

# Algorithmic Bias and Digital Divide - An Examination of Citizens' Discrimination Experiences in Human-System Interactions

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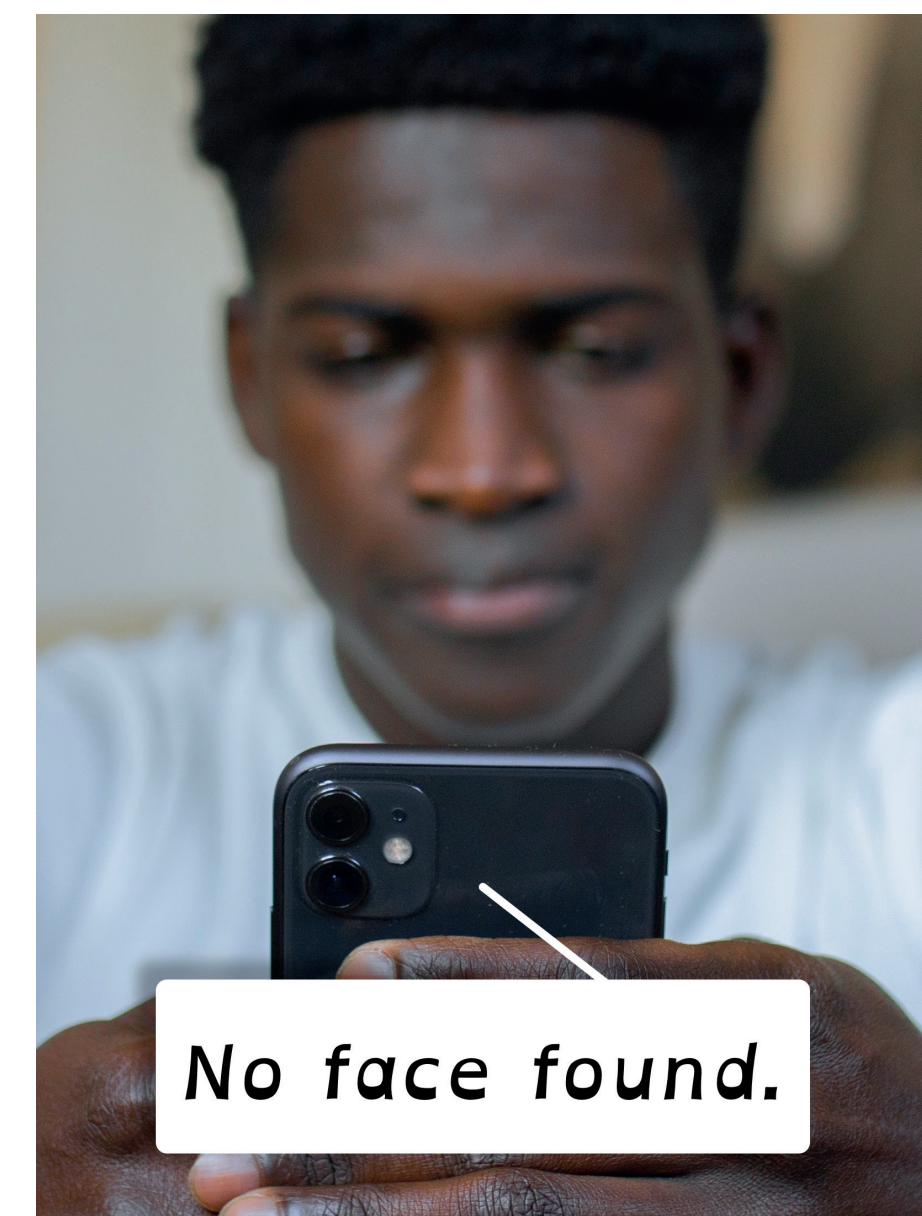
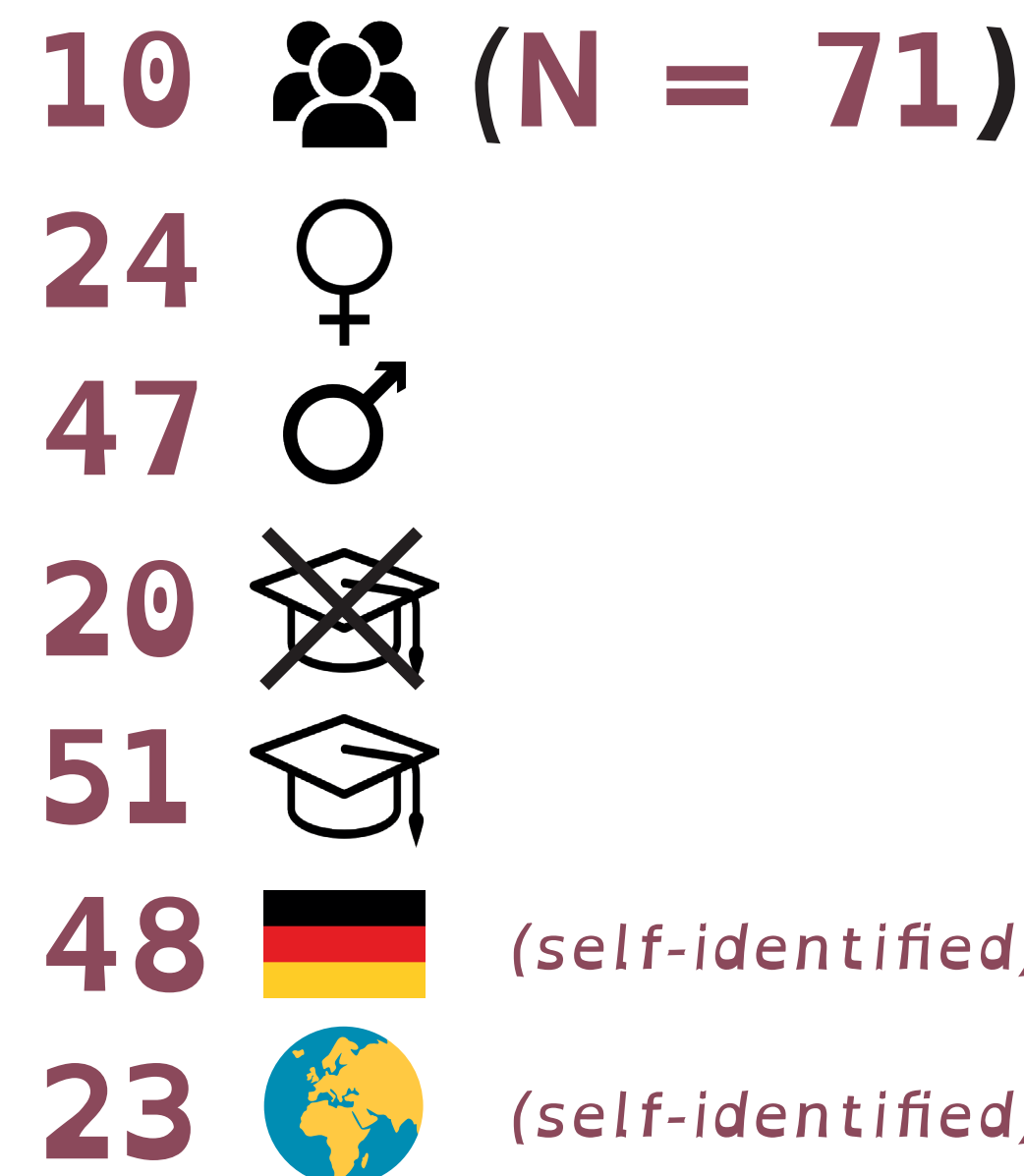
## Research Goal(s)

Technological systems in public spaces, need to interact with a diverse audience as citizens differ, e.g., in gender, educations, beliefs, and experiences with different technologies. However, a wide array of technological systems do not yet have the ability to cater for this human diversity, as evidenced by cases of **algorithmic bias** (algorithms benefiting or disadvantaging certain groups compared to others (Hitron et al., 2022; Kordzadeh & Ghasemaghaei, 2021)).

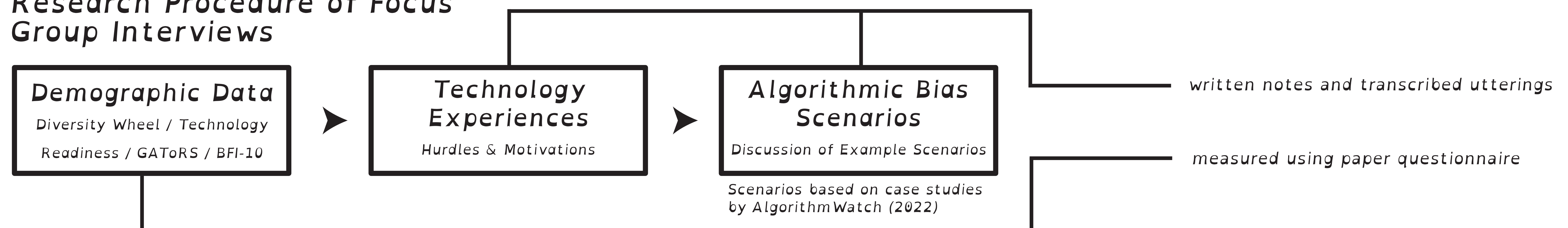
What experiences have citizens made with algorithmic bias?

How do citizens cope with algorithmic bias?

Does algorithmic bias lead to a digital divide?

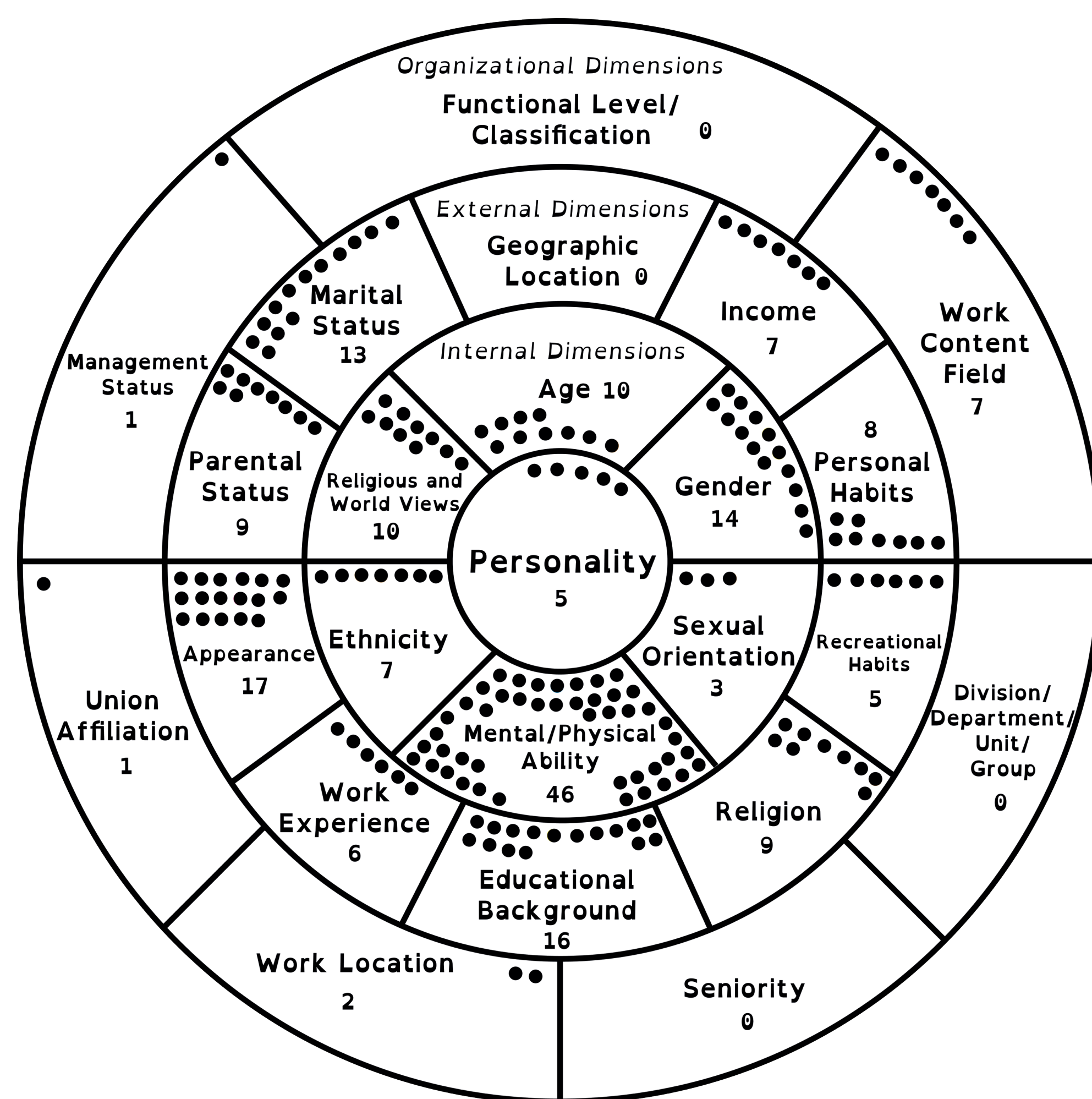


## Research Procedure of Focus Group Interviews

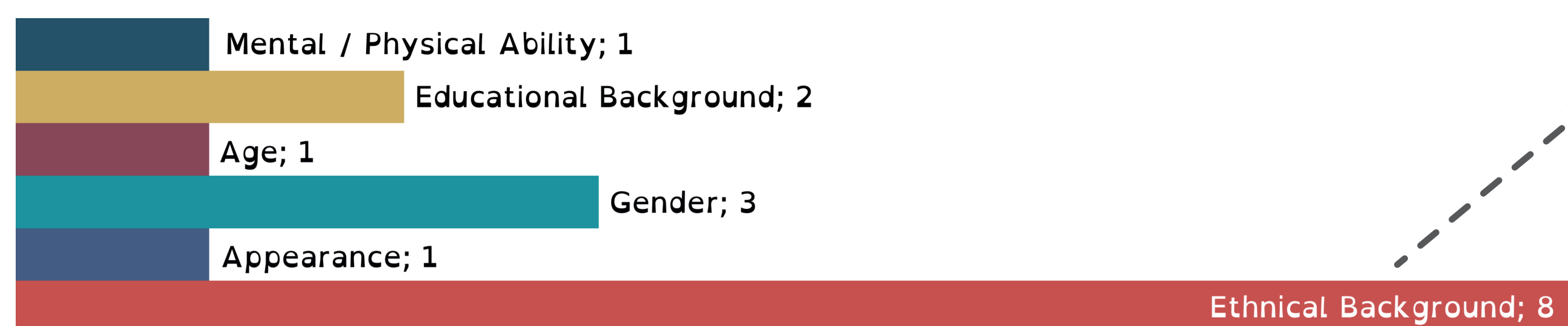


## The characteristics integral to participants' identity are...

Wheel based on Gardenswartz & Rowe (2002)



## EXPERIENCES WITH ALGORITHMIC BIAS BECAUSE OF...

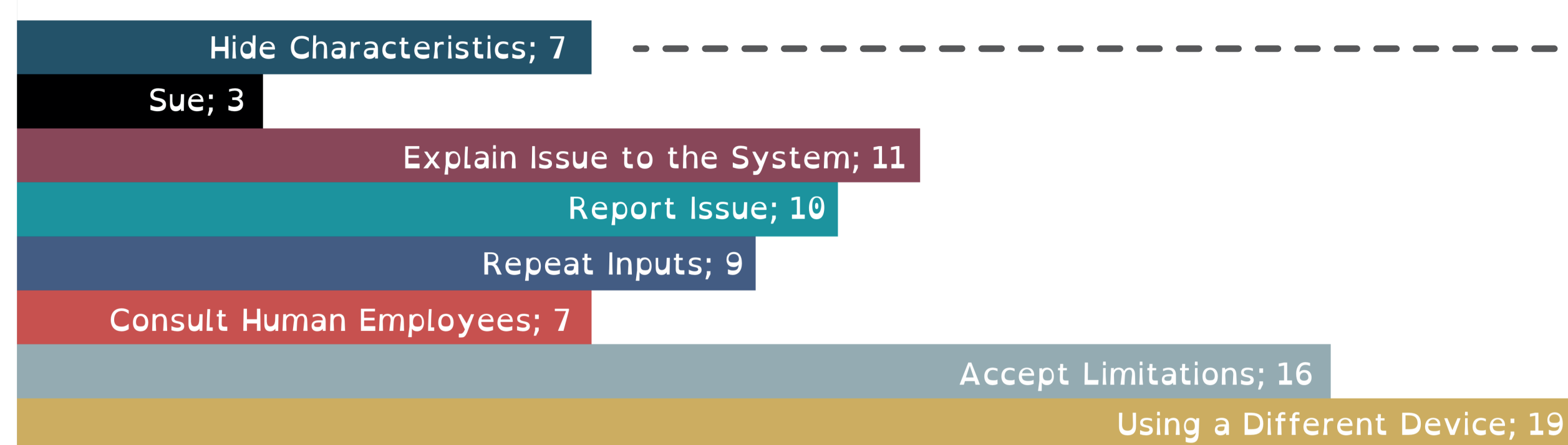


## Sample Quotes

„So the [voice assistants] can only speak High Arabic and nobody really speaks High Arabic normally. And then I have to talk very strangely, very formally, so that he understands me, and then he doesn't really understand me at all. And that simply leads to Arabs not using voice assistants at all, because it's simply awkward.“

Code: Ethnical Background

## COPING STRATEGIES WHEN FACING ALGORITHMIC BIAS



If you still want to receive personalized advertising, it is not possible. If you say okay, I don't care what I get, the main thing is that it is no longer tailored to my [gender], then you can simply take a VPN [or] ad blocker.

Code: Hide Diversity Characteristics

## REASON FOR ERROR OCCURENCE



„One must also mention that the first two people (in the example scenario) with the more common names have a lighter skin color and the two with less common names were both dark-skinned. And that probably also played a big role in this.“

Code: Algorithmic Bias

## ATTRIBUTION OF BLAME



„The error lies with the user, because his sound quality is probably not good enough so that the system cannot generate subtitles.“

Code: User

## Discussion

- 16 in 71 participants (22.54%) experienced Algorithmic Bias
- 18 participants (25.35%) did not identify instances of Algorithmic Bias in the scenarios
- only 47 participants (66,2%) wished for inclusive systems
- non-German citizens have experienced more Algorithmic Bias (10 in 23 / 40.48%) than German citizens (6 in 48 / 12.50%)

## Digital Divide

- Access Divide, Use Divide, and Knowledge Divide (Zillien & Haufs-Brusberg, 2014)
- **Knowledge Divide:** the primary goal is not knowledge acquisition (Bonfadelli, 2016) and the sample did not vary significantly in educational level
- **Access Divide:** no evidence from focus groups for
- **Use Divide:** some participants reported Algorithmic Bias, leading to a self-selection

## Limitations

- acquisition of participants through direct advertisements on the streets, monetary incentives, and via news outlets was largely ineffective
- sample is diverse, yet is subject to a self-selection bias (many elderly citizens did not want to participate due to feeling too far removed from technology)
- measuring diversity is very difficult and there is no standardized set of instruments for doing so
- participants had no clear idea of what „diversity“ means and what it encompasses

## Take-Home-Message

Despite some experiences with Algorithmic Bias, citizens do not necessarily attribute these experiences to Algorithmic Bias.

Most citizens either accept limitations or use a different system when experiencing Algorithmic Bias.

Participants place a lot of trust into systems to accurately and impartially process data.

Diversity is not a self-explanatory term and difficult to measure reliably.



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