components in the social fabric of the department, as they are part of well-established university traditions for computing departments internationally. MIT has a long-standing "hacking" tradition of designing and implementing pranks, tricks, and clever inventions (Peterson 2003), and computing departments in the US, UK, Australia, and Denmark often feature their own student-driven satirical musical theatre shows. There are long traditions for playful activities during orientation weeks for new students, and clearly humor and jokes embedded in traditional practices help creating communities and sense of belonging. Satirical songs and theatre productions become the medium through which students embed, re-create, reproduce, or challenge norms, traditions, values, and narratives – and pass that on to the next generation. Computing "filks"—humorous computing parody songs – have been crafted for decades in and outside of university settings and have a dedicated audience. Recently, filks have been celebrated for their potential to bring fun into teaching computing (Virtue et al. 2018). To study the humor in the department, we have particularly explored artefacts and rituals in which it is manifested.

As most of our research took place during intermittent lockdowns due to the COVID-19 pandemic, we started our inquiry by focusing on sociotechnical artefacts as a pragmatic way to address our research questions. What stereotyped narratives could we find, couched in humor, in some of the institutional artefacts and spaces – analog and digital – typically encountered by our students? We took our point of departure from what might seem an unusual item: the "Computer Science Songbook" created and edited by computer science bachelor students at the department. The songbook exists as both a physical book, printed on paper and as a digital artefact on GitHub. What makes the songbook particularly relevant is that it is used during an important transitional phase and ritual in the academic socialization of computer science students: The orientation week and freshers' trip activities—and it stands at the intersection of two well-established collective social traditions of humor at the department: Group-singing (which takes place during the orientation weeks, where students sing some songs from the book)

and the satirical musical theatre, in Danish *Revy*, which takes place yearly at the Department. Many of the songs in the book are "filks" and parody songs which were originally created and performed as part of the yearly Revy shows.

3.2 **Data sources**

One of our main data sources is an artefact: In this paper we analyze the 2019 edition of the Computer Science Songbook which was used by bachelor students during the last *freshers' trip* before the Covid-19 pandemic. The book is sponsored by the Danish Society of Engineers, and is also available as a PDF file. The first historic songbook was created in the early 70 s and has been reproduced, extended, and modified over the years.

Moreover, to better understand the socio-historical context in which the songbook has been created, we have conducted eight semi-structured interviews: We interviewed six students – ranging from alumni from the 70 s and current students – and two staff members at the university. Interviews have been conducted and recorded by the first author, who has full access to the names of the people interviewed and the interviews transcripts. All the interviewees in this study had a relation to the group singing tradition as either authors, composers, editors or audiences to the songs. However, to ensure confidentiality we cannot specifically state, when presenting a quote, the relation of the interviewee to the songbook.

In addition, we collected data on the department's sociomaterial practices through field notes, informal conversations, observations in formal and informal spaces and participation in events (such as two seminars on sexual harassment organized by the university), and we draw on our own experience as researchers involved with diversity and inclusion service work at the department.

Exploring the nature of the *stereotyped narratives which emerge from traditions of humor in computing* as they are embedded within the songbook, we identified a general classification of the songs. The digital and analog songbook includes 146 songs, plus one extra text. Almost all the songs, except for 25, are from the university Revy theatre shows. Most of these songs – 78 in all— are from the Computer Science department's own musical theatre. Most of the songs center around computing education, mostly focusing on programming and the academic and social life on campus. Other themes are explored, including bureaucracy, inefficient IT systems, working in IT or global software development. Many of the songs are authored by students of other departments for their theatre shows (Math and Physics) – showing a strong dynamic connection between student traditions across departments. This connection is worth noting, as many of the students might major in Computer science with a minor in Math, or major in Math with a minor in Computer science. The oldest student-authored song in the 2019 songbook is from the 1992 – but most of the songs written by students span from 2000 to 2014. Songs from the musical theatre include a note on which melody should accompany the lyrics, as they are either parodies or a

pastiche (in literature usage: a playful imitation) of well-known songs. Songs to be sung during the freshers' trip are typically chosen with a roll of dice.

3.3 **Data analysis**

To analyze our data, we applied both deductive and inductive coding: We adopted *qualitative content analysis* (Bernard 2002), to identify whether and how stereotyped and normative themes and narratives identified in literature occur in the empirical data (deductive coding), and *grounded theory* (Strauss and Corbin 1990) to be open and identify new relevant categories and themes emerging from the material analyzed (inductive coding). All the data material was imported into NVivo (version 12) and analyzed iteratively.

To investigate which main narratives are represented in the songbook, we used *text analysis*, a qualitative research method commonly adopted by ethnographers in the study of written texts. To capture subtle figures of speech, we first did a detailed analysis of all the songs, identified a set of themes, selected a series of excerpts and examples, translated them into English and organized them in categories. We then transferred all texts in NVivo, which served as a tool to easily navigate data. The whole process was accompanied by writing memos—taking running notes on the themes and how they were interrelated.

Through our analysis, we first identified a set of stereotyped narratives surfacing in the humor produced and re-produced through artefacts, spaces, and social practices at the computer science department, and which we grouped thematically in three main categories: 1) Gendered stereotypes of nerds and hackers; 2) Stereotyped representation of women; 3) Stereotypes on techno-capitalism and race in global software development. We will explore each thematic category in the first part of the Results section. Second, our empirical investigation highlighted some of the challenges for institutional accountability raised by stereotypical narratives in computing. We will present them in the second part of the Results section. It is important to notice that throughout the whole research process we have been in dialogue and discussion with the administration and management of the department to find ways to bring in our insights back to the department with the aim of taking action.

4 Results

In the below section, we provide empirical data which includes sexist, transphobic, and racist statements. We choose to display snippets of the data to be able to explicitly address the problems so that we as part of the institution can learn and reflect – and thus improve the practices. We believe that only by addressing what is difficult explicitly are we able to reflect and make interventions and change. We apologize in advance for the offensive statements.

4.1 Stereotyped narratives embedded in social practices, spaces and artefacts

4.1.1 Gendered stereotypes of computer geeks

As displayed in the 1980-ties pop culture movies such as 'Weird Science' from 1985 and 'War Games' from 1983 the science geek with a computer can do anything from literally build their own romantic partner to save the Earth from nuclear war by teaching powerful computers the concept of mutual assured destruction through playing tic-tac-toe. Computing geniuses in both movies end up using their computer powers to make impressive actions and reflect the stereotypical narrative of the computer geek as a masculine white man who spends most of his time alone in the dark in front of a screen hacking or playing videogames.

Not surprisingly, some of the parody lyrics written by students, which are featured in the songbook, weave in the stereotype of the lone person sitting in the dark, drinking cola, and playing games all night, and celebrated it with humor. For example, in the below song written in 2001 which originates from the Physic Revy, the joke is on the geeky computer scientist:

> 'Who is sitting in front of the screen / With Cola in his hand / With pale weak arms / And a body which weighs a ton/ It's the computer scientist / A nerd, that's for sure / With caffeine in his blood and cybersex at the ready.'

Rather than shying away from the societal stereotype, several songs in the songbook jokingly reappropriate the geek stereotype and embrace it proudly. Songs often quote classic geek fandom references such as games, movies comics and books. As the above example illustrates, some of the songs about geeks which are now part of the book's repertoire come from other departments' satirical theatre shows, such as Math or Physics. This is interesting because it illustrates how stereotypes are pervasive in and outside computer science educational programs, and how teasing others based on group stereotypes is a common social dynamic – which, in the case of computer science and close disciplinary fields like Math and Physic, can be a way to establish friendly and antagonistic group boundaries. In this example, and in other songs portraying geeks, the ironic use of the geek stereotype and its reappropriation can be employed to define and reaffirm group identity positively by reclaiming the stereotype.

In the students' songbook, the stereotypical geek is typically gendered as masculine, however we found one clever example on lyrics which try to counter the gendered nature of the geek. The parody "Let it Grow – Duet Between Two Female Computer Scientists" is authored by two women students who wrote the song for the 2014 Computer Science Revy, and we have later learned that the theme of the song emerged as a reflection that the only difference between students, for some, were their ability to grow or not grow a beard. The song illustrates the acute awareness of the presence of stereotypical and sexist assumptions

which are displayed in computing, but uses humor to expose and challenge preju-
diced narratives. One the lines: "Let them just stare" demonstrates the experience
of being visible *in a different way* as a woman in computing, but in the parody the
"staring" is embraced and welcome after they attach masculine beards to their
bodies. The song exposes and pushes against sexist narratives linking gender to
specific assumedly innate attributes such as technical skills (or lack thereof) and
makes a playful reference to the binary (in gender and computing) with the use of
0 and 1 in the text:

> '1: You're hoping to be a real computer scientist / 0: I've tried everything / But it will
> not grow
> 0: It cannot 'happen, I'm a girl' / 1: That's what all people will say /0: But the dream
> won't go away. Give me a beard! Let it grow Let it grow (…)
> 1: Without a beard, the days of a computer scientist are numbered / 1: Your female sex
> dictates
> All that your body can't do / 0: But it's hard to accept all I cannot get (....) 0 + 1: With
> our beards we can handle everything / Let them just stare / Without a beard, the days of
> a computer scientist are numbered'

In the YouTube video showcasing the original performance of the song dur-
ing the computer science Revy, props on stage include a poster featuring pho-
tos of bearded computer science teachers at the department, past and current, as
well as images of Ada Lovelace and Grace Hopper donning fake beards. In this
way the song both affirms and challenges the gendered stereotypes of geeks and
hackers. Further, the melody of the song is "Let it go" from the movie "Frozen",
confirming the focus on transformation – of producing a new, queer computer
scientist entity which blends across genders. While this parody is challenging and
queering assumedly innate gender distinctions, opening up to other gender possi-
bilities beyond the binary ("with our beards we can handle everything") – it still
clearly condemns the narrative naturally linking computer science to a masculine
undertakement.

4.1.2 Stereotyped representation of women

While the abovementioned song clearly was a clever humorous way of parodying
the argument linking gender to technical ability in computing by turning it into a
discussion on beards, most of the songs which include mentions of women would
be of a sexist nature. It is important to mention that the songs in the songbook
can be divided into three types of songs: 1) Parody songs written outside the uni-
versity; 2) Pop/traditional songs written outside the university, and 3) Songs writ-
ten by students. Sexual objectification of women was a recurrent theme in most
songs mentioning women, from either category. Overall, the complete songbook
of 146 songs, women and/or girls appear in 26 of the songs (18% of the songs),
and in more than half of these songs, women/girls are sexualized (n = 14/26;
54%), and in 5 out of the remaining 12 songs "women" appears as object of

desire. If we try to unpack these songs, there are traditional sea shanties, mock rock comedy songs (both Danish and American) and other traditional lyrics sexualizing women. Examples of these includes Tenacious D's song from 2010 "Fuck her gently" and Onkel Dum & Bananerne song from 1989 "Gætteleg" which is a Danish comedy song referring to oral sex. However, the sexualized humor is not only from adopted songs which have been included in the songbook. Sexualized humor also exists in the songs written by students.

Analyzing the songs written by students we observed that the trope of the "hot" scientist – skilled and sexy, an object of (heterosexual) desire was present. Examples includes a song from the 1998 Computer Science Revy, in which a computer scientist wants to get "close physical contact" to a sexy physics student ("she looks like something you download from the internet"), or a song from the Physics Revy 2015 in which there is a double entendre on women "coding". Further, we also found representations of gender inferiority joking on the fact that women are successful because they receive support and help from male fellow students and lecturers, but also a transphobic joke featuring the "disguised in drag" trope of the man dressed as a woman to mask his technical incompetence and receive help from fellow male students and staff. In this way, the representation of gendered sexuality in the songs is connected to inferiority of non-masculine characteristics of the field of computing – targeting not only women – but also non-binary and transpersons.

The sexualized representation of women as part of the humor and parody displayed in the songbook resurfaced in both online and physical spaces in the educational settings, creating and reproducing exclusionary dynamics and norms. We found that the same tradition of bawdy humor and (hetero)sexual themes present in the songbook were also showcased on campus in the interior decoration of the student-run bar (which is often mentioned in the songs), a popular meeting point for students from Computer Science, Math and Physics and other related disciplines in the Science faculty. The bar interior has been humorously designed with features such as a strip-club pole, and the toilet for people with disabilities is decorated with pictures of naked women and stickers of couples having sex. Young people make up the majority of the students in universities, and most of them are naturally interested and engaged in sexual behavior. The problem is not the sexualized representation per se, but specifically how these instances of humor reaffirming heterosexual masculinity and the sexualization of women are portraying problematic narratives about women and heteronormativity in social spaces on campus. Especially since these narratives are directly connected to narratives about the competences and potential success of students with minority characteristics (e.g., women or transpersons). In tandem with the sexualized narratives, we found that jokes displaying narratives on the technical incompetence of women were profoundly present. Examples includes sexist memes on a Facebook page curated by computer science students, a public group

counting thousands of members, representing women as technically incompetent and inferior to men:

'WOMEN PROGRAMMERS? YOU MEAN PROGRAMMING THE DISH-WASHER?'

A heated discussion follows in the comments section, where students discussing whether this joke is sexist and inappropriate. A student displays in her comments how jokes like the above make her want to leave the Facebook group altogether. Another recent meme posted in the student-run Facebook meme group is a pun on the objectification of women:

'Other: don't treat women like objects. Me: Women women = new Women ( ) ;'

The above memes are good examples of humor supporting a gender normative culture stressing innate capabilities of individuals and minimizing devaluing cultural norms. Besides the informal online and physical spaces like the bar and the Facebook group – the sexist jokes also enter the classroom. During a lecture in a class with more than 100 students in an auditorium, an anonymous student adopted the username "Women Can't Code" during an interactive exercise, with the result that the demeaning message was well visible for the whole auditorium, projected on the big screen. When this happened, a group of students explicitly expressed how such sexist humor was problematic and exclusive. It was discussed in class and the teacher explicitly stated how such behavior was inappropriate. However, the discussion continued in a Facebook group connected to the course – and it was clear that not all students understood why such behavior was problematic – some students continued to minimize the episode and frame the sexist statement as just a joke. This incident demonstrates that sexist jokes or other hateful expressions occurring in social interactions in the classroom might be hard to prevent, and might impact a large number of students and – as in this case, they might occur anonymously and without an easy way to satisfactorily handle and discipline the incident. For this reason, it is crucial that institutions emphasize the goal of actively countering negative stereotypes and sexist representations in institutional contexts where *it can be prevented and regulated*, so that they do not normalize excluding behavior and marginalizing narratives. When new students embark on their education and experience the songbook including the sexist songs, these jokes become normalized and make it difficult for students to determine what is inappropriate in both formal and informal spaces. The sexist jokes connecting gender with skills and competences create narratives about whom can become successful in the field, which again risks alienating and marginalizing gender minorities both socially and professionally.

4.1.3 Stereotypes on techno-capitalism and race in global software development

Programming is an important part of computer science education and profession. Throughout the education, students engage with and learn many different programming languages, and not surprisingly programming languages are also featured in many songs. Concretely, one out of four songs in the songbook features programming as a key theme.

Analyzing the ways in which programming is portrayed across the songs, we notice an emerging pattern which displays the existence of a hierarchy and specific value judgements on programming languages taught in the computer science department. Songs include references to obscure and esoteric programming languages, as shown in the excerpt below, from a 2012 song written by Computer Science students—a pastiche of the Animaniacs theme song where the lyrics are a long list of programing languages:

> '(Brainfuck), Emerald, Unix Shell, Babbage, F, Mouse, Squirrel, Oak, RPL, Legoscript, (Go)diva, Rust, E, Shakespeare, Racket, POP-2, Fjölnir, AutoHot-Key, Emacs Lisp.'

In the above song, the very listing of the programing languages is following the melody making the languages by themselves into lyrics. By playing with the grammatical expressions, syntax and semantics, students demonstrate familiarity with the specific nature of the computing languages. Highly valued programming languages include C and C++ (the latter created by Bjarne Stroustrup, a Danish computer scientist) and are portrayed as positive, providing connotations that C/C++ are the appropriate languages to really master. On the other hand, it is clear from the lyrics across songs that there are programming languages which are viewed as less valuable – and most jokes are on Java and Javascript. These are presented in the parody songs as programming languages developed by the 'greedy' industry whose only interest is earning money. Java is characterized as only used in large software engineering projects in large companies and is frowned upon as the language of "the capital" (alluding to the Marxist meaning of capitalist exploitation of workers).

It is noteworthy to mention that students in this way make political statements founded in the late 60 s-early 70 s university environment in Denmark, a time of uprising when students stood up to transform universities into democratic institutions and to push radical political agendas. So while computer science often is portrayed as an "apolitical" practice, which simply works 'objectively' with data, it is clear that the students through some of their songs, rituals, and traditions express a sharp critique of the tech corporate environment: "the capital"—explicitly providing a narrative about the private sector's exploitation of computer science human labor to earn money, and working in software

engineering is sometimes referred to just as "coding for the capital" (in some cases "coding badly for the capital"). Most of the parody songs focusing on the themes of working in software companies depict the IT industry negatively, and often juxtapose the stimulating complexity of studying computing or working on one's own project – and the "brain gymnastics" involved—with the well paid but boring and unchallenging reality of working in the industry. This narrative continues in the songs bringing in the theme of the global tech industry, and particularly global outsourcing software development. Here the theme of 'coding for the capital' is extended to software developers working from "the East", which can both refer to Eastern Europe as well as Eastern Asia (India, Philippines etc.). Here the themes of exploitation of computer scientists programming for the capital is extended to 'becoming a code slave'. In a song from the 2013 Computer Science Revy, we follow the tale of a Danish "code slave" who loses his job to a "slave coder" in "the East":

> 'Come on, you code slave / your boss is unhappy. Code, you slave, code now / Work all night." (…) "Poor code slave, no more job for you (…) In a dark office in the East sits a computer scientist
> On the wall is a webcam / This is where he now has to live / He earns for the day (…)'

While both the Danish "code slave" and the Eastern "slave coder" are being exploited by the capital, in this song the plot propels a narrative with problematic racist undertones. These racist undertones continue in another Computer Science Revy song, which is a social commentary on software engineering outsourcing in Africa from the point of view of a white "Microsoft evangelist", and in this song racial slurs are used explicitly. The presence of racist slurs and derogatory jokes on specific groups of individuals in an institutional context risks to produce harmful experiences, because it reflects and reproduces discriminatory attitudes and behavior. Since offensive behavior is clearly condemned by the university policies, the presence of slurs in an institutional songbook (written by students) used during orientation week, sends a confusing message to new students about what language and behavior are considered appropriate. Featuring the critique of tech companies' neocolonialism is not problematic per se, and clearly is a theme of importance to the students. However, the critique becomes problematic when embedded in a series of racial slurs or narratives dehumanizing global software developers.

4.2 Current challenges for institutional accountability

4.2.1 Harmonizing long-standing traditions of humor with new diversity & equity efforts

The computer science department we studied was established in the 1970s, which in Denmark was a period of significant cultural shift from the so-called elite

university to the mass university. At that time, the exponential increase of the number of students, the student rebellion in 1968 and the University Act led to a democratization of the governing bodies of Danish universities and an increase in student representation and their influence in boards, associations in creating and organizing social activities. The traditions of group singing during orientation week and during the freshers' trip and the satirical theatre were established at the same time as the scientific department was established, in the early 70 s. Moreover, the students had a huge influence on the development of the department. A computer science student who graduated in that decade explains that sketches from the satirical theatre were part of the students' first social introduction to the department:

> 'I did the freshers' trip in the beginning of the 70s and I did not know a single soul. We were all mixed from different natural science bachelors, not many girls, it was all run by students (…) That was fun, it established some ways into the institute, that you knew someone, so you felt a bit safer... (…) The singing was already an important part (…) And then there was a small theatre group, run by students, who would go around the various freshers' trips with small plays about what it was like being a student and so on.'

Humor and satire played a role in the socialization of students from the department's early days. Students got to know each other and learned about life at the department through humor. The satirical theatre soon became its own entity: Currently the Computer Science Revy is a yearly student-driven production taking place at the university. Satirical songs from the Revy are still an important part of early student socialization. These songs have increasingly filled almost all pages of the songbook, and when used during orientation week, songs are mostly picked randomly by rolling dice, or chosen by student volunteers in charge of the social activities.

Democratic participation is key in processes shaping social life at the university, and students are traditionally represented by councils or associations created to administer different areas. The freshers' trip, the Revy and the songbook are run and coordinated each by their own student council. At the time of writing, the department counts 12 official student councils, organizing anything from LAN-parties to the student-run canteen, ski trips, board games or soccer games. The department has, since 2016, initiated new agendas focusing on students' inclusion and diversity pioneering a variety of initiatives (from recruitment to retention) and a new Dialogue Forum has been established in 2021 to coordinate between students from the Student Council – a union and umbrella organization for all the student councils and administrators. This forum is designed to create a space for discussion and change, among other things with respect to creating more awareness on inclusivity and reflecting on how to activities risk

marginalizing certain student populations. The songbook is in focus as well. A student explains:

'There's been a big change towards making sure everybody's included…so students don't feel bad about what's in the songbook.'

When we discussed some of the bawdy pop songs part of the songbook, one of the students explained that these songs have traditionally been part of the repertoire, and as such have been maintained in the book in each new iteration. What is significant here is the weight of old traditions and the complex role they play in any of the newly established commitments to make institutions more open and inclusive. Every few years, few songs are taken out of the songbook by student volunteers and substituted with new ones, typically from Revy shows. The work of maintaining and renewing traditions reveals the complexity of identifying and teasing out what should be included and excluded in the institutional narrative.

4.2.2 Humor encodes and reproduces values and norms

The goal of this study was not to measure or systematically evaluate the impact of stereotypes on specific social groups, but to document and analyze how stereotypical narratives manifest themselves in the context of the department, and what challenges these narratives raise for the institution. Our data revealed that traditions of humor are perceived as an important part of the social life at the department, and they can both foster sense of belonging—creating a stronger sense of community—or work as exclusionary mechanisms, reproducing harmful stereotypes and narratives about who belongs in computing. Group singing contributes to student bonding, but significantly also to familiarizing oneself with the department culture, as this student – a man—notes:

'These songs are like, what can you compare it with? It's like a football team with...values... you give them along to new members, or something like that. Older students educate the younger students, and when they get old, they're like, moving on these traditions.'

This quote articulates how songs can narratively embed norms and values in the social fabric of the institution. Strong identification with certain traditions is part of any socialization into the academic discourse of specific knowledge areas – and in this process the celebration of the masculine geek stereotype, for instance, or the demeaning jokes on global software developers may reproduce stereotypes (through humor) and shape who is included/excluded in computing, in education and professionally. While the songs clearly are important for the socialization of the students, the narratives expressed in some of them become additional barriers for inclusivity in the department – as in the case, for example,

of lyrics gender- stereotyping women. The below quote by a woman student articulates how the widespread gendered narratives risk impacting how minority students navigate their educational experience. She comments on her reticence to ask questions openly during large courses in the large auditoriums, and her fear to be perceived as incompetent – reconfirming the gendered stereotypes which she encountered in the department:

> 'When you're a male student here, then you just come in and study, you don't have to think about anything else. But typically when you're a female student, you come in, and you also have to think: Am I gonna get judged? I was actually pretty confident before I started studying here, and it has been a battle for me to regain some confidence because... I notice, like, why am I not good enough at speaking up? Why I am not good enough at asking questions? It's a general problem that everybody feels a bit insecure. But it seems like it's even worse for women.'

The gradual decrease in self-confidence experienced throughout her engagement in the education adds an additional burden to her experience. Another woman student we interviewed used the Danish expression "hygge sexism" to explain how, in her experience, sexist comments or behavior (such as microaggressions) risk being normalized in the social interactions in the department, often framed as "just jokes". Through interviews, conversations, and observations we encountered different perceptions of what is considered appropriate as a joke, and in which context. During informal conversations with staff and interviews with students, Danish humor is sometimes framed as slagging—being harsh or insulting but not necessarily with the intention to be abusive. Others see inappropriate jokes as crossing the line, or even shocking, and problematize it, particularly when it targets specific groups of students – particularly minorities in the department.

Our analysis reveals that dealing with problematic and stereotyping humor and its implications, be it reproduced by institutional artefacts such as the songbook or in spaces such as the student-run bar, or in classrooms and other social daily interactions, creates a huge challenge for equity initiatives. A challenge further emphasized by the complexity of uneven regulation and a diffuse lack of knowledge of how to handle abusive language and behavior at the university as a whole. During a (non-mandatory) webinar on sexism and sexual harassment organized by the University and led by an attorney-at-law, with the goal to train staff to become aware of liability issues around offensive behavior, the first author observed that several questions from researchers and staff across different departments in the Faculty of Science revolved around humor. The attorney reported that "offensive behavior in the workplace cannot be excused by humor",

but confusion among the audience seem to be predominant on how to evaluate, as managers or administrators, where to intervene and how.

It is critical to note that strategic work on DEI (diversity, equity, and inclusion) in Danish universities is a quite recent attempt, and generally differs in scope and focus from institution to institution. Denmark does not currently have a set of specific and clear overarching state regulations to support and guide strategic preventive measures and accountability systems for equity and inclusivity in education – nor does it feature official frameworks of accreditation for DEI good practices.

5 Discussion

5.1 Beyond statistics: digging deeper

We set out to investigate which stereotyped narratives emerged from traditions of humor in computing. The results of this study provide evidence that stereotyped narratives along gendered and racial lines exists in the social ecosystem of the computer science institution we studied, and risk creating excluding mechanisms and inequitable outcomes – going against current diversity efforts. This is consistent with prior studies highlighting the prevalence of negative stereotypes in computing and their complex negative social impact (Hicks 2017; Ensmenger 2010; Margolis and Fischer 2002; Margolis 2008). That means that any project pursuing the agenda of broadening participation in computing needs to also pay attention to internal culture – traditions and rituals, to ensure that existing bias and negative narratives – especially when institutionalized – are identified and dealt with constructively.

Humor plays a complex role in articulating, reproducing, challenging and queering stereotyped narratives in organizations. We found that computer science students experience an ecosystem in which stereotypes manifest themselves in institutional and informal contexts, both online and offline (the songbook used during orientation weeks; the décor the student-run bar; the classroom and social media). Humor *is an essential way* to release and exorcise anxiety and worries in the busy life of being a computer science student, humor plays a role in celebrating and defining geekiness (Coleman 2012), maintaining joking relationships across social groups (Radcliffe-Brown 1940) and, in some cases, publicly making feminist statements. This is consistent with recent anthropological research describing humor as an important – and understudied—mode of human cognition (Hsu 2016) which allows people to perceive a situation or phenomenon from multiple diverse perspectives. Existing social relations shape what is accepted as "good" humor (Douglas 1968), and people with different backgrounds or characteristics perceive and experience humor differently, particularly in the case of tendentious humor.

In everyday interactions, humor might be used to minimize or to make sense of excluding behavior, particularly when certain issues are underexamined or stigmatized: like sexist microaggressions on campus, described as manifestations of "hygge sexism" (*hyggesexisme* in Danish) by computer science students, indicating that sexist beliefs or behavior might be couched in humor and/or downplayed as well-intentioned, particularly when students fail to perceive them as harmful. This is consistent with research showing the negative effects of disparaging humor in creating and normalizing inequitable social dynamics (Philips 1984; Ford et al. 2008). Humor can be serious matter: Some women students are coping negatively with the "spotlighting" effect of being perceived as a minority and the pressure to perform to counter negative stereotypical assumptions. These results have important implications, as they corroborate the negative impact of stereotypes reported by previous research. Negative stereotypes might discourage certain groups from participating in computing domains (Cheryan et al. 2013), negatively impact their sense of belonging (Cheryan et al. 2009; Ford et al. 2008). In addition, minority social groups risk activating *stereotype threat* (Cain and Trauth 2013; Aronson et al. 1998), potentially increasing anxiety, self-doubt, and disengagement. This means that, to successfully create strategies to promote equity in organizations so that all talents can thrive, we need to move beyond just collecting statistics and percentages of representation/recruitment/retention of specific social groups and complement those with new ways to investigate and tackle structural and cultural issues that disproportionally affects their everyday experience in our institutions. Statistics cannot capture everything – they are a starting point. The real challenge is to integrate data-driven approaches to diversity and inclusion with different strategies for gaining useful insights on existing cultural norms and social arrangements which might create patterns of exclusion. Basing decision-making on equity issues only on statistics can also concretely pose the risk of losing sights of in-group differences—groups of "minorities" (women, ethnic minorities and so on) become essentialized, and this approach can lead to initiatives that typically do not have an intersectional perspective and fail to capture critical insights.

5.2 Beyond the pipeline: examining sociomaterial practices

Socio-cultural challenges to equity efforts can be addressed and can change, albeit slowly. But how? Our work raises the question of how institutions can respond to humor displayed in rituals and traditions and assume their accountability for creating a supportive environment. Negative representations of marginalized identities in computing highlight complex accountability and response challenges – particularly when such representations and narratives are normalized as part of the discursive and material contexts. Sociomaterial artefacts and spaces that make up institutions are not discrete entities; they are intertwined in complex networks of relations which both shape and are shaped by those relations

(Bjørn and Østerlund 2014). The governance of universities in Denmark is both highly hierarchical and at the same time fairly bottom-up and participatory. The academic faculty presents and sets the agenda for research and education, but students are invited into shaping the institutions through student led committees, teaching assistantships, and they are drivers of social events. The department we studied was created in 1970, right in the aftermath of the'68 student uprising when the highly hierarchical professor-rule, shaped by a law which had not been updated since 1788, was replaced by what have been referred to as the most democratic university law, the "University Act" (Styrelsesloven) in 1970, which was amended shortly afterwards in 1973: Both students and technical administrative personal were assigned 25% representation each in all major decisions, reducing the academic faculty to 50% representation, creating the conditions for a new collegial, democratic governance (Rienecker and Li 2015). As a striking example of how exceptional the students' engagement was in the first years of existence of the department of computer science, in 1971 a 25-year-old active student was elected Head of Department (institutbestyrer). This has never happened in any other Danish university before or after. While the university law has been revised several times later – particularly in 1992 and 2003 – giving more modest representation to staff and students in decision-making processes—the importance of student voices and participation remains as an important principle and value in the computer science department formal and informal structure. Thus, there are multiple constellations of both student groups and formal student associations (*foreninger* in Danish) which organize and drive essential culture defining activities in the department such as Facebook groups, student cafés, freshers' rituals, activities, and so on. It is also important to note that boundaries between categories that we sometimes see as clear-cut when looking at organizational structures – like "students", "employed staff"—can be blurry: students often work as TAs, or do paid work running social activities (as mentors). While the students' drive and participation in making the department is valued and important, the organizational setup creates challenges for developing shared cross-functional accountability when it comes to work around issues of inclusion and equity, especially when students, faculty, and staff operate within long-standing cultural traditions – which often reach across other natural science disciplines and their social milieu. It is important to note that the lack of clear and specific state regulations to support and guide preventive measures and accountability systems for equity in higher education further complicates the effective co-creation of long-term and ambitious strategic interventions at a local level. Untangling the complex relations making up socio-cultural ecosystems reveals gaps in accountability that can form the basis of effective interventions – but we hope that our contribution will inspire discussion and action beyond future interventions in single organizations, towards a clearer focus on equity by public agencies regulating the higher education and research sector.

5.3 **Reframing core practices**

Interestingly, from our readings of the songbook as a historic manifestation of the culture in the department, it is clear that the spirit of the '68 students uprising is still present and is in some way aligned with the current increasing recognition of the political nature of computing, which have always been fundamental to CSCW research (Tellioğlu and Wagner 2001; Suchman 1993; Bjørn and Balka 2007; Boulus-Rødje et al. 2015) and especially the European CSCW research (Wulf et al. 2013, b; Stickel et al. 2015; Aal et al. 2014; Wagner 1993). We see this especially in the songs alluding to how working for 'the capital' is viewed as lucrative but less intellectually challenging – and in songs making jokes on specific programming languages for the industry, such as Java. The anti-capitalistic connotations are then connected to controlling ways of working – as in the song 'Who is sitting behind the screen', which also refers, through the chosen melody, to the exploitation of un-named people ('Jens Vejmand') in building infrastructure. However, the way these anti-capitalist narratives are expressed in the songs also show a missed opportunity of connecting with broader feminist critical perspectives which became influential in Danish society right after the student uprising, and with feminist and post-colonial perspectives which today are increasingly shaping current political concerns for technology in CSCW literature (Lazem et al. 2021; Tellioğlu and Wagner 2001; Kristiansen et al. 2018). Students are aware of and critical of the socio-political aspects of global technology development, as it is clear from the social commentaries weaved into some of their songs, but a critical sensibility to the power differentials created along the axes of gender and race is missing. This means that the agenda of furthering more equity in computing, if truly rooted in civic responsibility, should not just be focused on broadening participation to minoritized identities, but can also take the shape of strengthening and reforming the core practices of an organization. This could mean providing current students with the academic skills to better discuss, critically analyse and understand the impact of computing in shaping our future world. This is also consistent with recent calls in the academic computer science community for the need to develop a more critical computer science education "recasting computing itself in moral, ethical and social terms" (Ko et al. 2020).

We propose an equity-focused approach to institutional accountability as a set of principles for how technology institutions can identify and address exclusionary organizational patterns and traditions in an integrated way. First, an equity-focused approach to institutional accountability requires us to examine organizational traditions and social spaces to critically evaluate and challenge narratives and behaviors which might be embedded in institutional practices and have negative impact on marginalized identities. This principle is founded on extensive evidence showing the negative impact of stereotyped narratives and beliefs on the sense of belonging of groups that have been historically underrepresented

in computing (Margolis and Fischer 2002; Margolis 2008; Cheryan et al. 2009); with research showing how tendentious humor can narrow the self-perception of targeted people (Ford et al. 2015) and research linking exposure to group stereotyping with the activation of stereotype threat and its related negative outcomes (Aronson et al. 1998). Second, we must normalize critical reflection and inquiry in the core practices of our organizations—in our specific case, education and research—explicitly engaging multiple perspectives. Enacting cultural and institutional change also involves reforming the ways in which we teach and contextualize computer science and how we do research. Inspired by the Copenhagen Tradition of computer science, characterized "by maintaining a close connection with applications and other fields of knowledge" (Sveinsdottir and Frøkjær 1988, p. 468) and which follows an approach in which "dogmatic ideas are constantly challenged and people are being supported in revising their views in light of new insight or due to changed circumstances" (ibid) we propose to emphasize, in our core practices, critical reflection to better understand how computer-mediated systems impact society. Shifting towards critical awareness on how socio-cultural constructions such as race and gender are performed and how they intersect with other systems of power is crucial to enable technologists and researchers to better understand how inequity manifest in socio-technical systems, as highlighted by a growing body of research in CSCW (Ogbonnaya-Ogburu et al. 2020; Spiel et al. 2020; Burtscher and Spiel 2020). Third, we need to diversify and improve data collection to create opportunities for internal dialogue – cross-functionally—in order to grow. Tech institutions need to open up and be welcoming to people with different backgrounds and interests, which concretely means they need to identify areas for improvement and continuously assess progress. This requires moving beyond collecting recruitment and retention data and tailoring both the data collection, and the methods used to gather data, towards concrete goals. At the same time, it is crucial to find ways to create internal dialogue, taking into consideration the concrete multiplicity of social arrangements comprising the institution (Table 1).

Table 1. Three basic principles for an equity-focused approach to institutional accountability.

Equity-Focused Institutional Accountability – Basic Principles
1. **Examine organizational traditions, rituals, and spaces**: Situate equity efforts in their local contexts: examine organizational traditions, rituals, and social spaces to critically evaluate, address and counter marginalizing narratives and behaviours
2. **Normalize critical reflection in core practices**: Normalize critical reflection and inquiry in the core practices of the institution explicitly engaging multiple perspectives
3. **Diversify and improve data collection**: Improve and expand methods for data collection ensuring diverse types of data about equity to create opportunities for institutional dialogue in order to grow

Bold emphasis is to improve legibility and emphasis on the main principles we propose

6 Conclusion

This paper was an intervention. We interrogated the practices of our own organization, the computer science department of a large Danish university, to tease out some of the current hurdles in creating a more equitable and welcoming environment. While efforts to promote equality in organizational settings often focus on *diversity*—the numerical representation of specific groups of people (for example women or people from specific ethnic backgrounds), or *inclusion*, stressing how people can better feel included in a given structure, here we emphasize *equity*, which is created when unnecessary and unfair differences or unfair conditions (often gendered, or racialized for instance) are identified, addressed and eliminated. A focus on equity means zooming in on the unintentional or intentional barriers (often rooted in pervasive bias, or structural dynamics) that prevent certain groups of people from reaching their full potential. We zoomed in the stereotyped narratives embedded in the organizational traditions, social practices and sociomaterial artefacts of our institution. In particular, we looked at how these narratives might be expressed through humor, creating elusive challenges which counter current efforts to make our institution a place where all talents can thrive. From the analysis of our empirical material, we identified a set of cultural stereotypes couched in humor which we grouped in three main themes: gendered stereotypes of computer geeks; stereotyped representation of women; stereotypes on techno-capitalism and race in global software development. Our goal in sharing this analysis was to show how any efforts to broaden participation in computing has to go beyond the headcount and should go hand in hand with a critical examination of situated socio-cultural norms and values in order to make change.

The second aim of this study was to explore which challenges negative cultural stereotypes raise for the institutional response and accountability where they are produced. In a collegial, participatory culture such as the one of the computer science department we studied, institutional accountability is complex. Mapping out issues to generate a good overview of gaps in prevention and handling strategies is an essential step to do strategic work. But how do we integrate this critical perspective in the practices of our institutions, so that the focus is not only on increasing numbers of specific minorities, but rather on ensuring an open, welcoming environment which is psychologically safe? As a way forward, we proposed an equity-focused approach to institutional accountability with three basic principles that organizations can follow to identify and address: 1) Examine organizational traditions, rituals and spaces; 2) Normalize critical reflection in the core practices of the organization; 3) Diversify and improve data collection.

Further research is needed to unpack how biased humor encoded in artefacts, spaces, and organizational practices of technology organizations impacts intersectional identities both inside and outside academia.

Declarations

Conflict of Interest The authors declared that they have no conflict of interest.

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