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Prototypes and Stereotypes in the Intersectional Representation of Gender, Race, and Sexual Orientation Categories

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For Dziadzia.

“Keep going”.

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"No man is an island."

- *John Donne*

Also of note, very few women are islands. Regarding PhD students of any gender, there are actually very few islands, on the whole. In other words, there are a number of people whom I wish to sincerely thank.

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INTRODUCTION

When we first encounter a new person we inevitably and promptly categorize them according to social categories such as race, gender, and sexual orientation (Stroessner, 1996; Rule & Ambady, 2008). Categories have an internal structure, whereby some examples of the category are more typical or "better examples" of the category than others, and hence, come to mind more easily (Barsalou, 1992; Mervis & Rosch, 1981). To exemplify the category fruit, an apple tends to come to mind before a kiwi, despite both exemplars indisputably belonging to the category. The same process occurs in the categorization of people. White people tend to come to mind before Black people, men before women, and straight before gay people (Ghavami & Peplau, 2013; Bailey, LaFrance & Dovidio, 2018; Lick & Johnson, 2016). The "White male norm" hypothesis posits that the race "White" and gender "man" are the default categories, which are assumed, without information to the contrary (Zárate & Smith, 1990). The former categories are not necessarily perceived as superior to the latter, but they are perceived as the "default" or "normative" categories. Androcentrism, or a bias which centers on men as the neutral standard, positions men as the normal human and women as the "other" (Bem, 1993). This bias manifests in examples such as social media icons: if you do not select a profile picture on a social media platform, you will be assigned an icon representing a nondescript human; that human will appear to be a man (Bailey & LaFrance, 2016). In other words, the prototype of a human is a man.

The same rationale applies when we think of social category intersections. The first example of a Black person that tends to come to mind is a straight Black man. "Intersectionality" refers to the interconnected nature of social categories, and how they overlap and intersect, which creates unique and complex systems of privilege and disadvantage (Crenshaw, 1990). Individuals may be oppressed or privileged not just based on one social category to which they belong, but through the intersection of multiple social categories. An intersectional lens also brings awareness to the concept of "intersectional invisibility". Individuals who belong to multiple marginalized social

categories are often overlooked due to the intersection of their various identities. Black people are perceived as men by default, and women as White by default, causing a particular cognitive disadvantage in the processing the intersection “Black women”, as they are not the prototype of either of their constituent categories (Sesko & Biernat, 2010).

A prototype may be based on several factors such as frequency of encountering a given category exemplar, and social status. Additionally, people may consider an exemplar representative of a cateogory if they think the exemplar has attributes in common with the abstract concept of the category (Rosch & Mervis, 1975). For example, people may conceptualize a human as having more attributes in common with a man than with any other gender category (Bailey, LaFrance & Dovidio, 2018). The role of attributes in determining prototypes shows the relevance of stereotypes. While related, prototypes and stereotypes are also distinct in important ways.

A prototype is a mental representation or an idealized example of a category that encapsulates the most typical or characteristic features associated with that category and may include other social categories, e.g., the prototype of a Black person is a straight, Black man. A stereotype is a widely held set overgeneralizations about a social category, e.g., Black men are stereotyped as masculine, poor, and loud (Petsko & Bodenhausen, 2019). When individuals are exposed to stereotypes about a social category, those stereotypes can shape their mental prototypes of that category. The stereotype that Black men are hyper-masculine may be conflated with heteronormativity, and consequently, this may contribute to the prototype of a Black man as straight.

In Chapter 1, I will explore intersectional representations of gender (women and men) and race (Black and White people) categories by focusing on how people view category prototypes and whether this prototypical representation relates to perceived population prevalence and the social status of the intersectional categories under investigation. Furthermore, I will examine how these perceptions may differ across diverse countries. In understanding the interplay of ethnocentrism and androcentrism in shaping perceptions of intersectional race and gender categories, existing research

has been based on normative theory, non-prototypicality theory, and stereotype-overlapping theories. While normative theory posits an additive framework, suggesting ethnocentrism and androcentrism additively contribute to the conceptualization of gender and race categories, non-prototypicality theory and stereotype-overlapping theories propose an interactive effect which particularly disadvantages Black women. Our studies address theoretical and methodological gaps by assessing the representativeness of intersectional category members and exploring the influence of base rates and social status. Unlike previous research, we directly examine the graded structure of categories and incorporate base rates and contextual influences by conducting studies in Italy, the United States, and South Africa. Additionally, we explore the overlooked factor of social status by asking participants to estimate salaries, shedding light on how economic factors contribute to perceived category prototypes.

In Chapter 2, I will investigate how the cateogories Black man and gay man are cognitively combined, highlighting an asymmetry which has emerged in the co-construction of these categories. Due to normative defaulting, certain social categories come to mind more easily than others, impacting cognitive combinations. As Black men and gay men are both marginalized groups, their combination causes them to be overlooked, or intersectionally invisible. Oppositional stereotypes associated with Black men being perceived as more masculine and gay men as more feminine, as well as Black men stereotyped as poor and gay men as affluent, further complicate the conceptualization of this intersection. The difficulty in combining stereotypes of "Black men" and "gay men" is first approached through a conjunction fallacy paradigm, which provided a test of the extent to which these categories are viewed as opposing in stereotype content. The results prompted an examination of a potential asymmetry in this intersection, and whether ethnocentrism is embedded in stereotypes concerning gay men to the same extent as heteronormativity is in stereotypes concerning Black men. An updating paradigm explored what social categories individuals are perceived as belonging to when they are initially described by stereotypes of one category (Black men or gay men), then followed by additional stereotypes associated with either the

same category or its opposing exemplar (Black men or gay men). We predicted that due to the greater cognitive ease in perceiving gay men as Black than Black men as gay, the updating paradigm would cause greater impression updates of the individual when Black stereotypes are cued first, and then gay, compared to the reverse. This work highlights the nuanced and asymmetric nature of intersectional stereotyping.

In sum, this thesis explores how categorization based on race, gender, and sexual orientation is influenced by processes such as prototyping and stereotyping. Particular emphasis in placed on intersectional invisibility and the way in which social categories at the intersection of two marginalized categories are cognitively overlooked, and asymmetrically composed.

CHAPTER 1

Category prototypes, prevalence, and social status: Intersectional representations of gender and race categories in Italy, United States, and South Africa[1]

[1] Authored in collaboration with Andrea Carnaghi and submitted as an article for publication to *Social Cognition*

1. Introduction

Accumulated evidence has demonstrated that both ethnocentrism (i.e., a societal system organized around White people) and androcentrism (i.e., men as the organizing principle of a cultural system) operate in a variety of life domains, including human cognition (Sidanius, Pratto & Rabinowitz, 1994; Sidanius & Pratto, 1999; Hegarty & Bruckmüller, 2013; Bailey, LaFrance & Dovidio, 2018; Bem, 1993; de Beauvoir, 1949; hooks, 1981). More specifically, the idea that ethnocentrism affects the conceptualization of gender categories (e.g., men and women) and that androcentrism impacts the conceptualization of race categories (e.g., White and Black people) has long been acknowledged (Zárate & Smith, 1990; Stroessner, 1996; Purdie-Vaughns & Eibach, 2008; Thomas, Dovidio & West, 2014). However, the manner in which this occurs remains a debated issue. In fact, some research suggests that ethnocentrism and androcentrism operate in an additive fashion in the conceptualization of gender and race categories, respectively (henceforth referred to as normative theory, NT). The androcentric default in the stereotyping of both White and Black people (Ghavami & Peplau, 2013; Goff, Thomas & Jackson, 2008) and the ethnocentric default in the stereotyping of both men and women (Ghavami & Peplau, 2013) both occur, respectively, to a similar extent (Goff, Thomas & Jackson, 2008). Alternatively, some research that relies on memory and accessibility paradigms shows a particular cognitive processing disadvantage for Black women compared to the other gender and race category combinations (Sesko & Biernat, 2010; Goff, Thomas & Jackson, 2008; Thomas, Dovidio & West, 2014; Schug, Alt & Klauer, 2015). This evidence (henceforth referred to as non-prototypicality theory, NPT) suggests that individuals who have two subordinate category memberships (i.e., Black women) would be particularly likely to be overlooked (Crenshaw, 1990; Purdie-Vaughns & Eibach, 2008). In a similar vein, research has shown that compared to White people, Black people are more strongly associated with men or masculinity, and compared to White women, Black women, are perceived as less feminine, or attractive (an attribute strongly linked to femininity; Johnson, Freeman & Pauker,

2012; Galinsky, Hall & Cuddy, 2013; Goff, Thomas & Jackson, 2008; Coles & Pasek, 2020). The overlap between the stereotypes of Black people and men, and White people and women, particularly disadvantages the cognitive processing of Black women (henceforth referred to as stereotype-overlapping theories, SOT). Hence, NPT and SOT suggest an interactive effect of androcentrism, which is stronger for Black (vs. White) people, and of ethnocentrism, which is stronger for women (vs. men). In sum, NT predicts an additive pattern of androcentrism and ethnocentrism, while NPT and SOT predict an interactive pattern disadvantaging Black women.

Notwithstanding the relevance of previous research for shedding light on the conceptualization of race and gender intersections, in the current studies we address theoretical and methodological issues that have previously been overlooked to gain a more nuanced understanding of the manner in which ethnocentrism and androcentrism operate in shaping the perception of intersectional race and gender categories. Firstly, the cited studies assumed that category members differ in their degree of fit with respect to the category prototype, i.e., race categories possess a gender-graded structure which favors men, and gender categories display a race-graded category structure favoring White people (Barsalou, 1992; Mervis & Rosch, 1981; Murphy, 2002). However, NT and NPT/SOT studies relied on a variety of measures (i.e., stereotyping, memory-based and accessibility-based tasks) which are sensitive to, but do not directly assess, the graded structure of categories (Bless, Schwarz, Bodenhausen, & Thiel, 2001; Carnaghi et al., 2022; Coladonato et al., 2022; Rothbart & John, 1985). To overcome this limitation, the current studies assess the representativeness of the intersectional category members White men, White women, Black men, and Black women in conceptualizing White people and Black people as well as men and women, thus providing a strong test of the category graded structure (Battig & Montague, 1969; Bailey & LaFrance, 2016; Carnaghi et al., 2022). Category members that display high feature commonality with the abstract representation of their category (i.e., the prototype), or members that are more frequently instantiated, tend to be ranked as the most representative of that category (Barsalou, 1985; Hegarty & Prato, 2004; Lynch et al., 2000). The representativeness ranking method allows us

to assess the extent to which race categories are prototyped as men within both White and Black people, and gender categories are prototyped as White within both men and women, thus providing a more stringent test of the predictions derived from NT and NPT/SOT.

Secondly, while some research on the conceptualization of a single category has controlled for whether results related to category representativeness are intertwined with base rates, and less frequently, with the social status of the category (Lick, Johnson, Rule & Stroessner, 2019; Oldmeadow & Fiske, 2010), surprisingly, research on the conceptualization of race and gender category intersections has disregarded these concurrent factors. Evidence suggests that perceivers' expected prevalence of specific exemplars in a given category influences category stereotyping, exemplar categorization and, more importantly for the current research, category representativeness (Locksley, Hepburn & Ortiz, 1982; Locksley, Bordiga, Brekke, & Hepburn, 1980; Medin & Edelson, 1988; Kunda & Oleson, 1995). On one hand, assuming perceivers utilize general knowledge, men and women would be perceived as equally prevalent, and in Western contexts, White people would be viewed as more prevalent than Black people. Hence, intersectional category base rates would be misaligned with the pattern of perceived representativeness of such categories, as outlined by NT and NPT/SOT. On the other hand, it is likely that perceivers would neglect general knowledge (Tversky & Kahneman, 1983). Indeed, the enhanced salience of men and White people in the media may lead to an overestimation of men in both races, and of White people in both genders (Hodel et al., 2017; Tuchman, 1978; Twenge, Campbell & Gentile, 2012; UCLA Social Sciences Hollywood Diversity Report, 2018; Schug, Alt, Lu, Gosin & Fay, 2017). As such, the additive pattern predicted by NT, namely that men would be more representative of both races and White people of both genders, would be linked to a similar pattern in perceivers' base rates of the intersectional categories. Alternatively, the co-occurrence of the perceived most frequent instances (i.e., men and White people) may lead to an overestimation of the strength of association between these instances (i.e., illusory correlation effect, IC; Smedslund, 1963; Hamilton & Gifford, 1976; Remedios et al., 2011). Consequently, White people would be overestimated among men, and

men among White people. This interactive pattern would operate by particularly advantaging White men, rather than particularly disadvantaging Black women, as put forward by NPT and SOT. These alternative predictions were tested in the current studies by asking participants to estimate the prevalence of intersectional category members. This allows us to investigate the novel question of what role is played by perceivers' base rates concerning intersectional gender and race categories either in supporting the way these categories are prototyped, or in favoring White men, by hyper-inflating their perceived numerical majority status.

Moreover, perceivers' base rates, and by extension, prototyping of intersectional categories, may be influenced by the base rates in one's proximal context. Based on our literature review, a significant flaw of previous studies on the cognitive representation of intersectional categories is the fact that, at least to our knowledge, they were exclusively carried out in US and UK contexts. Moving research to other contexts not only enhances external validity but enables better understanding of the processes underpinning the conceptualization of race and gender intersections. In the current studies, we utilize participant samples from Italy, the United States, and South Africa. There is a higher population prevalence of Black people relative to White people in the United States (White people ~ 76%, Black people ~ 13%; United States Census, 2021) compared to Italy (White people ~ 96%, Black people ~ 2%; Italy population, 2021), and distinct from both, Black people are the numerical majority in South Africa (White people ~ 8%, Black people ~ 81%; South Africa Gateway, 2017). The gender distribution is similar across the countries (female population in Italy: ~ 51%, United States: ~ 50%, South Africa: ~ 51%; Statistica, 2024). Some evidence in Western settings suggests that changes in base rates does not affect perceivers 'default category representations (Bailey & LaFrance, 2016; Hegarty, 2017; Lick & Johnson, 2016; Lick, Johnson, Rule & Stroessner, 2019), while others found such an association (Hegarty & Prato, 2001; Lick, Johnson, Rule & Stroessner, 2019). Conducting the experimental studies across these cultural settings allows for the examination of how differing racial base rates might influence the representativeness of intersectional category members. Specifically, it allows us to analyze whether

perceivers rely on an ethnocentric default in the representation of gender categories (category representativeness), in line with either NT or NPT/SOT, even when base rates from their proximal social context do not favor White people. Alternatively, if perceivers make use of base rates from their context in the representation of gender categories, the ethnocentric bias in gender categories would be attenuated, if not reversed, in South Africa.

Lastly, an additional factor potentially related to race and gender category conceptualizations is their social status. The higher status, i.e., salary and wealth, of men and White people might cause them to be perceived as ideal, i.e., prototypical, category exemplars (for a similar claim, see Bailey, LaFrance & Dovidio, 2018; Bem, 1993). In the current studies, we addressed this neglected issue by asking participants to estimate the salaries of each intersectional target category (i.e., White men, White women, Black men, Black women). In Italy, the US, and South Africa, Black people are economically disadvantaged compared to White people, and women earn less than men (Mathä, Porpiglia & Sierminska, 2011; Eurostat, 2021; US Department of Labor, 2022; Mabuza, 2020). Evidence also suggests that both White people and men are assumed to earn more money and are stereotyped as more affluent than Black people and women, respectively (Fiske, Cuddy, Glick & Xu, 2018; Settles, 2006; Talbot & Durrheim, 2012; Wekwete, 2014). As such, the additive pattern predicted by NT (i.e., enhanced representativeness of men in both races and of White people in both genders) may also be demonstrated in perceivers' attributed salaries to the categories in question. Conversely, as White people and men are perceived to be wealthier (relative to Black people and women, respectively), perceivers may estimate hyper-inflated salaries of White men and hence judge a larger gender pay gap among White than Black people, and greater racial pay gap may among men than women (in line with IC).

1.1 Overview of the studies and hypotheses

In four pre-registered studies (Pilot and Studies 1-3), we addressed the way race and gender categories intersect at the individual level of cognition by using three tasks: representativeness task,

base rates task, and in Studies 1-3, salary estimation task. The hypotheses concerning the tasks are detailed below, first for the Italian and US sample, then the South African sample. All studies were conducted with White women and men as participants.

In the representativeness task, participants were provided with photographs of four individuals (i.e., targets), orthogonally cuing their race (target races: White and Black individuals), and their gender (target genders: men and women). Perceivers ranked the targets in terms of who people think is the most representative of White people and Black people (race as referent category) and men and women (gender as referent category). Participants were asked to indicate a societal perspective instead of personal to avoid social desirability bias (Kotzur et al., 2020). Firstly, and most obviously, we predicted that when presented with a given race or a gender as the referent category, targets belonging to that race or gender would be ranked before targets not belonging to that race or gender. Moreover, in Italy and the US, for both "men" and "women" as referent categories, the White target should be ranked first, and for both "White people" and "Black people", male targets should be ranked first. Importantly, and for the NT only, the ethnocentric default should be similar in both gender referent categories, and the androcentric default should be similar in both race referent categories, i.e., an additive effect. By contrast, according to NPT and an extended interpretation of SOT, the ethnocentric default should be stronger when "women" rather than "men" is the referent category, and the androcentric default should be stronger when "Black people" rather than "White people" is the referent category, demonstrating an interactive pattern disadvantaging Black women. Analyses concerning the ranking of inconsistent targets (i.e., targets whose group membership does not match the given referent category) have been preregistered and conducted, and results can be viewed on each project's page in the supplementary material on Open Science Framework (OSF).

In the base rates task, participants were asked to estimate what people think the prevalence is of each of the four intersectional target categories in the general population. Participants indicated a percentage for each group which was required to sum to 100%. If participants made use of general

knowledge concerning base rates in Italy and the US, men and women of both racial groups would be estimated to be equally prevalent across countries, and White men and women would be estimated to be more prevalent than Black men and women. However, if participants relied on heuristic reasoning, the ethnocentric and the androcentric defaults may additively operate, in line with NT: men would be more prevalent than women in both race categories, and White people would be more prevalent in both gender categories. Moreover, according to NPT, and an extension of SOT, Black women would be estimated to be less prevalent than both White women and Black men, as the ethnocentric default should be stronger for women than men, and the androcentric default should be stronger for Black than White people. By contrast, IC would also predict an interactive pattern but favoring White men rather than disadvantaging Black women: the ethnocentric default should be stronger for men than women, and the androcentric default should be stronger for White than Black people. By comparing the patterns of results in the representativeness and base rates tasks we would be able to ascertain whether processes jointly or differently contribute to the disadvantaging of certain social categories.

The salary estimation task entailed asking participants to estimate what people think the salaries are of each of the four intersectional target categories. While data on salary distributions in Italy and the US vary as to whether the patterns of income inequality are additive or interactive, in accordance with NT, White people would be estimated to earn more than Black people to a similar extent for both genders, and men more than women similarly for both races. In line with NPT, and an extension of SOT, Black women would be estimated to earn less than White women and Black men. More specifically, the gender pay gap would be perceived to be larger among Black than White people, and the racial pay gap larger among women than men. By contrast, IC would predict that due to perceived hyper-inflated salaries of White men, men would be estimated to have higher salaries within White than Black people, and White people to earn more within men than women.

Predictions for South Africa may differ from those for Italy and the US due to the numerical majority status of the Black population. For the base rates task, if perceivers do not take their

proximal social context into consideration, then the prediction patterns put forward for Italy and the US may also apply in South Africa. By contrast, if perceivers acknowledge contextual information, Black people should be estimated to be more prevalent than White people in the population. In this case, Black women would not be invisible due to being a double subordinate category (NPT). Also, Black men would be considered the most prevalent among men and Black people, namely, a double subordinate category, potentially causing Black men to be overestimated among both men and among Black people (IC). If prototypicality is structured on subjective base rates which take contextual information into account, the ethnocentric (i.e., White-centric) defaulting of gender categories in the representativeness task, as predicted in Italy and the United States, may be attenuated or eliminated. Specifically, "men" and "women" may be similarly represented as Black or White, or preferentially represented as Black. Hence, Black women would not have intersectional non-prototypicality status (NPT and SOT) in South Africa sample. As salary inequalities in South Africa are similar to those in Italy and the US, salary estimation task predictions would not differ in South Africa to those pertaining to Western samples.

Correlation analyses were used to ascertain whether any relationships occurred between the perceived representativeness of a given target (e.g., a Black man) with respect to a group as a whole (e.g., men) and the estimates of the proportion of that target group (e.g., Black man) in the population and/or the estimates of that target group's salary. Additionally, the role of participant gender was assessed in all measures, across countries. Hypotheses and analyses were preregistered and results can be found on OSF.

2. Pilot Study

2.1 Method

2.1.1 Participants

We aimed to collect at least one hundred and ten participants, as this is in line with previous research (Carnaghi et al., 2022) that uses the same paradigm. The participant sample was comprised

of 144 participants (103 women, 37 men, 4 did not indicate their gender; M_{age} = 19.90, SE = 0.31) from a social psychology course at Trieste University, Italy. In line with preregistration criteria, data were excluded for the given question(s) on which a participant provided invalid responses (e.g., missing or duplicate values in representativeness ranking task). Hence, the number of participants varied across tasks. In the representativeness ranking task, for "men", n = 137 participant responses remained after exclusion criteria was applied, for "women", 140; for "Black people", 141; for "White people", 139. In the base rates task, 139 participant responses remained after exclusion. One hundred and thirteen participants self-identified as heterosexual, 24 identified by a different sexual orientation, and 4 did not report their sexual orientation. Participants reported their demographic information at the end of their participation in the survey (i.e., gender, age, sexual orientation, nationality, ethnic group, and native language). A sensitivity power analysis (α = .05, $1 - \beta$ = .80; Cohen's f = .10) suggested that a sample size of 139 participants had enough power to detect a small effect size in a within-participants design (Cohen, 1988).

Exploratory analyses examining the role of participant gender were included in the supplementary material. The pilot study has been preregistered on OSF: https://osf.io/9ynh8/.

2.1.2 Material and procedure

All participants provided written consent to participate in the study and took part through a Qualtrics link online. Participants read that the experimenter was selecting stimuli for an upcoming experiment and the current study was pre-testing the material, namely, photographs of different people. In line with the procedure outlined by Carnaghi et al. (2022), participants were instructed to think about how a social group is represented in society, and were then sequentially presented, in a randomized order, with each of the four social groups (i.e., referent categories): men, women, Black people, White people. For each referent category, four photographs of different individuals were displayed in a randomized order (i.e., targets: White man, White woman, Black man, Black woman). Participants ranked the targets from one to four according to how representative each target was of the referent category. Hence, lower ranking scores indicated higher referent category

representativeness. The generic masculine in Italian was used for naming the referent race social categories “Black people” (i.e., “Neri”) and “White people” (i.e., “Bianchi”), but with the intent of being more conservative for hypothesis testing, the feminine grammatical form was used for the wording of “the person” (i.e., “la persona”) and “the photograph” (i.e., “la fotografia”). Photographs used in the representativeness ranking task (Pilot, Studies 1-3), selected from the Chicago Face Database (Ma, Correll & Wittenbrink, 2015). To diminish any potential bias due to the specific photographs selected, we used two sets of photographs, each set representing the four intersectional categories (i.e., a Black Man, a White Man, a Black Woman, and a White woman). Photograph selection was based on several criteria. Firstly, according to normative data from Chicago Face Database codebook (Ma, Correll & Wittenbrink, 2015), the individuals in each of the selected photographs had been rated with consensus by all participants (e.g., female probability = 1) as belonging to the intended referent social category (e.g., woman). Additionally, all individuals had neutral facial expressions and the average perceived age of the individuals, rated by participants, was between 25 and 30 years old (M = 27.90). We have controlled for the potentially confounding effects of masculinity, femininity, and attractiveness. To do so, we selected targets with at least in part comparable levels of these dimensions, rated with respect to other people of the same race and gender (see Table 1 in supplementary material for full details).

In photographs set one and two, masculinity ratings for the selected Black man and White man are approximately equivalent, as are femininity ratings, and attractiveness ratings. Likewise, masculinity ratings for the selected Black woman and White woman are also comparable, as are femininity ratings and attractiveness ratings. In both photograph sets, Black and White women have notably higher attractiveness ratings on average (M = 4.52) than Black and White men (M = 3.44). Previous research suggests that attractiveness is an especially relevant feature for the classification of female faces as female (O’Toole et al., 1998). Thus, to avoid participants selecting a given woman as the most representative of the category “women” due to the given woman being perceived as having higher attractiveness than the alternative target woman, we matched

attractiveness ratings within each gender, rather than between. Each participant was randomly assigned to view either photograph set one or set two. As indicated in the preregistration document, this variable was not considered further in the subsequent analyses.

The base rate task was presented second. Participants were instructed to think about the general population and estimate, according to society's perspective, the prevalence of each of the four intersectional target groups (randomized presentation order). Participants were instructed to report their estimates in percentages which sum to 100% (see Carnaghi et al., 2022). Participants reported their demographics and then were fully debriefed and thanked.

2.2 Results

2.2.1 Representativeness task

We used nonparametric Friedman tests and, if significant, conducted pairwise-comparisons using Wilcoxon rank tests. According to Bonferroni correction, statistical significance was set to 0.05 divided by 3, due to the number of comparisons, resulting in a new threshold of $p < .0167$.[2] We first analyzed the referent categories according to target gender, then race. Means and standard deviations are reported in the figure below (see Figure 1).

For "men", the Friedman test was significant χ^2 (3) = 310, $p < .001$. Specifically, participants ranked the White man as the most representative, followed by the Black man ($W = 3234$, $p < .001$, $d = .32$), and then by both the White woman ($W = 284$, $p < .001$, $d = .94$) and the Black woman ($W = 4290$, $p = .290$, $d = .09$), which did not significantly differ.

For "women" the Friedman test was significant χ^2 (3) = 359.40, $p < .001$, and participants ranked the White woman as more representative than the Black woman ($W = 1890$, $p < .001$, $d = -.62$), followed by the White man ($W = 47$, $p < .001$, $d = -.99$), and finally, the Black man ($W = 2590$, $p < .001$, $d = -.48$).

[2] Preregistration of the study stated that a correction for multiple comparisons would be applied but did not specify which type.

For "Black people" the Friedman test was significant χ^2 (3) = 352.80, $p < .001$, and participants ranked the Black man as more representative than the Black woman ($W = 781$, $p < .001$, $d = -.84$), followed by the White man ($W = 91$, $p < .001$, $d = -.98$), and finally, the White woman ($W = 3621$, $p = .001$, $d = -.28$).

For "White people" χ^2 (3) = 355.20, $p < .001$, participants ranked the White man as more representative than the White woman ($W = 3570$, $p = .002$, $d = -.27$), then the Black woman ($W = 0$, $p < .001$, $d = 1.00$), followed by the Black man ($W = 1610$, $p < .001$, $d = .67$).

The ethnocentric defaulting for women (i.e., the ranking score of the Black woman subtracted from the ranking score of the White woman on the referent category "women") was stronger than that for men (i.e., the ranking score of the Black man subtracted from the ranking score of the White man on the referent category "men") $W = 296$, $p = .002$, $d = .48$ (see Figure 2).

The androcentric defaulting for Black people (i.e., the ranking score of the Black woman subtracted from the ranking score of the Black man on the referent social category "Black people") was stronger than that for White people (i.e., the ranking score of the White woman subtracted from the ranking score of the White man on the referent social category "White people"), $W = 228$, $p < .001$, $d = .71$ (see Figure 2).

2.2.2 Base rates task

Four participants reported base rates whose sum was either below or above 100 and five participants did not report estimated base rates. As pre-registered, we computed normalized proportions by dividing each participant's percentage estimate for each group by the sum of all of their estimated base rates, such that the four base rates summed to 100. These normalized base-rate scores were analyzed by means of a 2 (target gender: man vs. woman) x 2 (target race: Black vs. White) ANOVA, with all the variables as within-subject factors.

The main effect of target gender was significant, $F(1, 138) = 74.59$, $p < .001$, $\eta^2 = .08$. Marginal means indicated that participants estimated that in the general population there are more men than women (see Figure 3). The main effect of target race was significant, $F(1, 138) = 304.67$,

$p < .001$, $\eta^2 = .44$. Participants estimated that in the general population there are more White than Black people (see Figure 3). Moreover, the target gender by target race interaction was significant, $F(1, 138) = 27.41$, $p < .001$, $\eta^2 = .02$.

Post hoc analyses (Bonferroni correction) showed that participants estimated more White men than White women ($t(138) = 7.87$, $p < .001$), and more Black men than Black women ($t(138) = 6.26$, $p < .001$) (see Figure 4). Also, participants estimated more White men than Black men ($t(138) = 14.94$, $p < .001$), and more White women than Black women ($t(138) = 15.44$, $p < .001$) (see Figure 4). Furthermore, a paired samples *t*-test showed that the ethnocentrism for men (i.e., the estimation of Black men in the population subtracted from the estimation of White men in the population) was stronger than that for women ($t(138) = 5.24$, $p < .001$) and the androcentrism for White people (i.e., the estimation of White women in the population subtracted from the estimation of White men in the population) was stronger than that for Black people ($t(138) = 5.24$, $p < .001$) (see Figure 5). Hence, participants estimated that there are more White people among men than women, and more men among White people than Black people.

2.2.3 Correlations

We calculated Spearman's rho correlations between representativeness rankings for each of the four referent categories and the corresponding base rate estimates for the same target groups. As shown in Table 1, when the referent category was "men", and when the referent category was "White people", the stronger the representativeness of the White man, the higher the estimated proportion of White men in the population. Finally, the stronger the representativeness of the Black man for "men", the higher the estimated proportion of Black men in the population. No other significant correlations were found.

2.3 Discussion

Results from the representativeness task demonstrated ethnocentrism in the rankings for both men and women as referent categories, and androcentrism in the rankings for both White and

Black people as referent categories. Furthermore, the ethnocentric defaulting was stronger for women than for men, and the androcentric defaulting was stronger for Black people than White people. Thus, with a direct measure of prototypicality, the results indicated that ethnocentrism and androcentrism displayed an interactive pattern, as anticipated by NPT and SOT, demonstrating a particular disadvantage for Black women.

The base rates task results indicated that participants estimated a higher prevalence of men than women, and White than Black people. The reported gender imbalance suggests that participants relied on heuristic processes over general knowledge in this task. Moreover, in line with IC, a pattern particularly advantaging White men, the base rates displayed an interactive pattern such that there was stronger ethnocentric defaulting for men than women and stronger androcentric defaulting for White people than Black people.

Thus, while the results from the representativeness task and base rates task both show ethnocentrism and androcentrism in the conceptualization of gender and race categories, respectively, the patterns of results differed: Black women were especially overlooked in the representativeness task, in line with NPT and SOT, while White men were especially overrepresented in the base rate task, consistently with IC.

The correlation analyses demonstrated a limited relationship between the results of the two tasks. Only for the conceptualization of the White man, for both “White people” and “men”, and of the Black man for “men”, was the strength of representativeness modestly related to estimated population prevalence.

3. Study 1

3.1 Method

3.1.1 Participants

As specified in the preregistration, we predetermined to collect at least 250 Italian participants to test whether the pilot study findings would replicate with a larger sample which is balanced in terms of participant gender. Data were initially collected from 297 participants on

Prolific who took part via a Qualtrics survey. Exclusion criteria were preregistered and differently applied from that in the Pilot Study, such that if a participant provided invalid or missing responses on any item, all their survey responses were excluded from analyses. Twenty-one participants were excluded due to invalid responses on the tasks, as predetermined in the preregistration (e.g., selecting the same rank for more than one target). In line with predetermined criteria, an additional 62 participants were excluded due to their demographics: six participants did not identify as either male or female (e.g., non-binary), one indicated a non-Italian nationality (i.e., Albanian), 27 did not indicate that they were White/Caucasian/Italian (e.g., mixed, European), and 28 participants were over 40 years of age.

Two hundred and fourteen participants remained after exclusion, so another 60 participants were recruited through Prolific to reach the predetermined N. After the same exclusion criteria were applied to the new participant set, 46 valid participants remained, resulting in a final sample of 260 participants (130 women, 130 men; *Mage* = 25.9, *SD* = 4.91). All participants were currently located in Italy, with Italian nationality, Italy as their country of birth, Italian as their first language, and fluent in Italian. In the questionnaire demographics, 205 identified as heterosexual, 54 identified by a different sexual orientation, and one did not report their sexual orientation. Participants were paid £1.35 for participation in the study, which took approximately ten minutes. A sensitivity power analysis ($\alpha = .05$, $1 - \beta = .80$; Cohen's $f = .07$) suggested that a sample size of 260 participants had enough power to detect a small effect size in a within-participants design (Cohen, 1988). Study 1 has been preregistered on OSF at: https://osf.io/s38ua/.

3.1.2 Material and procedure

Study 1 was comprised of the same representativeness ranking task, in which an equal number of participants viewed either photograph set one ($n = 130$) or set two ($n = 130$). Study 1 also included the same base rate task, but the presentation order of these two tasks was randomized to control for any potential carry-over effects. The salary estimation task was presented last. Participants were instructed to think about the general population and were given information about

the average salary in Italy as a reference (€1752, per month, after taxes; Take Profit, 2022). This allows participants to consider how the salaries of the intersectional target groups may fall in relation to the national average. Participants were asked to indicate the average salary (in Euros, per month, after taxes) that people in general would estimate for each of the four intersectional target groups (randomized presentation order).

3.2 Results

3.2.1 Representativeness task

The same analysis procedure as that in the Pilot was utilized for Study 1. Means and standard deviations are reported in the figure below (see Figure 1).

For "men", the Friedman test was significant, $\chi^2(3) = 604.70$, $p < .001$. Participants ranked the White man as the most representative, followed by the Black man ($W = 5709$, $p < .001$, $d = -.66$), and then by both the White woman ($W = 1176$, $p < .001$, $d = -.93$) and the Black woman ($W = 15505$, $p = .174$, $d = -.09$), which did not differ from each other.

For "women", $\chi^2(3) = 679.50$, $p < .001$, participants ranked the White woman as the most representative, followed by the Black woman ($W = 3900$, $p < .001$, $d = -.77$), then the White man ($W = 348$, $p < .001$, $d = -.98$), and finally, the Black man ($W = 7280$, $p < .001$, $d = -.57$).

For "Black people", $\chi^2(3) = 682.30$, $p < .001$, participants ranked the Black man as the most representative, followed by the Black woman ($W = 2610$, $p < .001$, $d = -.85$), then the White man ($W = 211$, $p < .001$, $d = -.99$), and finally, the White woman ($W = 10309.50$, $p < .001$, $d = -.39$).

For "White people", $\chi^2(3) = 649.90$, $p < .001$, participants ranked the White man as the most representative, followed by the White woman ($W = 12919.50$, $p < .001$, $d = -.24$), then the Black woman ($W = 255$, $p < .001$, $d = -.99$), and finally, the Black man ($W = 6264$, $p < .001$, $d = -.63$).

The ethnocentric defaulting for men did not significantly differ from the ethnocentric defaulting for women, $W = 1160$, $p = .100$, $d = .23$. The androcentric defaulting for Black people was stronger than that for White people, $W = 500$, $p < .001$, $d = .80$ (see Figure 2).

3.2.2 Base rates task

Twenty-nine participants reported base rates whose sum was either below or above 100. We computed normalized base rate proportions and conducted the same analyses as in the Pilot. The main effect of target gender was significant, $F(1, 259) = 55.10$, $p < .001$, $\eta^2 = .02$, indicating that participants estimated a higher percentage of men than women in the population (see Figure 3).

The main effect of target race was also significant, $F(1, 259) = 423.22$, $p < .001$, $\eta^2 = .50$, indicating that participants estimated that there are more White people than Black people in the population (see Figure 3). Additionally, the target gender by target race interaction was significant, $F(1, 259) = 13.80$, $p < .001$, $\eta^2 = .004$.

Post hoc analyses (Bonferroni correction) showed that participants estimated more White men than White women, $t(259) = 6.44$, $p < .001$, and more Black men than Black women, $t(259) = 5.35$, $p < .001$ (see Figure 4). Also, participants estimated more White men than Black men, $t(259) = 18.51$, $p < .001$, and more White women than Black women, $t(259) = 19.06$, $p < .001$ (see Figure 4). Furthermore, a paired samples *t*-test showed that the ethnocentrism for men was stronger than that for women, $t(259) = 3.72$, $p < .001$, $d = .23$, and the androcentrism for White people was stronger than for Black people (see Figure 5). In other words, more White people were estimated among men than women, and more men among White than Black people.

3.2.3 Salary estimation task

The estimated salaries of the targets were analyzed using a 2 (target gender: man, woman) x 2 (target race: Black, White) ANOVA, with all within-subject factors. The main effect of gender was significant, $F(1, 259) = 139.62$, $p < .001$, $\eta^2 = .07$, indicating that participants estimated higher salaries for men than women (see Figure 6). The main effect of race was also significant, $F(1, 259) = 229.90$, $p < .001$, $\eta^2 = .17$, indicating that participants estimated higher salaries for White people than Black people (see Figure 6).

The target gender by target race interaction was significant, $F(1, 259) = 5.85$, $p = .016$, $\eta^2 = .003$. Post hoc analyses (Bonferroni correction) showed that participants estimated higher salaries

for White men than White women, $t(259) = 21.86$, $p < .001$, and for Black men than Black women, $t(259) = 5.06$, $p < .001$ (see Figure 7). Also, participants estimated higher salaries for White men than Black men, $t(259) = 9.94$, $p < .001$, and White women than Black women, $t(259) = 22.09$, $p < .001$ (see Figure 7). Furthermore, a paired samples *t*-test showed that the ethnocentric default for men (i.e., the salary estimations of White men minus those of Black men) was stronger than that for women (i.e., the salary estimations of White women minus those of Black women), $t(259) = 2.42$, $p = .016$ (see Figure 8). Furthermore, the androcentric default for White people (i.e., subtracting the salary estimates of White women from the salary estimates of White men) was stronger than that for Black people (i.e., subtracting the salary estimates of Black women from the salary estimates of Black men), $t(259) = 3.72$, $p = .016$, $d = .15$ (see Figure 8). Hence, participants estimated that the gender pay gap was more pronounced within White people than Black people and that the race pay gap was more pronounced within men than women.

3.2.4 Correlations

Following the logic outlined in the Pilot, Spearman's rho correlations were computed between the representativeness rankings and both the base rates and salary estimates, and Pearson's R correlations were carried out between base rates and salary estimates.

As shown in Table 2, when the referent social category was "men", the stronger the representativeness of the White man, the higher the estimated proportion of White men in the population. Likewise, when the referent social category was "White people", the stronger the representativeness of the White man, the higher the estimated proportion of White men in the population.

The responses for the representativeness ranking and salary estimates were only correlated for the target Black women, on the referent social category "Black people": the lower the representativeness of the Black woman, the lower the estimated salary of Black women.

Finally, participants ’responses in the base rate estimates and salary estimates tasks were only correlated for the target Black women: the lower the estimated proportion of Black women in the population, the lower the estimated salary of Black women.

3.3 Discussion

Results from the representativeness task demonstrated ethnocentrism in the rankings for both men and women as referent categories, and androcentrism in the rankings for both White and Black people as referent categories. Furthermore, the ethnocentric defaulting for women did not differ from that for men, but the androcentric defaulting was stronger for Black people than White people. Thus, the results indicated that ethnocentric defaulting is similar for both gender categories, in line with NT, while androcentric defaulting displayed an interactive pattern, as anticipated by NPT and SOT, demonstrating a particular disadvantage for Black women.

The base rates task results showed that participants estimated a higher prevalence of men than women, and White than Black people. Moreover, in line with IC, there was stronger ethnocentric defaulting for men than women and stronger androcentric defaulting for White people than Black people. Hence, a pattern which particularly advantages White men as the numerical intersectional majority.

In the salary estimation task, results showed higher salary estimations for men than women, and White than Black people. Also, in line with IC, there was a stronger ethnocentric defaulting for men than women and stronger androcentric defaulting for White people than Black people. Hence, this pattern suggests a particular advantage for White men as the highest status intersectional category.

Thus, for the representativeness task, NT best explains the results for ethnocentric defaulting in gender categories, while NPT/SOT best explain androcentric defaulting for race categories. By contrast, the IC underpins the results in both the base rates task and salary estimation task.

The correlation analyses demonstrated a limited relationship between the results of the three tasks. Only for the conceptualization of the White man, for both “White people” and “men”, a stronger

representativeness correlated with a higher estimated prevalence in the population. Only for the conceptualization of the Black woman, for "Black people", a weaker representativeness correlated with a lower estimated prevalence in the population.

5. Study 2

5.1 Method

5.1.1 Participants

As determined in the preregistration, we aimed to collect at least 250 US American participants, with a balanced gender sample (male: n = 125, female: n = 125). Data were initially collected from 288 participants on Prolific who took part via a Qualtrics survey. In line with Study 1 exclusion criteria, 19 participants were excluded due to invalid responses on the tasks. In line with predetermined demographic criteria, six participants were excluded because they did not identify as either male or female (e.g., non-binary), two who indicated that their nationality was not US American (e.g., Portuguese), and five who did not indicate that they were White/Caucasian/American (e.g., non-White Hispanic).

One hundred and twenty female participants remained after exclusion, so another fifteen female participants were recruited through Prolific to reach the predetermined N. None of the fifteen additional participants met exclusion criteria, resulting in a final sample of 271 participants (135 female, 136 male; *Mage* = 30.3, *SD* = 5.94). All participants were currently located in the United States, with US American nationality, United States as their country of birth, English as their first language, and were fluent in English. Two hundred and six participants identified as heterosexual and 63 identified by a different sexual orientation, and 2 did not report sexual orientation. Participants were paid £1.65 for participation in the study. A sensitivity power analysis ($\alpha = .05$, $1 - \beta = .80$; Cohen's $f = .07$) suggested that a sample size of 271 participants had enough power to detect a small effect size in a within-participants design (Cohen, 1988). Study 2 has been preregistered on OSF at: https://osf.io/ke7m2/.

5.1.2 Material and procedure

Study 2 was comprised of the same representativeness ranking task, in which a similar number of participants viewed photograph set one (n = 138) or set two (n = 133), and the same base rates task, and the order of the two tasks was randomized. As in Study 1, the salary estimation task was presented last. Participants were given information about the average salary in the United States as a reference ($69,392 per year, before taxes; OECD Stat, 2022).

5.2 Results

5.2.1 Representativeness ranking

Analyses were carried out as in Pilot and Study 1. Means and standard deviations are reported in the figure (see Figure 1).

For "men", the Friedman test was significant, $\chi^2(3) = 648.90$, $p < .001$. Participants ranked the White man as the most representative, followed by the Black man, $W = 8166$, $p < .001$, $d = -.56$, then the Black woman, $W = 390$, $p < .001$, $d = -.98$, and, lastly, the White woman, $W = 21551$, $p = .006$, $d = -.17$.

For "women", χ^2 (3) = 681.80, $p < .001$, participants ranked the White woman first, followed by the Black woman, $W = 5628$, $p < .001$, $d = -.69$, then the White man, $W = 1236$, $p < .001$, $d = -.93$, and finally, the Black man, $W = 7907$, $p < .001$, $d = -.57$.

For "Black people", χ^2 (3) = 673, $p < .001$, participants ranked the Black man as the most representative, followed by the Black woman, $W = 4170$, $p < .001$, $d = -.77$, then the White man, $W = 524$, $p < .001$, $d = -.97$, and finally, the White woman, $W = 13719.50$, $p < .001$, $d = -.26$.

For "White people", χ^2 (3) = 662.40, $p < .001$, participants ranked the White man as the most representative, followed by the White woman, $W = 11882.50$, $p < .001$, $d = -.36$, then the Black woman, $W = 204$, $p < .001$, $d = -.99$, and finally, the Black man, $W = 8879$, $p < .001$, $d = -.52$.

Importantly, the ethnocentric defaulting for women was stronger than that for men, W = 1371, p = .032, d = .28, and the androcentric defaulting for Black people was stronger than that for White people, W = 810.50, p < .001, d = -.63 (see Figure 2).

5.2.2 Base rates task

Forty-four participants reported base rates whose sum was either below or above 100, and normalized proportions were calculated in the same way as in the Pilot and Study 1. The main effect of target gender was significant, $F(1, 270) = 35.15$, $p < .001$, $\eta^2 = .01$, indicating that participants estimated a higher percentage of men than women in the population (see Figure 3).
The main effect of target race was also significant, $F(1, 270) = 437.48$, $p < .001$, $\eta^2 = .53$, indicating that participants estimated that there are more White people than Black people in the population (see Figure 3). Additionally, the target gender by target race interaction was significant, $F(1, 270) = 15.58$, $p < .001$, $\eta^2 = .003$. Post hoc analyses (Bonferroni correction) showed that participants estimated more White men than White women, $t(270) = 5.60$, $p < .001$, and more Black men than Black women, $t(270) = 3.19$, $p = .009$ (see Figure 4). Also, participants estimated more White men than Black men, $t(270) = 20.01$, $p < .001$, and more White women than Black women, $t(270) = 18.70$, $p < .001$ (see Figure 4). Furthermore, a paired samples t-test showed that the ethnocentric defaulting for men was stronger than that for women, $t(270) = 3.95$, $p < .001$, $d = .24$, and the androcentric defaulting for White people was stronger than that for Black people, $t(270) = 3.95$, $p < .001$, $d = .24$ (see Figure 5). That is, more White people were estimated among men than women, and more men among White than Black people.

5.2.3 Salary estimation task

The estimated salaries of the targets were analyzed using the same measures as Study 1. The main effect of gender was significant, $F(1, 270) = 301.06$, $p < .001$, $\eta^2 = .04$, indicating that participants estimated higher salaries for men than women (see Figure 6). The main effect of race was also significant, $F(1, 269) = 433.60$, $p < .001$, $\eta^2 = .08$, indicating that participants estimated

higher salaries for White people than Black people (see Figure 6). Post hoc analyses (Bonferroni correction) showed that participants estimated higher salaries for White men than White women ($t(269) = -7.97$, $p < .001$), and for Black men than Black women ($t(269) = -4.00$, $p < .001$) (see Figure 7). Also, participants estimated higher salaries for White men than Black men ($t(258) = -7.94$, $p < .001$), and White women than Black women ($t(258) = -7.52$, $p < .001$) (see Figure 7). The target gender by target race interaction, however, was not significant, $F(1, 270) = 2.19$, $p = .140$, $\eta^2 = .002$ (see Figure 8).

5.2.4 Correlations

Correlation analyses were carried out as in Study 1. As shown in Table 3, when the referent social category was "men", the stronger the representativeness of the White man, the higher the estimated proportion of White men in the population. Also for "men", the stronger the representativeness of the Black man, the higher the estimated proportion of Black men in the population.

The responses for the representativeness ranking and salary estimates were only correlated for the target Black men, on the referent social category "men": the weaker the representativeness of the Black man, the lower the estimated salary of Black men.

Finally, participants 'responses in the base rate estimates and salary estimates tasks were not correlated for any of the targets.

5.3 Discussion

Results from the representativeness task demonstrated ethnocentrism in the rankings for both men and women as referent categories, and androcentrism in the rankings for both White and Black people as referent categories. Furthermore, the ethnocentric defaulting for women was stronger than that for men, and the androcentric defaulting for Black people was stronger than that for White people. Thus, ethnocentrism and androcentrism displayed an interactive pattern, as

anticipated by NPT and SOT, demonstrating a particular disadvantage for Black women in terms of representativeness.

In the base rates task, participants estimated a higher prevalence of men than women, and White than Black people. In line with IC, there was stronger ethnocentric defaulting for men than women and stronger androcentric defaulting for White people than Black people, rendering White men particularly advantaged as the numerical majority.

The salary estimation task results showed higher salary estimations for men than women, and White than Black people. In line with NT, ethnocentric defaulting was similar for both gender categories and androcentric defaulting was similar for both race categories.

Thus, the results of the representativeness task are consistent with the hypothesis issued by NPT/SOT, the base rate findings are in line with the IC, while the salary estimation showed a pattern of findings consistent with the predictions of NT.

The correlation analyses demonstrated that only for “men”, the stronger the representativeness of both the White man and Black man, the higher the estimation of their prevalence in the population. Only for the conceptualization of the Black man for “men”, the weaker the representativeness, the lower the salary estimation.

7. Study 3

7.1 Method

7.1.1 Participants

As determined in the preregistration, we aimed to collect at least 250 South African participants, with a balanced gender sample (male: n = 125, female: n = 125). A filter was used to select participants between the ages of 18 to 40, however, due to the small pool of available participants, the required N = 250 was not met. Hence, the age bracket was incrementally extended, first to 41-50, then 51-70, allowing us to reach N = 305, albeit with an unbalanced gender sample. In line with Study 1 and Study 2 exclusion criteria, 21 participants were excluded due to invalid

responses on the tasks. In line with predetermined demographic criteria, 13 participants were excluded because they did not identify as either male or female (e.g., non-binary), or White/Caucasian (e.g., colored, Black). Two hundred seventy-four remained after exclusion (176 female, 98 male; *Mage* = 32.1, *SD* = 11.5). All participants were currently located in South Africa, with South African nationality, South Africa as their country of birth, and were fluent in English. Two hundred participants identified as heterosexual, 45 identified by a different sexual orientation, 23 reported a gender (e.g., women) instead of a sexual orientation, and 5 did not respond. Participants were paid £1.65 for participation in the study. A sensitivity power analysis ($\alpha = .05$, $1 - \beta = .80$; Cohen's $f = .09$) suggested that a sample size of 417 participants had enough power to detect a small effect size in a within-participants design (Cohen, 1988). Study 3 has been preregistered on OSF at: https://osf.io/zef7x/.

7.1.1 Material and procedure

Study 3 was comprised of the same representativeness ranking task in which a similar number of participants viewed photograph set one ($n = 133$) or set two ($n = 141$), and the same base rates task, the order of the two tasks being randomized. As in Study 1 and Study 2, the salary estimation task was presented last. Participants were given information about the average salary in South Africa as a reference (R23,502, per month, before taxes; Business Tech, 2022).

7.2 Results

7.2.1 Representativeness ranking

Analyses were carried out as in Pilot, Study 1, and Study 2. Means and standard deviations are reported in the figure (see Figure 1).

For "men", the Friedman test was significant, χ^2 (3) = 606.50, $p < .001$. Participants ranked the White man as the most representative, followed by the Black man ($W = 12195$, $p < .001$, $d = -.35$), then the Black woman ($W = 1056$, $p < .001$, $d = -.94$) and, lastly, the White woman ($W = 16458$, $p = .038$, $d = -.13$).

For "women" the Friedman test was significant, $\chi^2(3) = 618.40$, $p < .001$, participants ranked the White woman first, followed by the Black woman ($W = 10164$, $p < .001$, $d = -.46$), then the White man ($W = 1470$, $p < .001$, $d = -.92$), and finally, the Black man ($W = 11798$, $p < .001$, $d = -.37$).

For "Black people" the Friedman test was significant, $\chi^2 (3) = 658.30$, $p < .001$. Participants ranked the Black man as the most representative, followed by the Black woman ($W = 5460.50$, $p < .001$, $d = -.71$), followed by the White man ($W = 341.50$, $p < .001$, $d = -.98$) and the White woman ($W = 16595$, $p = .050$, $d = -.12$) who did not differ in representativeness.

For "White people" the Friedman test was significant $\chi^2 (3) = 677.40$, $p < .001$, participants ranked the White man as the most representative, followed by the White woman ($W = 15561.50$, $p = .004$, $d = -.17$), then the Black woman ($W = 532$, $p < .001$, $d = -.97$), and finally, the Black man ($W = 5168$, $p < .001$, $d = -.72$).

Importantly, the ethnocentric defaulting for women was not significantly stronger than that for men, $W = 2984$, $p = .123$, $d = .16$, but the androcentric defaulting for Black people was stronger than that for White people, $W = 5675$, $p < .001$, $d = .62$ (see Figure 2).

7.2.2 Base rates task

Thirty-eight participants reported base rates whose sum was either below or above 100, and normalized proportions were calculated in the same way as in the previous studies. The main effect of target gender was significant, $F(1, 273) = 31.07$, $p < .001$, $\eta^2 = .02$, indicating that participants estimated a higher percentage of men than women in the population (see Figure 3). The main effect of target race was also significant, $F(1, 273) = 61.27$, $p < .001$, $\eta^2 = .14$, indicating that participants estimated that there are more Black people than White people in the population (see Figure 3). Post hoc analyses (Bonferroni correction) showed that participants estimated more White men than White women ($t(273) = -4.90$, $p < .001$), and more Black men than Black women ($t(273) = -4.17$, $p < .001$) (see Figure 4). Also, participants estimated more Black men than White men ($t(273) = 6.53$, $p < .001$), and more Black women than White women ($t(273) = 8.58$, $p < .001$) (see Figure 4). The

target gender by target race interaction, however, was not significant, $F(1, 273) = 0.54$, $p = .465$, $\eta^2 = .0001$ (see Figure 5).

7.2.3 Salary estimation task

The estimated salaries of the targets were analyzed using the same measures as Study 1 and Study 2. The main effect of gender was significant, $F(1, 273) = 57.62$, $p < .001$, $\eta^2 = .04$, indicating that participants estimated higher salaries for men than women (see Figure 6). The main effect of race was also significant $F(1, 273) = 19.55$, $p < .001$, $\eta^2 = .02$, indicating that participants estimated higher salaries for White people than Black people (see Figure 6). The target gender by target race interaction was significant, $F(1, 273) = 4.96$, $p = .027$, $\eta^2 = .003$. Post hoc analyses (Bonferroni correction) showed that participants estimated higher salaries for White men than White women, $t(273) = 5.21$, $p < .001$, and for Black men than Black women, $t(273) = 8.08$, $p < .001$ (see Figure 7). Also, participants estimated higher salaries for White men than Black men, $t(273) = 3.59$, $p = .002$, and White women than Black women, $t(273) = 4.12$, $p < .001$ (see Figure 7). A paired samples *t*-test showed that the ethnocentric default for men was stronger than that for women, $t(273) = 2.23$, $p = .027$ (see Figure 8). Furthermore, the androcentric default for White people was stronger than that for Black people, $t(273) = 2.23$, $p = .027$ (see Figure 8). Hence, participants estimated that the gender pay gap was more pronounced within White people than Black people and that the race pay gap was more pronounced within men than women.

7.2.4 Correlations

Correlation analyses were carried out as in Study 1 and Study 2. As shown in Table 4, when the referent social category was “men”, the stronger the representativeness of the White man, the higher the estimated proportion of White men in the population. When the referent category was “White people”, the weaker the representativeness of the White woman, the lower estimated salary.

For both Black women and Black men, base rate and salary estimations were correlated such that lower base rate estimations related to lower salary estimations.

7.3 Discussion

Results from the representativeness task showed ethnocentrism in the rankings for both men and women as referent categories, and androcentrism in the rankings for both White and Black people as referent categories. The ethnocentrism of gender categories was displayed in an additive fashion, in line with NT, while the androcentric defaulting for Black people was stronger than that for White people, in line with an interactive pattern, as predicted by NPT/SOT.

In the base rates task, participants estimated a higher prevalence of men than women, similarly for White people and Black people, and Black than White people, similarly for men and women. Hence, an additive pattern favoring men and Black people.

The salary estimation task results showed higher salary estimations for men than women, and White than Black people. In line with IC, there was stronger ethnocentric defaulting for men than women and stronger androcentric defaulting for White than Black people. Hence, a particular advantage in terms of social status for White men was displayed.

In sum, for the representativeness ranking task the ethnocentrism pattern could be explained by NT and androcentrism by NPT/SOT, while the predictions issued from NT were in line with the ethnocentrism and androcentrism displayed in the base rates task, and IC was most relevant for the salary estimation task. The correlation analyses demonstrated that for “men” the stronger the representativeness of the White man the higher their estimated population prevalence, for “White people” the weaker the representativeness of the White woman the lower estimated salary, and for both Black women and Black men lower base rate estimations were correlated with lower salary estimations.

8. General Discussion

Based on prototype theories of category representation, categories are arranged in a hierarchy in which category exemplars have a ranked structure (Rosch & Mervis, 1975; Mervis & Rosch, 1981; Smith & Medin, 1981; Rothbart & John, 1985; Barsalou, 1992; Murphy, 2002). We argued that race categories possess a gender-graded structure in which men are the most prototypical category exemplars, and gender categories display a race-graded category structure in which White people are the most prototypical exemplars (Thomas, Dovidio & West, 2014; Bailey, LaFrance & Dovidio, 2018; Bailey & LaFrance, 2016). Importantly, we further tested predictions derived from the NT vs. SOT/NPT, suggesting that such a gender graded structure is either similar, or disadvantages one specific race category over the other, and that the race graded structure of gender categories is similar, or more pronounced in one specific gender than the other. To our knowledge, this is the first work to directly analyze androcentrism in race category representation and ethnocentrism in gender category representation through the analyses of the gender ranked structure of race categories and the race ranked structure of gender categories, respectively.

Consistently across studies carried out in Italy, the United States, and South Africa, results from the representativeness ranking task indicated that men were judged to be more representative than women of both race categories (i.e., androcentrism), and White people were considered more representative of gender categories than Black people (i.e., ethnocentrism). Hence, both androcentrism and ethnocentrism persisted across diverse cultural contexts.

Importantly, the ranking measure adopted in these studies allowed us to directly compare the magnitude of androcentrism between race categories as well as ethnocentrism between gender categories. Results on the androcentrism of race categories are consistent across studies and cultural contexts. Indeed, differently from predictions rooted in the NT, androcentrism was especially strong in the conceptualization of Black vs. White people. Furthermore, in the Pilot Study conducted in Italy, and Study 2 in the US, ethnocentrism was stronger in the conceptualization of women than men. In Study 1 in Italy and in Study 3 in South Africa, an additive pattern was found, namely,

ethnocentrism was displayed to a similar extent in the conceptualization of both men and women. Taken together, while the androcentrism of race categories is consistently stronger in Black than White people across contexts, the ethnocentric default of gender categories is persistent across contexts but not always stronger in women than in men. Thus, notwithstanding the mixed results of ethnocentrism in gender category representation, the joint pattern of androcentrism of race categories and ethnocentrism of gender categories is closer to the predictions of the NPT/SOT than those of NT.

Our results stemming from the representativeness task corroborate the theoretical and empirical basis for the intersectional "invisibility" of individuals whose memberships stem from the intersection of two non-prototypical categories (Purdie-Vaughns & Eibach, 2008). Additionally, to our knowledge, our research is the first to extend the analyses of the intersectional invisibility of Black women beyond the North American contexts, and provide evidence of the unique category representation of Black women in the Italian and South African context as well. The current analyses of the hierarchical organization of the race and gender categories reveals that Black women appear to be the only category exemplars that are simultaneously ranked as neither typical of their gender nor of their race category. The reduced race typicality of Black women is stronger than that of White women across cultural contexts, and their decreased gender typicality is either maintained by a general ethnocentrism of gender categories (in South Africa and partially in Italy) or further exacerbated by especially "Whitening" the category of women, more so than that of man (in the US, and partially in Italy). Group intersections with multiple subordinate memberships are also viewed as having more unique attributes. Such attributes do not result from a merely additive process of combining the constituent subordinate categories, but rather, render intersections with multiple subordinate memberships less typical with respect to their constituents (Carnaghi et. al, 2022; Preddie & Biernat, 2021; Coles & Pasek, 2020). Similar to older gay men and Black gay men, Black women run the risk of being overlooked (Coladonato et al., 2022; Thomas, Dovidio & West, 2014; Schug, Alt & Klauer, 2015). For example, compared to White women, Black men, and

White men, statements made by Black women in a discussion were most likely to be misattributed to other people (Sesko & Biernat, 2010).

These results contribute to the existing literature by suggesting that when it comes to the prototyping of referent categories with a subordinate (e.g., Black people) vs. dominant (e.g., White people) status, there is a particularly strong tendency to select targets whose referent category (e.g., Black people) intersects with a dominant status category (e.g., men) vs. an additional subordinate status category (e.g., women). This theoretical claim finds additional support in previous research showing that, when it comes to the prototyping of 'older men', a subordinate category, perceivers show stronger heteronormativity (i.e., defaulting to a category with dominant status) than with the sexual orientation prototyping of 'young men' (Carnaghi et al., 2022; Coladonato et al., 2022). Likewise, in the prototyping of 'gay men', a subordinate category, perceivers more strongly default to the intersecting category 'young men '(i.e., category with the dominant status) than when prototyping 'heterosexual men'. In a similar vein, when minority ethnic groups (e.g., Black men, Hispanic men) are categorized as gay (vs. not), they are "Whitened", i.e., the additional, intersecting category of a subordinate status sexual orientation resulted in stronger defaulting to a dominant status racial category (Petsko & Bodenhausen, 2019).

An additional goal of the current research was to ascertain whether the pattern of results in terms of representativeness was related to actual and/or subjective population base rates. For participants in Western countries, base rates consistently appear to be structured upon a heuristic process which overestimates men over women among White people, and White over Black people among men, in line with an illusory correlation process. By contrast, the ethnocentrism, but not the androcentrism, of base rates was reversed with participants in South Africa. In line with previous research on perceivers' inferences concerning base rates from social context, our results suggest that racial base rate estimations were in fact informed by proximal context concerning the numerical status of the categories in question (Lick, Johnson, Rule & Stroessner, 2019). However, differently from research attesting a direct relationship between the perceived prevalence of specific category

exemplars and the prototype of that category, our data do not directly suggest an overt association between these conceptualizations when it comes to race and gender intersectional categories (Locksley, Hepburn & Ortiz, 1982; Locksley, Bordiga, Brekke, & Hepburn, 1980; Kunda & Oleson, 1995). In fact, it appears that contextual variations in base rates concerning race categories do not directly map onto the prototypicality of race by gender category intersections; that is, the prototyping of gender and race intersections appears to be at least partly independent from racial make-up of participants' proximal context.

Lastly, we sought to ascertain whether the manner in which the social status of the category intersections was structured mimics the prototyping structure of race and gender categories. Notwithstanding the ethnocentrism of gender categories and androcentrism of race categories that was found in both the representativeness and social status tasks, the pattern in which these defaults intertwined shows some differences between tasks and across countries (Bailey, LaFrance & Dovidio, 2018; Bem, 1993). Across countries, Black women are particularly overlooked as neither typical of Black people nor of women, while White people and men are considered of high social status across countries, and such defaults interactively advantage White men in Italy and South Africa specifically.

In addition to the comparisons of the pattern of results among the representativeness, base rates, and social status tasks, examining the correlation analyses among these tasks and across cultural contexts allows us to understand the degree of overlap between the specific processes involved. First, results concerning the correlation between the representativeness and the social status task did not consistently show significant associations across studies. Second, with a few exceptions, data from the representativeness tasks are not associated with those of the base-rate tasks. The only significant correlation that was found across studies concerns the association between the enhanced prototypicality of White men for "men" and the inflated perceived prevalence of White men, but with a small correlation coefficient. Also, the association between the increased prototypicality of the White man for "White people" and the inflated prevalence of White

men, was significant in Italy, marginally significant in Study 2 (US) but not in Study 3 (SA). At least in the Western samples, such results are suggestive of the "white male norm" hypothesis, namely that White men are considered to be the norm, by virtue of their representativeness and attributed numerical majority (Zarate & Smith, 1990). However, considering the small correlation coefficient across studies, the relation between representativeness and subjective base rates for White men should be taken with caution.

Looking at the results from a cross-cultural perspective, our work is the first suggesting a distinct manner in which racial and gender disadvantage is cognitively maintained in different country contexts. In Italy, Black women are particularly overlooked when processing their race and gender categories, and their numerical and economic minority status is maintained by the hyper-prevalence and status of White men. In the US, Black women are also rendered particularly cognitively invisible, and White men are also hyper-inflated as a numerical majority, but the high status of White people and men does not result in hyper-privileged social status for White men. In South Africa, the prototypicality of Black women remains especially neglected with respect to both Black people and women, and their low social status is in relation to White men, who, although not a numerical majority, are represented as the most affluent group.

Notwithstanding the relevance of this line of research, several limitations should be acknowledged. Firstly, we acknowledged different patterns of results between, for instance, the representativeness ranking task and the base rate task, to claim that the prototyping and perceived base rates of intersectional categories are in part independent. However, the framing of the representativeness ranking task required that participants consider single social categories (e.g., men) and select a corresponding intersectional image, while the base rates task (and salary estimation task) required that participants compute numerical representations of intersectional groups. Future studies may rely on similar tasks (e.g., ranking of targets in terms of both representativeness and numerical majority status) for assessing both representativeness and base rates of category intersections to minimize the risk that the discrepancy in the observed findings

issued from the two tasks is due to their relative specificities. For a similar reason, social status may be more accurately operationalized in future research by explicitly asking participants about the status of groups (e.g., how prestigious/economically successful/well educated are White women; Fiske, Cuddy, Glick & Xu, 2018), rather than inferring status from salaries. Secondly, countries in the present research were selected with varying racial make-up, but no country contextual variation was possible for social status, in which Black people tend to have higher salaries than White people and men than women. Future research may employ an experimental design with fictitious groups orthogonally described as high vs. low status and majority vs. minority in population prevalence to better investigate the relationship between these variables. Lastly, the present research controlled for potential differences in responses due to participant race by utilizing only White participants. Thus, it remains unclear whether participant race may moderate the ethnocentric default in the prototyping of gender categories. Indeed, the conceptualization of gender categories as White might be magnified in White people relative to people of other racial categories given the preference for same-race relationships and higher familiarity with ingroup over outgroup members (Currarini, Jackson, & Pin, 2009; Judd & Park, 1988).

The present research not only has important theoretical implications, but also practical. Firstly, as the label “Black people” implies a male prototype and “women” implies a White prototype, language usage (e.g., Black women and men) which specifically includes other groups may attenuate invisibility. This might be particularly useful in both media and official communications to help routinize gendered language in racial issues and racial language in gender issues. Some policy making initiatives may seek to reduce inequality through boosting the higher numeric proportions of certain groups, however, our research findings suggest that higher perceived prevalence alone is ineffective in increasing prototypicality. The prototypical dominance of White men would likely be unimpaired by population changes such as those due to higher rates of immigration. However, increasing the numerical representation of groups may still yield social benefits. Public policy interventions may conflate the public at large with the numerical majority,

thus, greater numerical representation of marginalized groups may better facilitate their inclusion as targets of policies. This may be achieved through greater representation of women and people of colour, and particularly women of colour, in representation and policies such as Affirmative Action in educational contexts. Such a goal would be particularly relevant in countries (e.g., Italy and US) where White men are thought of the numerical majority. Furthermore, and especially in countries (e.g., Italy and South Africa) in which White men are perceived to be the most affluent group, policies which focus on income inequality might benefit from considering both how to mitigate the disadvantage of some groups and the extreme advantage of others.

The mental representations we hold of certain groups are incidentally intersectional in a way which tends to jointly privilege the most advantaged groups and obscure the most disadvantaged, across diverse global contexts. By better understanding the underlying pattern in our cognitive processes and their contributing factors we have a better chance of making our representations of people more diverse, realistic, and fair.

Table 1

Correlations between the representativeness ranking of each target with respect to its referent categories and base rates in the Pilot Study

Target	Rep & base rate
Black woman	
Ref: Women	$r = .03$, $p = .700$
Ref: Black people	$r = .10$, $p = .238$
White woman	
Ref: Women	$r = .09$, $p = .282$
Ref: White people	$r = .04$, $p = .674$
Black man	
Ref: Men	$r = -.19$, $p = .030$*
Ref: Black people	$r = -.11$, $p = .190$
White man	
Ref: Men	$r = -.28$, $p < .001$*
Ref: White people	$r = -.21$, $p = .013$*

Note. Spearman's rho correlation between the representativeness ranking (i.e., "Rep") and the corresponding base rate estimates for intersectional targets (e.g., "Black woman") on both their referent categories (i.e., "Ref").

* significance ($p < 0.05$)

Table 2

Correlations between the representativeness ranking of each target with respect to its referent categories and base rates in Study 1

Target	Rep & base rate	Rep & salary	Base rate & salary
Black woman			$r = .18$, $p = .003$*
Ref: Women	$r = -.01$, $p = .819$	$r = -.12$, $p = .057^{+}$	
Ref: Black people	$r = -.05$, $p = .381$	$r = -.16$, $p = .012$*	
White woman			$r = .11$, $p = .070$
Ref: Women	$r = .01$, $p = .821$	$r = -.06$, $p = .325$	
Ref: White people	$r = .05$, $p = .457$	$r = -.02$, $p = .719$	
Black man			$r = -.07$, $p = .258$
Ref: Men	$r = -.03$, $p = .654$	$r = -.09$, $p = .133$	
Ref: Black people	$r = -.04$, $p = .474$	$r = .10$, $p = .091$	
White man			$r = .05$, $p = .399$
Ref: Men	$r = -.12$, $p = .046$*	$r = -.07$, $p = .290$	
Ref: White people	$r = -.13$, $p = .041$*	$r = -.12$, $p = .052^{+}$	

Note. Spearman's rho correlations between representativeness ranking (i.e., "Rep") for each referent social category (i.e., "Ref") and the corresponding base rate estimates and salary estimates for each intersectional target (e.g., Black woman). Pearson's R correlations between base rate estimates and salary estimates for the targets.

* significance ($p < 0.05$)

$^{+}$ $p < 0.06$

Table 3

Correlations between the representativeness ranking of each target with respect to its referent categories and base rates in Study 2

Target	Rep & base rate	Rep & salary	Base rate & salary
Black woman			$r = .06$, $p = .365$
Ref: Women	$r = -.08$, $p = .204$	$r = -.05$, $p = .386$	
Ref: Black people	$r = .003$, $p = .956$	$r = -.06$, $p = .342$	
White woman			$r = .09$, $p = .138$
Ref: Women	$r = -.08$, $p = .166$	$r = -.05$, $p = .375$	
Ref: White people	$r = .08$, $p = .179$	$r = -.01$, $p = .835$	
Black man			$r = .07$, $p = .257$
Ref: Men	$r = -.23$, $p < .001$*	$r = -.16$, $p = .007$*	
Ref: Black people	$r = .03$, $p = .679$	$r = .10$, $p = .118$	
White man			$r = .04$, $p = .506$
Ref: Men	$r = -.20$, $p = .001$*	$r = .002$, $p = .976$	
Ref: White people	$r = -.12$, $p = .058^{+}$	$r = .06$, $p = .364$	

Note. Spearman's rho correlations between the representativeness ranking (i.e., "Rep") of each referent social category (i.e., "Ref") and the corresponding base rate estimates and salary estimates for each intersectional target (e.g., "Black woman"). Pearson's R correlations between base rate estimates and salary estimates for the targets.

* significance ($p < 0.05$)

$^{+}$ $p < 0.06$

Table 4

Correlations between the representativeness ranking of each target with respect to its referent categories and base rates in Study 3

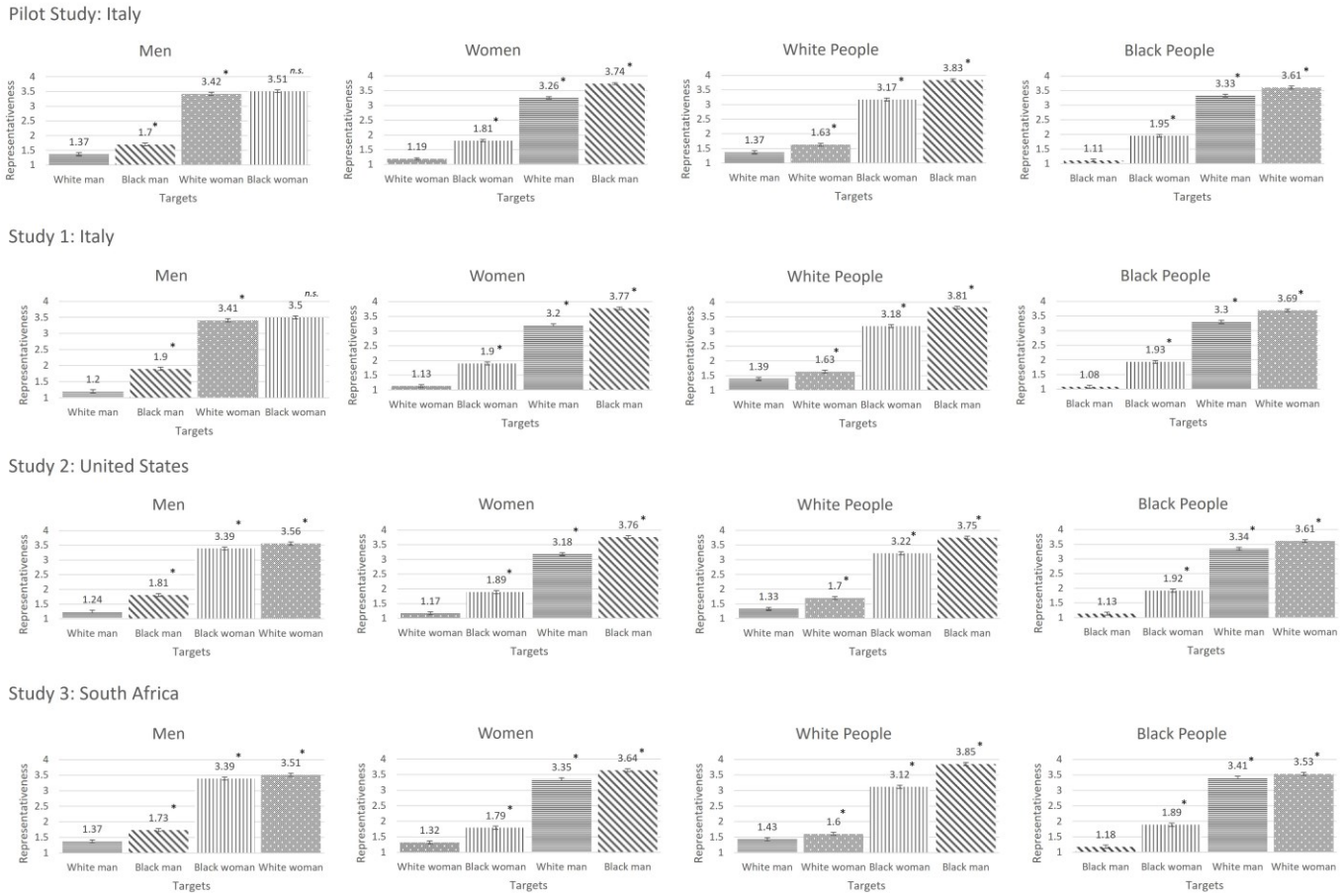
Target	Rep & base rate	Rep & salary	Base rate & salary
Black woman			$r = .15$, $p = .013$*
Ref: Women	$r = -.01$, $p = 1.00$	$r = -.10$, $p = .102$	
Ref: Black people	$r = -.02$, $p = .686$	$r = -.08$, $p = .172$	
White woman			$r = -.04$, $p = .477$
Ref: Women	$r = -.01$, $p = .901$	$r = -.10$, $p = .090$	
Ref: White people	$r = .003$, $p = .965$	$r = .13$, $p = .032$*	
Black man			$r = .13$ $p = .035$*
Ref: Men	$r = -.07$, $p = .278$	$r = -.11$, $p = .077$	
Ref: Black people	$r = .01$, $p = .984$	$r = .03$, $p = .598$	
White man			$r = .01$, $p = .880$
Ref: Men	$r = -.14$, $p = .023$*	$r = -.03$, $p = .667$	
Ref: White people	$r = -.05$, $p = .419$	$r = -.08$, $p = .163$	

Note. Spearman's rho correlations between the representativeness ranking (i.e., "Rep") of each referent social category (i.e., "Ref") and the corresponding base rate estimates and salary estimates for each intersectional target (e.g., "Black woman"). Pearson's R correlations between base rate estimates and salary estimates for the targets.

* significance ($p < 0.05$)

Figure 1

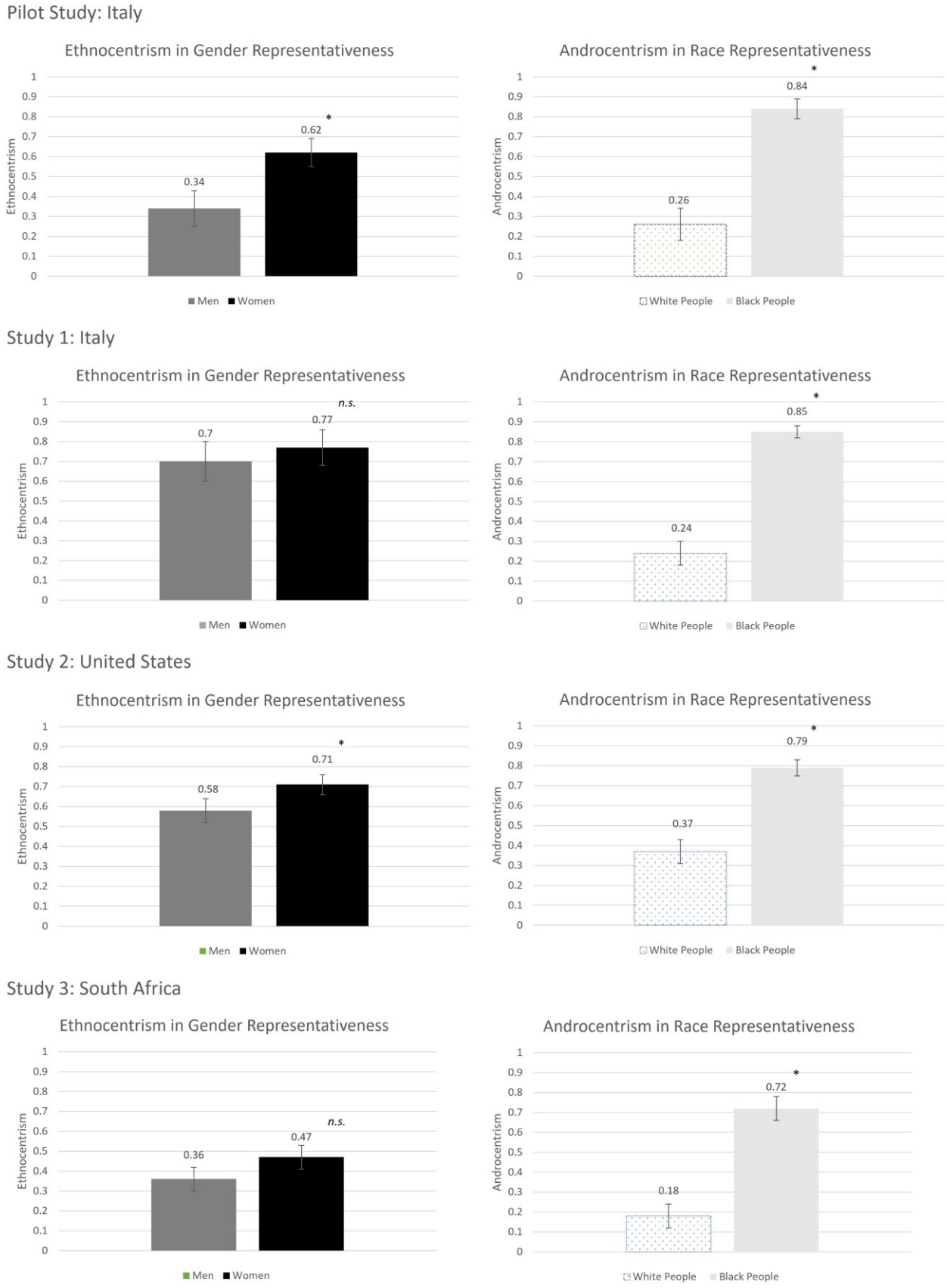
Representativeness rankings of the targets for each referent category across four studies.



Note. Lower mean values (e.g., 1) on the representativeness y-axis indicate greater representativeness with respect to the referent categories. X-axis targets have been arranged from most to least representative. Asterisks indicate statistical significance, while *n.s*. indicates non-significance (Bonferroni correction applied) between the adjacent targets. Graph bars indicate standard error (full details can be viewed on OSF).

Figure 2

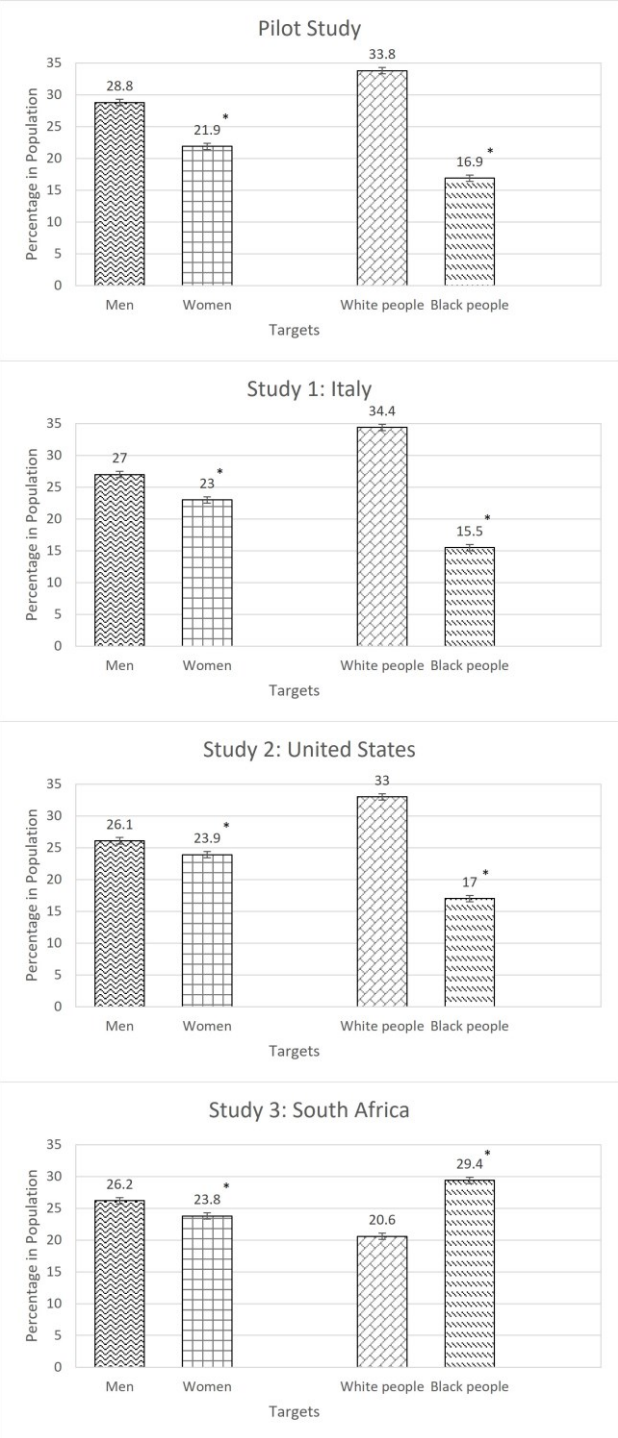
Ethnocentric defaulting averages for men and women and androcentric defaulting averages for White people and Black people in representativeness ranking task, across four studies.



Note. Each bar represents the difference in representativeness ranking of the two consistent targets (e.g., White man and Black man) with respect to the referent category (e.g., men). Means and standard error bars are provided for each referent category. Asterisks indicate a significant difference in ethnocentric or androcentric defaulting between referent categories (e.g., men and women), while *n.s*. indicates non-significance (full details can be viewed on OSF).

Figure 3

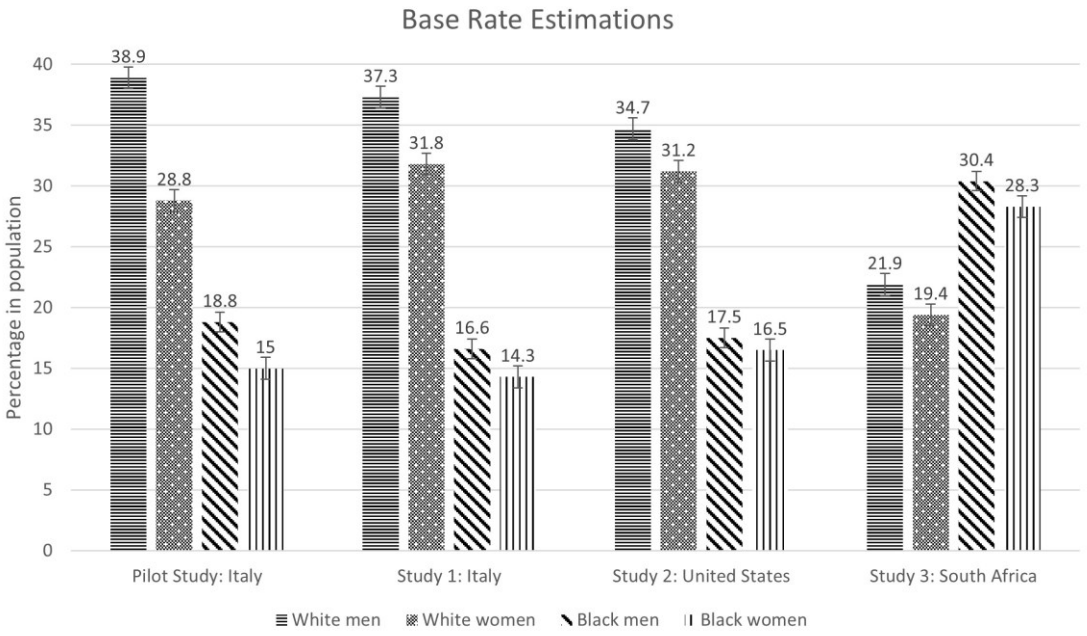
Target gender and target race main effects in the base rate estimation task, across four studies.



Note. Asterisks indicate a significant difference in average base rate estimations between genders (i.e., men and women) and races (e.g., White and Black people) (full details can be viewed on OSF).

Figure 4

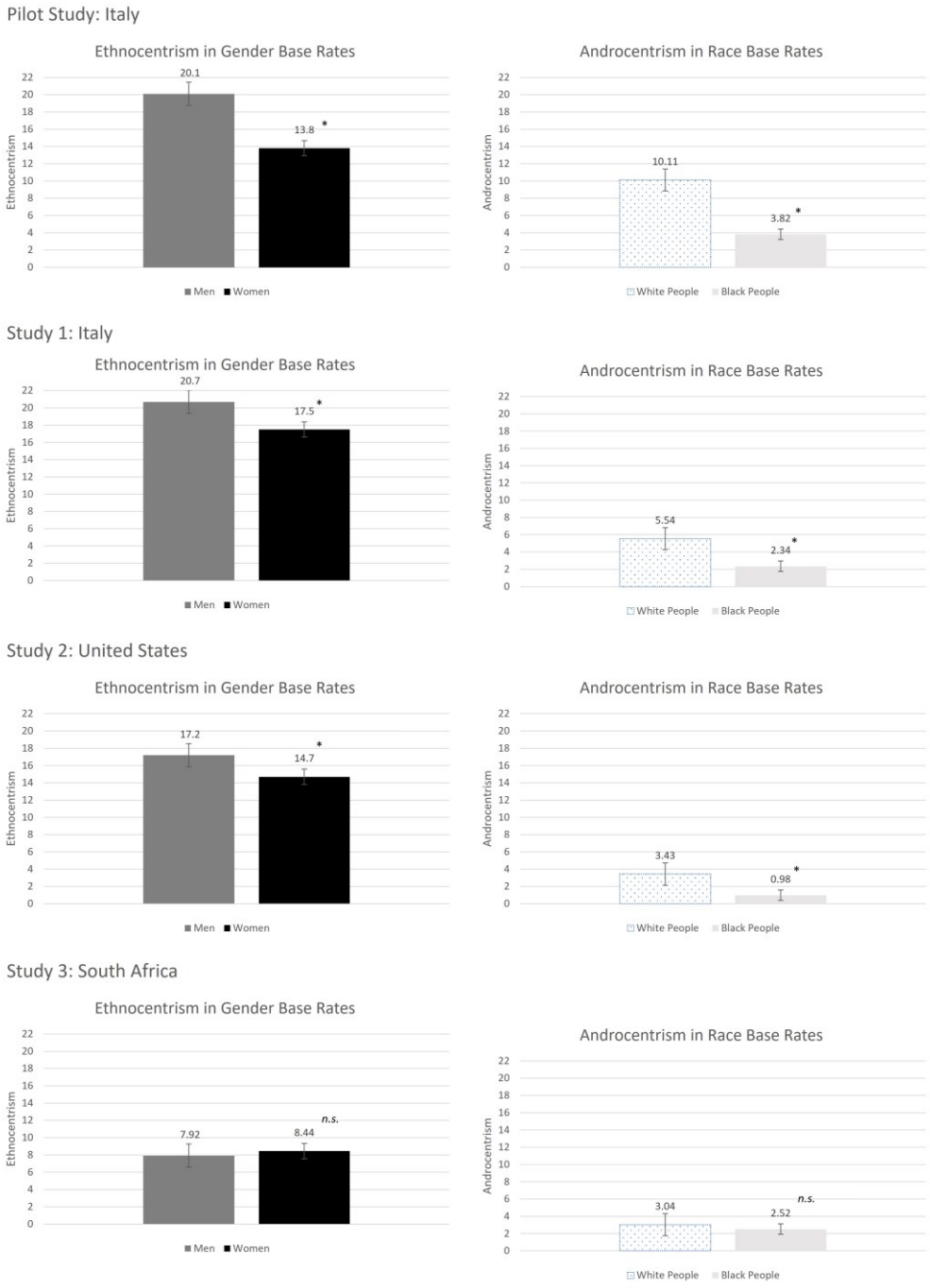
Average base rate estimations for each intersectional category, across four studies.



Note. Means and standard error bars are provided for each intersectional category.

Figure 5

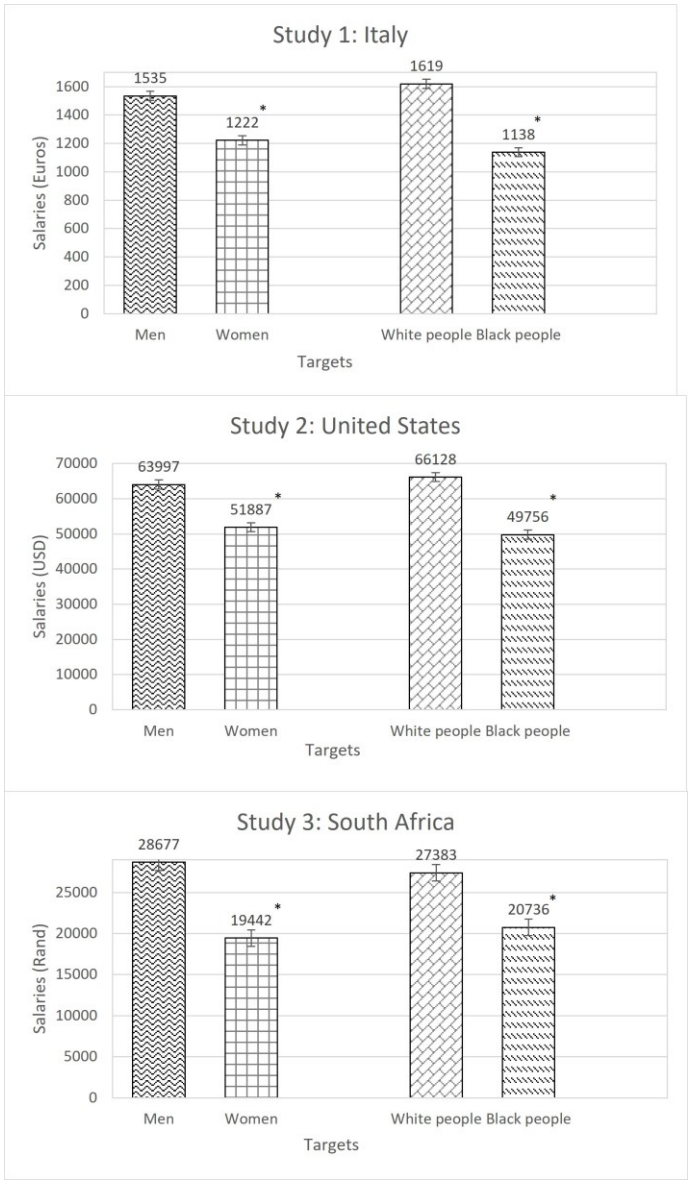
Ethnocentric defaulting averages for men and women as referent categories and androcentric defaulting averages for White people and Black people as referent categories in base rate estimation task, across four studies.



Note. Each bar represents the difference in base rate estimations of the two consistent targets (e.g., White man and Black man) with respect to the referent category (e.g., men). Means and standard error bars are provided for each referent category. Asterisks indicate a significant difference in ethnocentric or androcentric defaulting between referent categories (e.g., men and women) while *n.s*. indicates non-significance (full details can be viewed on OSF).

Figure 6

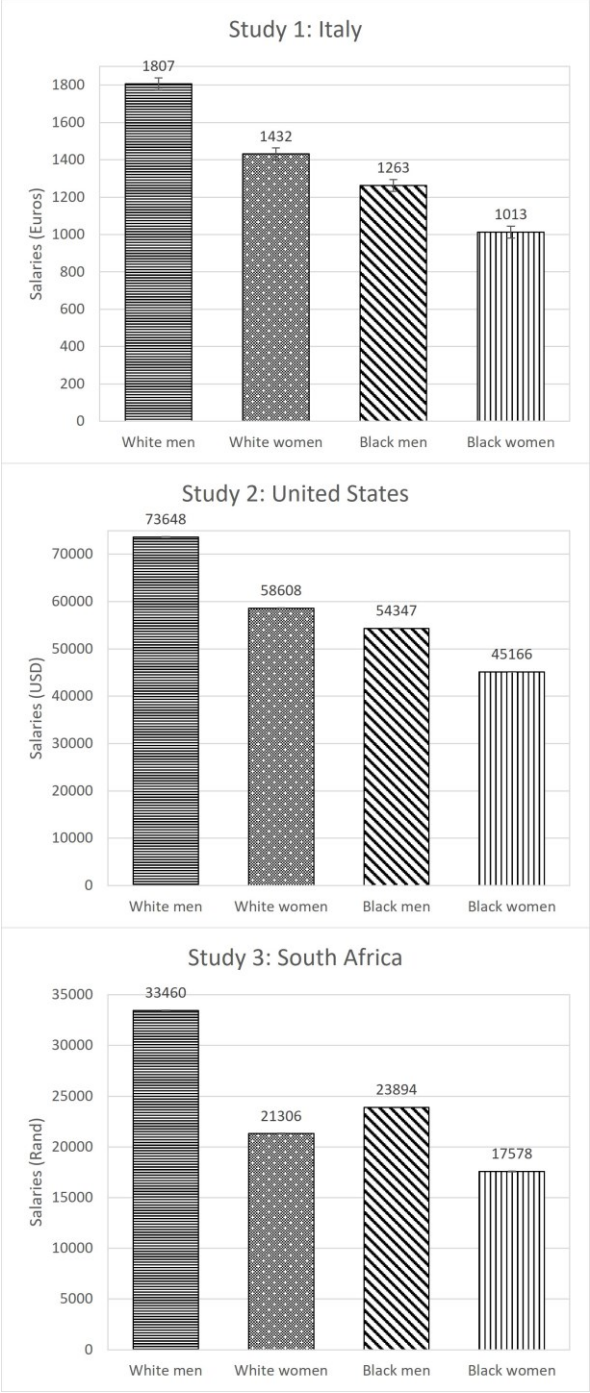
Gender and race main effects in the salary estimation task, across three studies.



Note. Salary information for Italy is presented in euros, per month, after taxes, the United States is in US dollars, per year, before taxes, and South Africa is in South African Rand, per month, before taxes. Asterisks indicate significant differences between genders (i.e., men and women) and races (i.e., White people and Black people) (full details can be viewed on OSF).

Figure 7

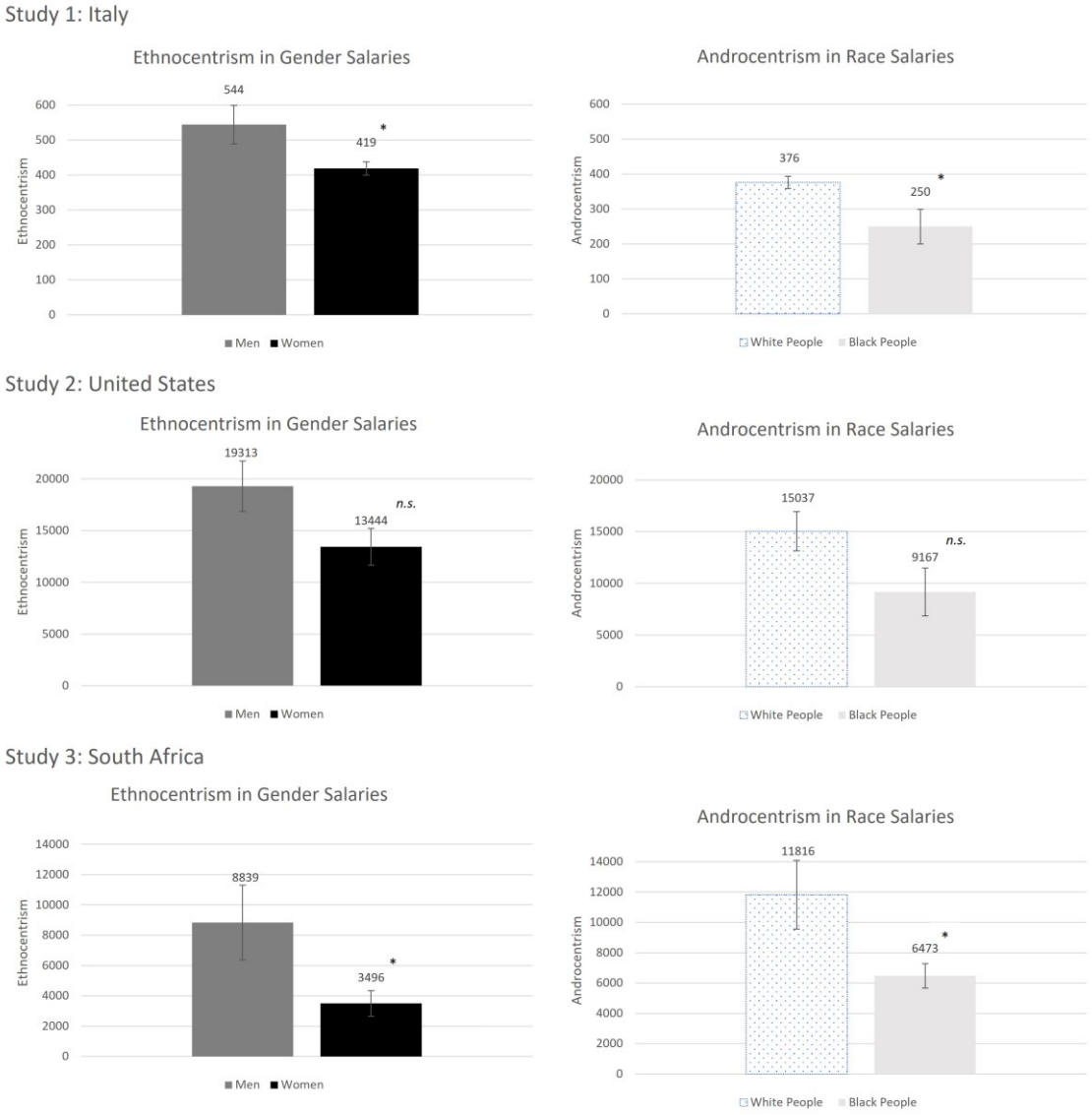
Average salary estimations for each intersectional category, across three studies.



Note. Means and standard error bars are provided for each intersectional category (full details can be viewed on OSF).

Figure 8

Ethnocentric defaulting averages for men and women as referent categories and androcentric defaulting averages for White people and Black people as referent categories in salary estimation task, across three studies.



Note.

Each bar represents the difference in salary estimations of the two consistent targets (e.g., White man and Black man) with respect to the referent category (e.g., men). Means and standard error bars are provided for each referent category. Asterisks indicate a significant difference in ethnocentric or androcentric defaulting between referent categories (e.g., men and women) while *n.s*. indicates non-significance (full details can be viewed on OSF).

9. Supplementary Material

9.1 Inconsistent Targets in Representativeness Ranking Task

First, considering “men” as the referent category, both the White woman and Black woman were equally ranked as the least representative targets in Italy (Pilot and Study 1) thus suggesting that both these targets were mainly processed according to their gender, and perceived to be equally at odds with the category men. By contrast, in the US and South Africa, the Black woman was considered more representative of men than the White woman. Hence, in these countries, the stereotype overlapping model might account for this pattern of results: Black women are considered less feminine/more masculine than White women, which may account for the Black woman being ranked as a more representative example of men than the White woman.

With “women” as the referent category, the White man was ranked as more representative than the Black man across countries (Pilot, Study 1, Study 2, Study 3). Thus, it seems that the normative racial category, i.e., White people, not only guided the ranking of the consistent targets, but also the inconsistent targets.

Considering “Black people” as the referent category, the White man was considered more representative than the White woman in Italy and the US (Pilot, Study 1, Study 2). Therefore, it appears that the normative gender category, i.e., men, shapes the perceived representativeness of the inconsistent targets. By contrast, in South Africa, it seems the gender normativity is weaker, as the White man and the White woman did not differ in their representativeness ranking.

For the referent category “White people”, the Black woman was ranked as more representative than the Black man across countries (Pilot, Study 1, Study 2, Study 3). It appears that the normative gender category, i.e., men, did not account for the perceived representativeness of the inconsistent targets. Extrapolating from stereotype overlapping theory, the strong association between "Black people" and "men" may have resulted in White people preferentially being represented by a Black woman over a Black man.

9.2 Participant Gender Differences

9.2.1 Representativeness Ranking Task

Pilot Study: Italy

It is worth noting that the experimental sample for the pilot study was strongly unbalanced in terms of participant gender (103 women, 37 men), and consisted of a small sample of male participants, thus the following results should be taken with caution given the dependence of the statistical power on the sample size.

Non-parametric Friedman tests were conducted separately for female and male participants for each referent category. If significant, we conducted pairwise comparisons using Wilcoxon rank tests. According to Bonferroni correction, statistical significance was set to 0.05 divided by 3, due to the number of comparisons, resulting in a new threshold of $p < .0167$.

On the referent category "men", for male participants, the Friedman test was significant χ^2 (3) = 86.74, $p < .001$. Specifically, male participants equally ranked the White man and the Black man as the most representative ($W = 296$, $p = .347$, $d = -.16$), followed by both the White woman ($W = 7$, $p < .001$, $d = -.98$) and the Black woman ($W = 333$, $p = .758$, $d = -.05$), who did not significantly differ in ranking. For female participants, on the referent category "men", the Friedman test was significant ($\chi^2 = 219.50$, $p < .001$). Female participants ranked the White man as the most representative, followed by the Black man ($W = 1457$, $p < .001$, $d = -.40$), then both the White woman ($W = 190$, $p < .001$, $d = -.92$), and the Black woman ($W = 2209$, $p = .389$, $d = -.09$), who did not significantly differ in rankings.

On the referent category "women", for male participants, the Friedman test was significant χ^2 (3) = 94.72, $p < .001$. Specifically, male participants ranked the White woman as the most representative, followed by the Black woman ($W = 190$, $p = .005$, $d = -.46$), then the White man ($W = 0$, $p < .001$, $d = -1.00$), and lastly, the Black man ($W = 152$, $p < .001$, $d = -.57$). For female participants, on the referent category "women", the Friedman test was significant ($\chi^2 = 257.40$, $p < .001$). Female participants ranked the White woman as the most representative, followed by the Black woman (*W*

= 800, $p < .001$, $d = -.68$), then the White man ($W = 33.50$, $p < .001$, $d = -.99$), and lastly, the Black man ($W = 1450$, $p < .001$, $d = -.43$).

For "Black people", for male participants, the Friedman test was significant χ^2 (3) = 99.45, $p < .001$, and participants ranked the Black man as more representative than the Black woman ($W = 38.0$, $p < .001$, $d = -.89$), followed by the White man ($W = 0$, $p < .001$, $d = -1.00$), and finally, the White woman ($W = 209$, $p = .014$, $d = -.41$). For female participants, for "Black people", the Friedman test was significant ($\chi^2 = 242.60$, $p < .001$), and participants ranked the Black man as more representative than the Black woman ($W = 454.50$, $p < .001$, $d = -.82$), followed by both the White man ($W = 62$, $p < .001$, $d = -.98$) and the White woman ($W = 2020$, $p = .046$, $d = -.20$).

For "White people", for male participants, the Friedman test was significant χ^2 (3) = 94.07, $p < .001$. Male participants ranked the White man as similarly representative compared to the White woman ($W = 247$, $p = .072$, $d = -.30$), then the Black woman ($W = 0$, $p < .001$, $d = -1$), followed by the Black man ($W = 133$, $p < .001$, $d = -.62$). For female participants, for "White people", the Friedman test was significant ($\chi^2 = 255.90$, $p < .001$). Female participants ranked the White man the most representative, followed by the White woman ($W = 1868.50$, $p = .009$, $d = -.26$), then the Black woman ($W = 0$, $p < .001$, $d = -1$), followed by the Black man ($W = 808$, $p < .001$, $d = -.68$).

In sum, the only difference in representative rankings for consistent targets based on participant gender was for "men": male participants ranked the White man and Black man as similarly representative, while female participants selected the White man. For inconsistent targets, for "Black people", male participants ranked the White man as more representative than the White woman, while female participants similarly ranked these targets.

For each referent category, we compared the ranking of each target made by male and female participants by using Welch's independent *t*-test. Results showed there were no significant differences in the representativeness ranking scores of each target (e.g., Black man) on each referent category (e.g., Black people) (see Table 2).

Study 1: Italy

The same analysis procedure as that in the Pilot was utilized for Study 1.

For "men", for male participants, the Friedman test was significant ($\chi^2 = 293.90$, $p < .001$). Participants ranked the White man as the most representative, followed by the Black man ($W = 1650.50$, $p < .001$, $d = -.61$), followed by the White woman ($W = 410.50$, $p < .001$, $d = -.90$), finally, the Black woman ($W = 3324.50$, $p = .015$, $d = -.22$). For female participants, the Friedman test was significant ($\chi^2 = 312.60$, $p < .001$). Female participants ranked the White man as the most representative, followed by the Black man ($W = 1206.50$, $p < .001$, $d = -.72$), followed by both the White woman ($W = 192.50$, $p < .001$, $d = -.95$) and the Black woman ($W = 4480$, $p = .557$, $d = .05$), who did not significantly differ in rankings.

For "women", for male participants, the Friedman test was significant ($\chi^2 = 329.20$, $p < .001$). Specifically, male participants ranked the White woman as the most representative, followed by the Black woman ($W = 1244.50$, $p < .001$, $d = -.71$), then the White man ($W = 43$, $p < .001$, $d = -.99$), and lastly, the Black man ($W = 2423.50$, $p < .001$, $d = -.43$). For female participants, on the referent category "women", the Friedman test was significant ($\chi^2 = 352.20$, $p < .001$). Female participants ranked the White woman as the most representative, followed by the Black woman ($W = 715$, $p < .001$, $d = -.83$), then the White man ($W = 127$, $p < .001$, $d = -.97$), and lastly, the Black man ($W = 1235$, $p < .001$, $d = -.71$).

For "Black people", for male participants, the Friedman test was significant ($\chi^2 = 336.30$, $p < .001$), and participants ranked the Black man as more representative than the Black woman ($W = 851.50$, $p < .001$, $d = -.80$), followed by the White man ($W = 107.00$, $p < .001$, $d = -.98$) and lastly, the White woman ($W = 2227$, $p < .001$, $d = -.48$). For female participants, for "Black people" the Friedman test was significant ($\chi^2 = 346.70$, $p < .001$), and participants ranked the Black man as more representative than the Black woman ($W = 458.50$, $p < .001$, $d = -.89$), followed by the White man ($W = 0$, $p < .001$, $d = -1.00$), and finally, the White woman ($W = 2947.50$, $p < .001$, $d = -.31$).

For "White people", for male participants, the Friedman test was significant ($\chi^2 = 328.30$, $p < .001$). Male participants ranked the White man as similarly representative compared to the White woman

($W = 3668$, $p = .115$, $d = -.14$), then the Black woman ($W = 0$, $p < .001$, $d = -1$), followed by the Black man ($W = 1572$, $p < .001$, $d = -.63$). For female participants, for "White people", the Friedman test was significant ($\chi^2 = 322.50$, $p < .001$). Female participants ranked the White man the most representative, followed by the White woman ($W = 2816.50$, $p < .001$, $d = -.34$), then the Black woman ($W = 128.50$, $p < .001$, $d = -.97$), followed by the Black man ($W = 1572$, $p < .001$, $d = -.63$).

There was no significant difference between female and male participants in the rankings of targets that are consistent with their referent categories (e.g., the Black woman and White woman for the referent category "women"). Not crucial to the central hypotheses, the only participant gender difference that emerged was related to the ranking of targets that are inconsistent (i.e., the Black woman and the White woman) with the referent category "men". For the referent category "men", male participants ranked the White woman target ($M = 3.32$, $SE = 0.05$) as significantly more representative than the Black woman target ($M = 3.55$, $SE = 0.05$; $p = .004$), while female participants did not rank the White woman target ($M = 3.49$, $SE = 0.05$) as significantly different in representativeness than the Black woman target ($M = 3.44$, $SE = 0.05$; $p = .45$)

For each referent category, we compared the ranking of each target made by male and female participants by using Welch's independent *t*-test (see Table 3 for details). The only differences that emerged related to the inconsistent targets: male participants indicated that the White woman was more representative of men than female participants, and for the referent category "women", female participants indicated that the White man is more representative than male participants, while male participants indicated that the Black man is more representative than female participants.

Study 2: United States

The same analysis procedure as that in the Pilot and Study 1 was utilized for Study 2.

For "men", for male participants, the Friedman test was significant ($\chi^2 = 327.20$, $p < .001$). Participants ranked the White man as the most representative, followed by the Black man ($W = 1653$, $p < .001$, $d = -.65$), followed by both the White woman ($W = 136$, $p < .001$, $d = -.97$) and the

Black woman ($W = 5400.50$, $p = .065$, $d = .16$), who did not significantly differ. For female participants, the Friedman test was significant ($\chi^2 = 322.50$, $p < .001$). Female participants ranked the White man as the most representative, followed by the Black man ($W = 2445$, $p < .001$, $d = -.47$), followed by both the White woman ($W = 63$, $p < .001$, $d = -.99$) and the Black woman ($W = 5413.50$, $p = .040$, $d = .18$), who did not significantly differ in rankings.

For "women", for male participants, the Friedman test was significant ($\chi^2 = 334.80$, $p < .001$). Specifically, male participants ranked the White woman as the most representative, followed by the Black woman ($W = 1340$, $p < .001$, $d = -.71$), then the White man ($W = 379.50$, $p < .001$, $d = -.92$), and lastly, the Black man ($W = 2227.50$, $p < .001$, $d = -.52$). For female participants, on the referent category "women", the Friedman test was significant ($\chi^2 = 347.40$, $p < .001$). Female participants ranked the White woman as the most representative, followed by the Black woman ($W = 1485$, $p < .001$, $d = -.68$), then the White man ($W = 242.50$, $p < .001$, $d = -.95$), and lastly, the Black man ($W = 1742$, $p < .001$, $d = -.62$).

For "Black people", for male participants, the Friedman test was significant ($\chi^2 = 331.50$, $p < .001$), and participants ranked the Black man as more representative than the Black woman ($W = 1139.50$, $p < .001$, $d = -.76$), followed by the White man ($W = 227$, $p < .001$, $d = -.95$) and lastly, the White woman ($W = 3283.50$, $p < .001$, $d = -.30$). For female participants, for "Black people" the Friedman test was significant ($\chi^2 = 341.80$, $p < .001$), and participants ranked the Black man as more representative than the Black woman ($W = 952$, $p < .001$, $d = -.79$), followed by the White man ($W = 39$, $p < .001$, $d = -.99$), and finally, the White woman ($W = 3604$, $p = .013$, $d = -.22$).

For "White people", for male participants, the Friedman test was significant ($\chi^2 = 318.80$, $p < .001$). Male participants ranked the White man as the most representative, followed by the White woman ($W = 3325.50$, $p = .001$, $d = -.29$), then the Black woman ($W = 62$, $p < .001$, $d = -.99$), followed by the Black man ($W = 2701$, $p < .001$, $d = -.42$). For female participants, for "White people", the Friedman test was significant ($\chi^2 = 344.80$, $p < .001$). Female participants ranked the White man the most representative, followed by the White woman ($W = 2632.50$, $p < .001$, $d = -.43$), then the

Black woman ($W = 37.50$, $p < .001$, $d = -.99$), followed by the Black man ($W = 1755$, $p < .001$, $d = -.62$).

In sum, the representativeness rankings of targets did not differ between male and female participants for any referent categories.

For each referent category, we compared the ranking of each target made by male and female participants by using Welch's independent *t*-test (see Table 4). There was no significant difference between female and male participants in the rankings of targets that are consistent with their referent categories (e.g., the Black woman and White woman for the referent category "women"). Not crucial to the central hypotheses, the only significant participant gender difference in ranking that emerged was related to the targets that are inconsistent with the referent category "White people": male participants ranked the Black man target ($M = 3.68$, $SE = 0.05$) as significantly more representative of White people than female participants did ($M = 3.81$, $SE = 0.03$, $W = 2.12$, $p = .035$, $d = .26$).

Study 3: South Africa

The same analysis procedure as that in the Pilot, Study 1, and Study 2 was utilized for Study 3. For "men", for male participants, the Friedman test was significant ($\chi^2 = 215$, $p < .001$). Participants ranked the White man as the most representative, followed by the Black man ($W = 1649$, $p = .002$, $d = -.32$), followed by both the White woman ($W = 93$, $p < .001$, $d = -.96$) and the Black woman ($W = 2377.50$, $p = .848$, $d = .02$), who did not significantly differ. For female participants, the Friedman test was significant ($\chi^2 = 392.10$, $p < .001$). Female participants ranked the White man as the most representative, followed by the Black man ($W = 4900$, $p < .001$, $d = -.37$), followed by both the White woman ($W = 513$, $p < .001$, $d = -.93$) and the Black woman ($W = 6336$, $p = .014$, $d = .19$), who did not significantly differ in rankings.

For "women", for male participants, the Friedman test was significant ($\chi^2 = 226$, $p < .001$). Specifically, male participants ranked the White woman as the most representative, followed by the Black woman ($W = 1138.50$, $p < .001$, $d = -.53$), then the White man ($W = 134$, $p < .001$, $d = -.94$),

and lastly, the Black man ($W = 1407.50$, $p < .001$, $d = -.42$). For female participants, on the referent category "women", the Friedman test was significant ($\chi^2 = 392.70$, $p < .001$). Female participants ranked the White woman as the most representative, followed by the Black woman ($W = 4499$, $p < .001$, $d = -.42$), then the White man ($W = 702.50$, $p < .001$, $d = -.91$), and lastly, the Black man ($W = 5075$, $p < .001$, $d = -.34$).

For "Black people", for male participants, the Friedman test was significant ($\chi^2 = 248$, $p < .001$), and participants ranked the Black man as more representative than the Black woman ($W = 245$, $p < .001$, $d = -.90$), followed by both the White man ($W = 28.50$, $p < .001$, $d = -.99$) and the White woman ($W = 2156$, $p = .275$, $d = -.11$) who did not significantly differ. For female participants, for "Black people" the Friedman test was significant ($\chi^2 = 412$, $p < .001$), and participants ranked the Black man as more representative than the Black woman ($W = 3080$, $p < .001$, $d = -.60$), followed by both the White man ($W = 167$, $p < .001$, $d = -.98$), and the White woman ($W = 6826$, $p = .103$, $d = -.12$).

For "White people", for male participants, the Friedman test was significant ($\chi^2 = 232.30$, $p < .001$). Male participants ranked the White man as the most representative, followed by the White woman ($W = 1831.50$, $p = .015$, $d = -.24$), then the Black woman ($W = 169$, $p < .001$, $d = -.93$), followed by the Black man ($W = 742.50$, $p < .001$, $d = -.69$). For female participants, for "White people", the Friedman test was significant ($\chi^2 = 445.50$, $p < .001$). Female participants tended to rank the White man as more representative than the White woman ($W = 6738$, $p = .075$, $d = -.14$) albeit this difference was not significant, then the Black woman ($W = 42.50$, $p < .001$, $d = -.99$), followed by the Black man ($W = 2001$, $p < .001$, $d = -.74$).

In summary, the only participant gender difference in representativeness ranking emerged for "White people": while male participants ranked the White man as the most representative, female participants similarly ranked the White man and White woman.

For each referent category, we compared the target rankings by male and female participants using Welch's independent *t*-test (see Table 5). The only participant differences emerged for the referent

category “Black people”: male participants ranked the Black man as more representative than the female participants did, and female participants ranked the Black woman as more representative than male participants did.

Summary: Participant differences in representativeness ranking task

As indicated at the beginning of this section, the Pilot Study was not designed to test participant gender differences, which is reflected by the fact that the sample was not balanced between male and female participants and the number of male participants was particularly small. Hence, looking at Study 1-3, in which the samples were more balanced in terms of participant gender, the patterns of results reported in the main document were largely replicated in both male and female participants, with the only exceptions being Italian male participants and South African female participants, both of which conceptualized White men and White women as being similarly representative of White people.

9.2.2 Base Rates Task

Pilot Study: Italy

To assess the role of participant gender in the base rates task a 2 (target gender: man, woman) x 2 (target race: Black, White) X 2 (participant gender: male, female) ANOVA was used, with the former two variables as within-subject factors, and the latter variable as a between-subject variable. The main effect of target gender was significant, $F(1, 136) = 42.31$, $p < .001$, $\eta^2 = .05$. Marginal means indicated that participants estimated that in the general population there are more men ($M = 28.31$, $SE = 0.58$) than women ($M = 22.62$, $SE = 0.46$). The main effect of target race was significant, $F(1, 136) = 213.58$, $p < .001$, $\eta^2 = .37$. Participants estimated that in the general population there are more White ($M = 33.43$, $SE = 0.60$) than Black people ($M = 17.49$, $SE = 0.63$). Moreover, the target gender by target race interaction was significant, $F(1, 136) = 12.57$, $p < .001$, $\eta^2 = .008$. Post hoc analyses (Bonferroni correction) showed that participants estimated more White men ($M = 37.46$, $SE = 1.13$) than White women ($M = 29.40$, $SE = 0.66$) ($t(136) = 5.70$, $p < .001$), and more Black men ($M = 19.16$, $SE = 0.72$) than Black women ($M = 15.83$, $SE = 0.70$) ($t(136) =$

5.11, $p < .001$). Also, participants estimated more White men than Black men ($t(136) = 12.24$, $p < .001$), and more White women than Black women ($t(136) = 13.35$, $p < .001$).

The target gender by target race by participant gender interaction was also significant, $F(1, 136) = 5.14$, $p = .025$, $\eta^2 = .003$. First, no difference occurred between male and female participants in the estimation of White men ($M = 34.44$, $SE = 1.94$; $M = 40.48$, $SE = 1.17$, for male and female participants respectively; $t(136) = 2.67$, $p = .239$), for White women ($M = 30.87$, $SE = 1.13$; $M = 27.93$, $SE = 0.69$, for male and female participants respectively; $t(136) = 2.22$, $p = .789$), for Black men ($M = 19.62$, $SE = 1.23$; $M = 18.69$, $SE = 0.74$, for male and female participants respectively; $t(136) = 0.65$, $p = 1.000$), or for Black women ($M = 17.77$, $SE = 1.21$; $M = 13.89$, $SE = 0.73$, for male and female participants respectively; $t(136) = 2.75$, $p = .190$).

Moreover, to gain a better understanding of the three-way interactions, we analyzed the estimates among female participants first. Female participants estimated a higher prevalence of White men than White women $t(136) = 8.57$, $p < .001$, and of Black men than Black women $t(136) = 7.12$, $p < .001$. Also, they estimated a higher prevalence of White men than Black men $t(136) = 14.08$, $p < .001$, and of White women than Black women $t(136) = 13.33$, $p < .001$.

For male participants, they estimated a similar prevalence of White men and White women $t(136) = 1.47$, $p = 1.000$, and of Black men and Black women $t(136) = 1.67$, $p = 1.000$. Also, they estimated a higher prevalence of White men than Black men $t(136) = 5.79$, $p < .001$, and of White women than Black women $t(136) = 7.53$, $p < .001$.

Study 1: Italy

To assess the role of participant gender in the base rates task a 2 (target gender: man, woman) x 2 (target race: Black, White) X 2 (participant gender: male, female) ANOVA was used, with the former two variables as within-subject factors, and the latter variable as a between-subject variable. The main effect of target gender was significant, $F(1, 258) = 54.97$, $p < .001$, $\eta^2 = .02$. Marginal means indicated that participants estimated that in the general population there are more men ($M = 26.97$, $SE = 0.27$) than women ($M = 23.03$; $SE = 0.27$). The main effect of target race was

significant, $F(1, 258) = 421.59$, $p < .001$, $\eta^2 = .50$. Participants estimated that in the general population there are more White ($M = 34.55$, $SE = 0.46$) than Black people ($M = 15.45$, $SE = 0.46$). Moreover, the target gender by target race interaction was significant, $F(1, 258) = 14.07$, $p < .001$, $\eta^2 = .004$. Post hoc analyses (Bonferroni correction) showed that participants estimated more White men ($M = 37.31$, $SE = 0.72$) than White women ($M = 31.78$, $SE = 0.54$) ($t(258) = 6.45$, $p < .001$), and more Black men ($M = 16.63$, $SE = 0.50$) than Black women ($M = 14.28$, $SE = 0.52$) ($t(258) = 5.36$, $p < .001$). Also, participants estimated more White men than Black men ($t(258) = 18.51$, $p < .001$), and more White women than Black women ($t(258) = 19.06$, $p < .001$).

The Target Gender x Participant Gender interaction, $F(1, 258) = 0.39$, $p = .53$, $\eta^2 = .000$ and the Target Race x Participant Gender interaction, $F(1, 258) = 0.01$, $p = .94$, $\eta^2 = .000$ were not significant.

The Target Gender x Target Race x Participant Gender interaction, however, was significant $F(1, 258) = 5.42$, $p = .021$, $\eta^2 = .001$. Post hoc comparisons were carried out (Bonferroni correction method), and the marginal means were reported. Male and female participants did not estimate significantly different base rates for White men (female: $M = 38.01$, $SE = 1.01$; male: $M = 36.62$, $SE = 1.01$; $t(258) = 0.98$, $p = 1.000$), White women (female: $M = 31.15$, $SE = 0.76$; male: $M = 32.40$, $SE = 0.76$; $t(258) = -1.17$, $p = 1.000$), Black men (female: $M = 16.26$, $SE = 0.71$; male: $M = 16.99$, $SE = 0.71$; $t(258) = -0.73$, $p = 1.000$), or Black women (female: $M = 14.58$, $SE = 0.74$; male: $M = 13.99$, $SE = 0.74$; $t(258) = 0.56$, $p = 1.000$).

Moreover, and to gain a better understanding of the three-way interactions, we analyzed the estimates among female participants first. Female participants estimated a higher prevalence of White men than White women, $t(258) = 5.66$, $p < .001$, but a similar prevalence of Black men and Black women, $t(258) = 2.72$, $p = .193$. Also, they estimated a higher prevalence of White men than Black men, $t(258) = 13.76$, $p < .001$, and of White women than Black women $t(258) = 12.77$, $p < .001$. For male participants, they estimated a higher prevalence of White men than White women, $t(258) = 3.47$, $p = .017$, and of Black men than Black women $t(258) = 4.85$, $p < .001$. Also, they

estimated a higher prevalence of White men than Black men $t(258) = 12.42$, $p < .001$, and of White women than Black women $t(258) = 14.18$, $p < .001$.

Study 2: United States

To assess the role of participant gender in the base rates task a 2 (target gender: man, woman) x 2 (target race: Black, White) X 2 (participant gender: male, female) ANOVA was used, with the former two variables as within-subject factors, and the latter variable as a between-subject variable. The main effect of target gender was significant, $F(1, 269) = 35.37$, $p < .001$, $\eta^2 = .01$. Marginal means indicated that participants estimated that in the general population there are more men ($M = 26.10$, $SE = 0.19$) than women ($M = 23.90$; $SE = 0.19$). The main effect of target race was significant, $F(1, 269) = 455.35$, $p < .001$, $\eta^2 = .53$. Participants estimated that in the general population there are more White ($M = 32.96$, $SE = 0.37$) than Black people ($M = 17.04$, $SE = 0.37$). Moreover, the target gender by target race interaction was significant, $F(1, 269) = 15.59$, $p < .001$, $\eta^2 = .003$. Post hoc analyses (Bonferroni correction) showed that participants estimated more White men ($M = 34.68$, $SE = 0.51$) than White women ($M = 31.24$, $SE = 0.45$) ($t(269) = 5.61$, $p < .001$), and more Black men ($M = 17.53$, $SE = 0.41$) than Black women ($M = 16.55$, $SE = 0.40$) ($t(269) = 3.20$, $p = .009$). Also, participants estimated more White men than Black men ($t(269) = 20.25$, $p < .001$), and more White women than Black women ($t(269) = 19.13$, $p < .001$).

The Target Race x Participant Gender interaction, $F(1, 269) = 12.38$, $p < .001$, $\eta^2 = .01$ was significant. Post hoc comparisons were carried out (Bonferroni correction method), and the marginal means were reported. Male participants estimated a higher prevalence of White people ($M = 34.3$, $SE = 0.53$) than female participants ($M = 31.6$, $SE = 0.53$), $t(269) = 3.52$, $p = .003$. Male participants estimated a lower prevalence of Black people ($M = 15.7$, $SE = 0.53$) than female participants ($M = 18.4$, $SE = 0.53$), $t(269) = 3.52$, $p = .003$. Moreover, male participants reported a higher prevalence of White than Black people $t(269) = 17.61$, $p < .001$, female participants also reported a higher prevalence of White than Black people $t(269) = 12.58$, $p < .001$.

The Target Gender x Participant Gender interaction, $F(1, 269) = 2.15$, $p = .144$, $\eta^2 = .001$, and the Target Gender x Target Race x Participant Gender interaction were not significant $F(1, 269) = 0.70$, $p = .404$, $\eta^2 = .000$.

Study 3: South Africa

To assess the role of participant gender in the base rates task a 2 (target gender: man, woman) x 2 (target race: Black, White) X 2 (participant gender: male, female) ANOVA was used, with the former two variables as within-subject factors, and the latter variable as a between-subject variable. The main effect of target gender was significant, $F(1, 272) = 20.84$, $p < .001$, $\eta^2 = .01$. Marginal means indicated that participants estimated that in the general population there are more men ($M = 26.17$, $SE = 0.26$) than women ($M = 23.83$, $SE = 0.26$). The main effect of target race was significant, $F(1, 272) = 64.47$, $p < .001$, $\eta^2 = .15$. Participants estimated that in the general population there are more Black ($M = 29.36$, $SE = 0.54$) than White people ($M = 20.64$, $SE = 0.54$). The interaction between target gender and participant gender was significant $F(1, 272) = 9.06$ $p = .003$, $\eta^2 = .005$. Post hoc comparisons were carried out (Bonferroni correction method), and the marginal means were reported. Male participants estimated a higher prevalence of women ($M = 24.60$, $SE = 0.41$) than female participants ($M = 23.06$, $SE = 0.31$) $t(272) = 3.01$, $p = .017$. Male participants estimated a lower prevalence of men ($M = 25.40$, $SE = 0.41$) than female participants ($M = 26.94$, $SE = 0.31$), $t(272) = 3.01$, $p = .017$. Female participants estimate a higher prevalence of men than women $t(272) = 6.33$, $p < .001$, while male participants estimate a similar prevalence of men and women $t(272) = 0.97$, $p = 1.000$.

The interaction between target gender and target race was not significant $F(1, 272) = 0.23$, $p = .631$, $\eta^2 = .000$. Also, the interaction between target gender and target race and participant gender was not significant $F(1, 272) = .60$, $p = .439$, $\eta^2 = .000$.

Summary: Participant differences in base rates task

In conclusion, as already acknowledged, the imbalance in the samples of male and female participants in the Pilot study and the small number of male participants, prevents us from drawing strong inferences about participant gender differences in base rates. In Study 1 and Study 2, the target race by target gender interaction which was reported in the main document was replicated when participant gender was included as a between participant factor in the ANOVAs. The only case in which participant gender qualified this interaction was in Study 1. The estimated base rates for each intersectional group did not significantly differ between male and female participants, but the hyper-prevalence of White men within White people and within men was particularly pronounced in estimates made by female compared to male participants. In Study 3, the target race by participant gender interaction was not significant, as in the main document, and it was not further qualified by participant gender.

9.2.3 Salary Estimation Task

Study 1: Italy

To assess the role of participant gender in the salary estimation task a 2 (target gender: man, woman) x 2 (target race: Black, White) X 2 (participant gender: male, female) ANOVA was used, with the former two variables as within-subject factors, and the latter variable as a between-subject variable.

The main effect of target gender was significant, $F(1, 258) = 141.68$, $p < .001$, $\eta^2 = .07$. Marginal means indicated that participants estimated that men ($M = 1535$, $SE = 29.22$) have higher salaries than women ($M = 1222$, $SE = 15.59$). The main effect of target race was significant, $F(1, 258) = 229.02$, $p < .001$, $\eta^2 = .17$. Participants estimated that White people ($M = 1619$, $SE = 15.97$) have higher salaries than Black people ($M = 1138$, $SE = 31.65$).

Additionally, the target gender by target race interaction was significant, $F(1, 258) = 5.82$, $p = .017$, $\eta^2 = .003$. Post hoc analyses (Bonferroni correction) showed that participants estimated higher salaries for White men ($M = 1807$, $SE = 19.68$) than White women ($M = 1432$, $SE = 16.24$), $t(258) =$

22.39, $p < .001$, and Black men ($M = 1263$, $SE = 53.15$) than Black women ($M = 1013$, $SE = 20.07$) ($t(258) = 5.06$, $p < .001$). Also, participants estimated higher salaries for White men than Black men ($t(258) = 9.92$, $p < .001$), and White women than Black women ($t(258) = 22.05$, $p < .001$).

The interaction between target gender and participant gender was significant $F(1, 258) = 4.83$ $p = .029$, $\eta^2 = .002$. Post hoc comparisons were carried out (Bonferroni correction method), and the marginal means were reported. Male participants estimated higher salaries for women ($M = 1272$, $SE = 22.05$) than female participants ($M = 1172$, $SE = 22.05$), $t(258) = 3.21$, $p = .009$. There is no significant difference between male and female participants in the estimated salaries for men ($M = 1528$, $SE = 41.32$; $M = 1543$, $SE = 41.32$, respectively), $t(258) = 0.26$, $p = 1.000$. Female participants estimated higher salaries for men than women $t(258) = 9.97$, $p < .001$, and male participants estimated higher salaries for men than women $t(258) = 6.86$, $p < .001$.

The interaction between target gender and target race was significant $F(1, 258) = 5.82$, $p = .017$, $\eta^2 = .003$. Post hoc analyses (Bonferroni correction) showed that participants estimated higher salaries for White men ($M = 1807$, $SE = 19.7$) than White women ($M = 1432$, $SE = 16.2$) ($t(258) = 22.39$, $p < .001$), and Black men ($M = 1263$, $SE = 53.2$) than Black women ($M = 1013$, $SE = 20.1$) ($t(258) = 5.06$, $p < .001$). Also, participants estimated higher salaries for White men than Black men ($t(258) = 9.92$, $p < .001$), and White women than Black women ($t(258) = 22.05$, $p < .001$).

The interaction between target race and participant gender was not significant $F(1, 258) = 0.01$, $p = .934$, $\eta^2 = .00$, and the interaction between target gender and target race and participant gender was not significant $F(1, 258) = 0.02$, $p = .881$, $\eta^2 = .00$.

Study 2: United States

To assess the role of participant gender in the salary estimation task a 2 (target gender: man, woman) x 2 (target race: Black, White) X 2 (participant gender: male, female) ANOVA was used, with the former two variables as within-subject factors, and the latter variable as a between-subject variable.

The main effect of target gender was significant, $F(1, 269) = 311.61$, $p < .001$, $\eta^2 = .04$. Marginal means indicated that participants estimated that men ($M = 63997$, $SE = 1426$) have higher salaries than women ($M = 51887$, $SE = 1208$). The main effect of target race was significant, $F(1, 269) = 440.45$, $p < .001$, $\eta^2 = .08$. Participants estimated that White people ($M = 66128$, $SE = 1231$) have higher salaries than Black people ($M = 49756$, $SE = 1430$).

The target gender by participant gender interaction was significant, $F(1, 269) = 10.10$, $p = .002$, $\eta^2 = .001$. No difference occurred between male ($M = 63539$, $SE = 2013$) and female participants ($M = 64455$, $SE = 2020$) in their estimation of the men's salaries, $t(269) = 0.32$, $p = 1.000$. Similarly, no difference was found between male ($M = 53609$, $SE = 1705$) and female participants ($M = 50165$, $SE = 1711$) in their estimation of the women's salaries $t(269) = 1.43$, $p = .931$. Male participants estimated that men have higher salaries than women $t(269) = 10.25$, $p < .001$, and female participants display the same pattern $t(269) = 14.70$, $p < .001$. The target race by participant gender interaction was also significant, $F(1, 269) = 5.50$, $p = .020$, $\eta^2 = .001$. No difference occurred between male ($M = 67675$, $SE = 1737$) and female participants ($M = 64581$, $SE = 1744$) in their estimation of White people's salaries $t(269) = 1.25$, $p = 1.000$. Similarly, no difference was found between male ($M = 49473$, $SE = 2019$) and female participants ($M = 50039$, $SE = 2027$) in their estimation of Black people's salaries $t(269) = 0.20$, $p = 1.000$. Male participants estimated that White people have higher salaries than Black people $t(269) = 16.53$, $p < .001$, and female participants display the same pattern $t(269) = 13.16$, $p < .001$.

The interaction between target gender and target race was not significant $F(1, 269) = 2.17$, $p = .141$, $\eta^2 = .002$. Also, the interaction between target gender and target race and participant gender was not significant $F(1, 269) = 0.49$, $p = .486$, $\eta^2 = .001$.

Study 3: South Africa

To assess the role of participant gender in the salary estimation task a 2 (target gender: man, woman) x 2 (target race: Black, White) X 2 (participant gender: male, female) ANOVA was used,

with the former two variables as within-subject factors, and the latter variable as a between-subject variable.

The main effect of target gender was significant, $F(1, 272) = 53.82$, $p < .001$, $\eta^2 = .04$. Marginal means indicated that participants estimated that men ($M = 28677$, $SE = 1340.90$) have higher salaries than women ($M = 19442$, $SE = 597.80$). The main effect of target race was significant, $F(1, 272) = 20.90$, $p < .001$, $\eta^2 = .02$. Participants estimated that White people ($M = 27383$, $SE = 1347.20$) have higher salaries than Black people ($M = 20736$, $SE = 778$).

Additionally, the target gender by target race interaction was significant, $F(1, 272) = 5.43$, $p = .020$, $\eta^2 = .004$. Post hoc analyses (Bonferroni correction) showed that participants estimated higher salaries for White men ($M = 33460$, $SE = 2471.30$) than White women ($M = 21306$, $SE = 569.80$) ($t(272) = 5.13$, $p < .001$), and Black men ($M = 23894$, $SE = 882.60$) than Black women ($M = 17578$, $SE = 884.40$) ($t(272) = 7.55$, $p < .001$). Also, participants estimated higher salaries for White men than Black men ($t(272) = 3.73$, $p = .001$), and White women than Black women ($t(272) = 4.21$, $p < .001$).

The interaction between target gender and participant gender was not significant $F(1, 272) = 0.06$, $p = .800$, $\eta^2 = .000$, and the interaction between target race and participant gender was not significant $F(1, 272) = 1.34$, $p = .248$, $\eta^2 = .001$. Additionally, the interaction between target gender and target race and participant gender was not significant, $F(1, 272) = 0.48$, $p = .488$, $\eta^2 = .000$.

Overall, the pattern of results we reported in the main document was not modified by the gender of participants.

Table 1

Perceived masculinity, femininity, and attractiveness means of targets, according to the Chicago Face Database's independent raters (1-7 Likert scale).

Target	Photograph ID	Masculinity	Femininity	Attractiveness
Set 1				
Black man	BM-205	5.20	1.20	3.24

White man	WM-205	5.00	1.54	3.80
Black woman	BF-201	1.52	5.00	4.16
White woman	WF-243	1.56	5.28	4.36
Set 2				
Black man	BM-200	4.70	1.26	3.22
White man	WM-203	4.87	1.33	3.50
Black woman	BF-244	1.56	5.21	4.75
White woman	WF-205	1.68	5.56	4.83

Table 2

Welch's t-test results comparing female and male participant differences in target rankings for each referent category in the Pilot Study

Ref: Men	Mean (SE) *Females*	Mean (SE) *Males*	W-test (df)	p-value

White man	1.34(0.05)	1.43(0.08)	-0.99(64.19)	.33
Black man	1.76(0.06)	1.60(0.09)	1.48(69.49)	.14
White woman	3.41(0.06)	3.46(0.09)	-0.46(73.89)	.64
Black woman	3.50(0.05)	3.51(0.08)	-0.14(66.74)	.90

Ref: Women	Mean (SE) *Females*	Mean (SE) *Males*	W-test (df)	p-value
White woman	1.16(0.04)	1.27(0.07)	-1.33(54.83)	.19
Black woman	1.85(0.04)	1.73(0.07)	1.44(56.72)	.16
White man	3.28(0.05)	3.22(0.07)	0.77(72.42)	.45
Black man	3.71(0.05)	3.78(0.07)	-0.90(69.88)	.37

Ref: White people	Mean (SE) *Females*	Mean (SE) *Males*	W-test (df)	p-value
White man	1.37(0.05)	1.35(0.08)	0.20(64.51)	.84
White woman	1.63(0.05)	1.65(0.08)	-0.20(64.5)	.84
Black woman	3.16(0.04)	3.19(0.07)	-0.39(60.4)	.70
Black man	3.84(0.04)	3.81(0.07)	0.39(60.4)	.70

Ref: Black people	Mean (SE) *Females*	Mean (SE) *Males*	W-test (df)	p-value
Black man	1.13(0.05)	1.05(0.04)	1.24(127.19)	.22
Black woman	1.95(0.03)	1.95(0.04)	0.08(83.05)	.93
White man	3.36(0.05)	3.30(0.08)	0.68(72.06)	.50
White woman	3.56(0.06)	3.70(0.08)	-1.46(84.12)	.15

Table 3

Welch's t-test results comparing female and male participant differences in target rankings for each referent category in Study 1

Ref: Men	Mean (SE) *Females*	Mean (SE) *Males*	W-test (df)	p-value
White man	1.16(0.04)	1.23(0.05)	-1.17(248.50)	.24
Black man	1.91(0.04)	1.89(0.05)	0.26(251.40)	.80
White woman	3.49(0.05)	3.32(0.05)	2.27(256.10)	.02 *
Black woman	3.44(0.05)	3.55(0.05)	-1.69(257.80)	.09
Ref: Women	**Mean (SE) *Females***	**Mean (SE) *Males***	**W-test (df)**	**p-value**
White woman	1.09(0.03)	1.16(0.03)	-1.53(227.10)	.13
Black woman	1.93(0.03)	1.87(0.03)	1.43(256.50)	.16
White man	3.13(0.04)	3.27(0.04)	-2.58(253)	.01 *
Black man	3.85(0.03)	3.70(0.04)	2.67(233.20)	.008 *
Ref: White people	**Mean (SE) *Females***	**Mean (SE) *Males***	**W-test (df)**	**p-value**
White man	1.35(0.04)	1.43(0.04)	-1.38(258)	.17
White woman	1.69(0.05)	1.57(0.04)	1.84(257.70)	.07
Black woman	3.17(0.04)	3.19(0.03)	-0.30(255.10)	.76
Black man	3.80(0.04)	3.82(0.03)	-0.31(256.50)	.76
Ref: Black people	**Mean (SE) *Females***	**Mean (SE) *Males***	**W-test (df)**	**p-value**
Black man	1.05(0.02)	1.12(0.03)	-1.57(208.30)	.12
Black woman	1.95(0.02)	1.92(0.03)	0.92(237.80)	.36
White man	3.35(0.04)	3.25(0.04)	1.68(258)	.10
White woman	3.65(0.04)	3.72(0.04)	-1.18(257.80)	.24

* significance ($p < 0.05$)

Table 4

Welch's t-test results comparing female and male participant differences in target rankings for each referent category in Study 2

Ref: Men	Mean (SE) *Females*	Mean (SE) *Males*	W-test (df)	p-value
White man	1.28(0.04)	1.19(0.04)	1.57(265.50)	.12
Black man	1.76(0.04)	1.87(0.04)	-1.91(269)	.06
White woman	3.58(0.05)	3.55(0.05)	0.40(268.80)	.69
Black woman	3.39(0.04)	3.39(0.04)	0.05(268.90)	.96
Ref: Women	**Mean (SE) *Females***	**Mean (SE) *Males***	**W-test (df)**	**p-value**
White woman	1.18(0.03)	1.17(0.04)	0.17(265.80)	.86
Black woman	1.86(0.04)	1.91(0.04)	-0.97(267.50)	.33
White man	3.16(0.04)	3.19(0.04)	-0.47(268.10)	.64
Black man	3.80(0.03)	3.73(0.04)	1.32(258.90)	.19
Ref: White people	**Mean (SE) *Females***	**Mean (SE) *Males***	**W-test (df)**	**p-value**
White man	1.29(0.04)	1.38(0.05)	-1.44(264)	.15
White woman	1.72(0.04)	1.68(0.05)	0.55(260)	.07
Black woman	3.19(0.04)	3.26(0.04)	-1.40(268)	.16
Black man	3.81(0.03)	3.68(0.05)	2.12(244)	.04*
Ref: Black people	**Mean (SE) *Females***	**Mean (SE) *Males***	**W-test (df)**	**p-value**
Black man	1.12(0.03)	1.15(0.04)	-1.57(266)	.57
Black woman	1.91(0.03)	1.93(0.03)	-0.36(255)	.72
White man	3.38(0.04)	3.31(0.05)	1.09(268)	.28
White woman	3.59(0.05)	3.62(0.05)	-0.38(269)	.71

* significance ($p < 0.05$)

Table 5

Welch's t-test results comparing female and male participant differences in target rankings for each referent category in Study 3

Ref: Men	Mean (SE) *Females*	Mean (SE) *Males*	W-test (df)	p-value
White man	1.36(0.04)	1.39(0.05)	-0.46(209.30)	.65
Black man	1.74(0.04)	1.71(0.06)	0.32(189.60)	.75
White woman	3.55(0.04)	3.46(0.07)	1.08(180.70)	.28
Black woman	3.36(0.04)	3.44(0.05)	-1.19(216.20)	.23
Ref: Women	**Mean (SE) *Females***	**Mean (SE) *Males***	**W-test (df)**	**p-value**
White woman	1.34(0.04)	1.29(0.06)	0.70(187.50)	.48
Black woman	1.77(0.04)	1.82(0.05)	-0.68(239.70)	.50
White man	3.27(0.04)	3.49(0.28)	-0.77(102)	.44
Black man	3.62(0.04)	3.68(0.06)	-0.84(191.50)	.40
Ref: White people	**Mean (SE) *Females***	**Mean (SE) *Males***	**W-test (df)**	**p-value**
White man	1.44(0.04)	1.42(0.05)	0.29(192)	.77
White woman	1.57(0.04)	1.66(0.06)	-1.26(176.40)	.21
Black woman	3.30(0.18)	3.11(0.04)	1.00(195.10)	.32
Black man	3.87(0.03)	3.81(0.05)	1.12(149.90)	.26
Ref: Black people	**Mean (SE) *Females***	**Mean (SE) *Males***	**W-test (df)**	**p-value**
Black man	1.23(0.04)	1.07(0.04)	2.96(263.90)	.003*
Black woman	1.84(0.03)	1.98(0.03)	-3.56(268.40)	<.001*
White man	3.40(0.04)	3.42(0.05)	-0.23(207.20)	.82
White woman	3.52(0.05)	3.53(0.06)	-0.11(208.20)	.92

* significance ($p < 0.05$)

CHAPTER 2

Intersectional Asymmetry in the Cognitive Combination of Gay Men and Black Men[3]

[3] Authored in collaboration with Peter Hegarty and Andrea Carnaghi for publication as an article

1. Introduction

What race is a man? White (Devos & Banaji, 2005; Thomas, Dovidio & West, 2014; Hegarty, 2017). What sexual orientation is a White man? Straight (Hegarty, Pratto & Lemieux, 2004; Lick & Johnson, 2016; Carnaghi et al., 2022). According to a norm-based approach to intersectionality, some social categories come to mind more easily than others. That makes some social categories easier to cognitively combine than others, such as White straight men (Zárate & Smith, 1992; Stroessner, 1996). When "Black people" are referred to, people tend to think of straight Black men, and when "gay men" are referred to, people tend to think of White gay men. We reasoned that a factor contributing to the cognitive difficulty in combining these categories lies in the stereotypes associated with these categories, particularly the presence of oppositional stereotypes. Indeed, Black people are stereotyped as more masculine than White people (Galinsky, Hall, & Cuddy, 2013) and gay men are stereotyped as more feminine than heterosexual men (Blashill & Powlishta, 2009; Kite & Deaux, 1987). Furthermore, Black men are stereotyped as poor, while gay men are stereotyped as affluent (Fiske et al., 2002; Petsko & Bodenhausen, 2019). Hence, perceivers may experience more difficulty integrating categories whose conceptualization appears to be negatively correlated (Kunda, Miller & Claire, 1990; Carnaghi et al., 2020; Coladonato et al., 2022).

However, a social category intersection, such as gay Black men, is not necessarily symmetrically composed, as one category may more readily contain the other category than the reverse. Previous literature that has investigated this social category intersection has tended not to investigate the direction of the category combination, that is, whether stereotypes of Black men combine with stereotypes of gay men to the same extent that stereotypes of gay men combine with those of Black men. There is indirect evidence in previous literature that the categories "Black men" and "gay men" may not combine symmetrically. The intersection "gay Black man" has more stereotypes in common with stereotypes of gay men than stereotypes of Black men (Preddie &

Biernat, 2020; Petsko & Bodenhausen, 2019). If the conceptualization of “gay men” accommodates the category “Black” to a greater extent than “Black men” accommodates “gay”, it could be plausible that perceivers are more likely to integrate the representation of gay men with that of Black men, than vice versa.

We relied on a two-stage approach to assess the difficulty and directionality of cognitively combining Black men and gay men through intersectional stereotyping. First, we used a conjunction fallacy paradigm (Study 1a-1b, Study 2a-2b). Previous research utilizing this paradigm, most notably "The Linda problem" (Tversky & Kahneman, 1983) has suggested that people tend to make probability judgments based on whether a description cues, or is representative of, a particular category. In this paradigm, participants were presented with a description of an individual, Linda, which cued stereotypes associated with feminists. Participants were then asked which of two options was more probable: Linda is a bank teller, or Linda is a bank teller and a feministOption two is a subset of option one, hence in accordance with probability laws, option one must be correct. However, participants tend to select option two, committing a conjunction fallacy error, because option two includes the category that is representative of the description. The conjunction fallacy occurs because the categories “bank teller” and “feminist” have opposing stereotypes, making it difficult to participants to cognitive combine these categories. We used the same rationale with categories “Black man” and “gay man”. If perceivers construe an individual as a Black man, based on a given description of this individual, the extent to which perceivers discard the option containing one category, for instance a gay man, and accept the two-category option, a Black gay man, indexes the oppositional stereotypes between Black and gay men. Using this method allowed us to assess to what extent the categories Black men and gay men are viewed as opposing in stereotype content, as a conjunction fallacy should occur to a greater extent the more difficult the categories are to combine.

Differently from previous research addressing the stereotypes of the categories in question (Katz & Braly, 1933; Ghavami & Peplau, 2013; Petsko & Bodenhausen, 2019) the measure does

not require that participants list stereotypes, but rather, demonstrates that when stereotypes about a certain group are used to describe an individual, participants consider it unlikely that the individual could belong to an additional group, which has opposing stereotype content. Importantly, and differently from earlier studies utilizing a conjunction fallacy paradigm (Tversky & Kahneman, 1983; Mirza & Blumberg, 2017; Wabnegger, Gremsl & Schienle, 2021), we were interested in a bi-directional test to investigate whether ethnocentrism is embedded in stereotypes concerning gay men to a similar extent that heteronormativity is embedded in stereotypes concerning Black men. As a direct test of the potential asymmetry in this social category intersection, we employed an updating paradigm (Study 3). In this paradigm, initial information is provided about a target and participants are asked to evaluate the target. New information about the target is then provided, which may or may not be at odds with the initial information, and participations are again asked to provide their evaluations. The participants' impressions of the target would be described as having updated if the new information, at odds with the initial information, causes a revised evaluation of the target (Brambilla et al., 2019).This paradigm allows to assess at the cognitive level the integration of the category Black men within the category gay men, and vice versa.

We pre-registered that a conjunction fallacy would occur both when stereotypes of "Black men" and "gay men" were cued. We also tested whether participants' own social category membership would moderate the conjunction fallacy effect, i.e., whether being Black and/or gay would mitigate the stereotyping of the categories, thereby reducing the conjunction fallacy effect. We put forward two opposing hypotheses: firstly, we hypothesized that in-group membership may moderate the conjunction fallacy effect as previous research has shown that at least in an intragroup context, individuals perceive themselves and other in-group members based on more individuating, and less stereotypical, characteristics (Sinclair, Hardin, & Lowery, 2006). Secondly, we put forward the hypothesis that a conjunction fallacy may occur across participants, regardless of their group memberships, as stereotypes are known by all members of the same culture through socialization processes (Devine, 1989).

Based on the results of Study 1 and 2, and especially the unexpected results of Study 2b, we performed exploratory analyses (i.e., henceforth referred to as not pre-registered analyses), which are reported in the 'Discussion' section of (Study 1a-1b; Study 2a-2b), and that prompted a revision of the theoretical framework (which is outlined in the current introduction of this chapter) and allowed us to set up Study 3. In the updating paradigm, we predicted that due to asymmetrical stereotyping[4], an individual described by stereotypes of gay men would be estimated to be more "Black" than an individual described by stereotypes of Black men would be estimated to be "gay". We predicted that when an individual is initially described by stereotypes of Black men, then gay men, estimations that the individual is gay would increase after the additional category is cued. Likewise, when an individual is initially described by stereotypes of gay men, then Black men, estimations that the individual is Black would increase. Importantly, we predicted that the impression update from Black to gay on sexual orientation categories would be greater than the update from gay to Black on race categories.

2. Study 1a

2.1 Method

2.1.1 Participants and Design

Study 1a used a 2 x 2 between-subjects ANOVA with two independent variables: condition (one category vs. conjunction), and participant sexual orientation (gay vs. straight). Sensitivity power analysis using G*Power 3.1 informed our aim to sample at least 150 gay and 150 straight men. We collected data from 330 participants, and applied our preregistered criteria to exclude participants who did not agree to participate (n = 2), provided no response for the critical target (n = 3), or who did not identify as a man (e.g., "non-binary") (n = 2), as White/Caucasian (e.g., "multiracial") (n = 3), or as either straight/heterosexual or gay/homosexual/queer (e.g., "bisexual") (n = 10). Six participants providing unanticipated responses were included; three who reported their

[4] Prediction based on the not-preregistered results of Study 1 and Study 2

gender as an age, and three who identified as transgender men (n = 3).[5] The analysis included 154 gay and 156 straight White men (M_{age} = 30.85, SE = 0.32, range = 18-40 years) born in the United States, currently located there, and fluent in English. A sensitivity power analysis ($\alpha = .05$, $1 - \beta = .80$; Cohen's $f = .18$) suggested that a sample size of 310 participants had enough power to detect a small effect size in a between-participants design (Cohen, 1988). The pre-registration for Study 1a and 1b can be found at the following OSF link: https://osf.io/8kefm.

2.1.2 Material and procedure

All participants provided written consent to participate through Prolific whilst materials were hosted on Qualtrics. The materials were introduced via a cover story describing the accuracy of algorithms in inferring demographic information about people from other information: "A wealth of information is now available about people based on their online activities. Typically available information includes a person's GPS location, Google searches, online shopping, as well as movie and music streaming history." The study was described as examining individuals' accuracy at making these estimations.

> Algorithms are fairly accurate in the estimation of additional information about a person, given the information already known. For example, algorithms may infer the gender of a user based on their activities. This research project investigates how accurate *people* are at making these estimations. You will be provided with several pieces of information about an individual and asked to select which *additional* pieces of information about them seem most likely. You will be asked to make this estimation for four different individuals.

This cover story aimed to render the request for participants to make *probability estimates* more plausible. Participants read four passages which each described information about an individual (e.g., age, occupation, religion) and asked participants to estimate the probability of something else about each individual (e.g., the probability that they are vegetarian), using a sliding scale ranging from 0% to 100%.

[5] n = 3 transgender men identified as gay/queer

Only the probability estimates from the fourth target passage were used to test the hypotheses. The information presented was "Tyrone is attending college on a basketball scholarship in Detroit. He is Christian, and in his spare time he often listens to hip hop music." This information was designed to cue stereotypes of Black men. The name "Tyrone" implies that a man is Black (Gaddis, 2017). Stereotypes associated Black men with include attending college on a basketball scholarship (Higginbotham, Shropshire & Johnson, 2022), living in Detroit (Howell, Perry & Vile, 2004), being Christian (Johnson, Rowatt & LaBouff, 2010), and listening to hip hop (Neguţ & Sârbescu, 2014). In the *one category condition*, participants completed one item: "What is the probability that Tyrone is gay?" In the *conjunction condition* (n = 155), completed one item: "What is the probability that Tyrone is gay and African American?" Participants in both conditions indicated their estimations using a sliding scale from 0% to 100%. Finally, participants reported their demographics and were debriefed.

2.2 Results

In line with the preregistered hypotheses, participants made higher estimations in the conjunction condition (M = 24.2, SE = 1.46) than in the one category condition (M = 15.3, SE = 1.46), indicating a conjunction fallacy effect, $F(1, 306) = 18.61$, $p < .001$, $n^2 = .06$. The difference in probability estimates between experimental conditions was M = 8.9%, SE = 2.06. Neither the main effect of participant sexual orientation $F(1, 306) = 3.53$, $p = 0.06$, $n^2 = .01$ nor the condition x sexual orientation interaction was significant $F(1, 306) = 1.42$, $p = 0.24$, $n^2 = .004$.

3. Study 1b

3.1 Method

3.1.1 Participants and Design

Study 1b used a 2 x 2 between-subjects ANOVA with two independent variables: condition (one category vs. conjunction), and participant race (Black vs. White). We collected data from 324

participants and applied preregistration criteria to exclude participants who did not provide a response for the critical target (n = 2), did not identify as a man (n = 1), as straight/heterosexual (e.g., "bisexual") (n = 9), or as either White/Caucasian or Black/African American (e.g., "multiracial") (n = 5). The analysis included 148 Black and 159 White straight men (*Mage* = 30.72, *SD* = 5.96, range = 18-67), born in the United States, currently located there, and fluent in English. A sensitivity power analysis ($\alpha = .05$, $1 - \beta = .80$; Cohen's $f = .18$) suggested that a sample size of 307 participants had enough power to detect a small effect size in a between-participants design (Cohen, 1988). Participants were paid £0.75 for taking part in the study.

3.1.2 Material and procedure

The material and procedure were the same as that in Study 1a, with the exception of the fourth passage, which was designed to cue stereotypes of gay men: "Jonathan is a Theatre Arts student in San Francisco. He is atheist, and in his spare time he often goes to the opera".Theatre and the performing arts are stereotyped as being gay-friendly (Rumens & Broomfield, 2014), San Francisco is stereotyped as having a high LGBT+ population (Lick, Johnson & Rule, 2019), gay-as-godless stereotypes promote the idea of gay people being atheist (Blakemore, 2019), and opera is stereotyped as a gay-friendly culture (Gvion, 2020).

In the *one category condition*, participants completed the item: "What is the probability that Jonathan is African American?" In the *conjunction condition* (n = 154), participants completed the item: "What is the probability that Jonathan is African American and gay?" Participants indicated their estimations using a sliding scale from 0% to 100%.

3.2 Results

In line with the preregistered hypotheses, participants made higher estimations in the conjunction condition (M = 36.5, SE = 1.72) than in the one category condition (M = 25.4, SE = 1.72), indicating a conjunction fallacy effect, $F(1, 303) = 20.55$, $p < .001$, $n^2 = .06$. The difference in probability estimates between experimental conditions was M = 11.0%, SE = 2.43. Neither the main

effect of participant race $F(1, 303) = 1.13$, $p = 0.29$, $n^2 = .003$ nor the condition x participant race interaction was significant $F(1, 303) = 1.07$, $p = 0.30$, $n^2 = .003$.

3.3 Discussion

Going beyond Tversky and Kahenman's (1983) classic study of feminist bank tellers, Study 1 demonstrated a bi-directional conjunction fallacy. As an exploratory analysis, we found that whether we cued stereotypes of Black men (Study 1a) or gay men (Study 1b), a similar sized conjunction fallacy effect emerged (i.e., difference in probability estimates between experimental conditions): Study 1a ($M = 8.9\%$, $SE = 2.06$) and Study 1b ($M = 11.0\%$, $SE = 2.43$, $t(615) = 0.66$, $p = 0.510$). However, and although not pre-registered, we observed higher probability estimates in the conjunction condition in Study 1b compared to Study 1a, $t = -4.73$, $p < .001$. Also, higher probability estimates were observed for the one category condition in Study 1b than in Study 1a, $t = -5.60$, $p < .001$. As the effect was not moderated by participant sexual orientation (Study 1a) or race (Study 1b), later studies did not systematically sample across relevant demographic variables. Study 2 provided a more stringent test of the conjunction fallacy effect using a within-participants design, following Tversky and Kahneman (1983). Also, a within-participants design provided more methodologically robust analyses of the strength of conjunction fallacy effects for Black men compared to gay men.

4. Study 2a

4.1 Method

4.1.1 Participants and Design

Study 2a used a within-subject design with one variable: condition (one category vs. conjunction). Sensitivity power analysis using G*Power 3.1 informed our aim to sample at least 150 participants. Data were collected from 154 participants and preregistration criteria was applied to exclude participants who did not provide a response for the critical target ($n = 6$). The analysis

included 148 participants (n = 72 women, n = 72 men, n = 4 different gender; M_{age} = 30.8, SD = 5.13, age range = 18-40), born in the United States, currently located there, fluent in English, majority straight (n = 111 heterosexual, n = 36 different sexual orientation, n = 1 did not report), and majority White (n = 111 White, n = 6 Black, n = 25 different race, n = 3 did not report). A sensitivity power analysis ($\alpha = .05$, $1 - \beta = .80$; Cohen's $f = .10$) suggested that a sample size of 148 participants had enough power to detect a small effect size (Cohen, 1988). Participants were paid £0.75 for taking part in the study. The pre-registration for Study 2a and 2b can be found on OSF: https://osf.io/p8g5c.

4.1.2 Material and procedure

All participants provided written consent to participate through Prolific and accessed a Qualtrics link online. The study briefing was identical to that in Study 1, except that participants were asked to select which of two options concerning each individual was more probable. The fourth, target passage cued stereotypes of Black men as per Study 1a: "Tyrone is attending college on a basketball scholarship in Detroit. He is Christian, and in his spare time he often listens to hip hop music."

Participants were prompted to indicate whether the one category (option 1), or the conjunction (option 2) was more likely: "Which is more probable? Tyrone is gay. Tyrone is gay and African American." Finally, participants reported demographics and were debriefed.

4.2 Results

Following Kahneman and Tversky (1983), we deemed that participants made a conjunction fallacy if they indicated that the conjunction was more likely than the one category option. One hundred and two of 148 participants (69%) made a conjunction fallacy error, a statistically significant majority of participants, binomial p <.001.

5. Study 2b

5.1 Method

5.1.1 Participants and Design

Study 2b mirrored the design of Study 2a. Data were collected from 150 participants and preregistration criteria was applied to exclude participants who did not provide a response for the critical target (n = 3). The analysis included 147 participants (n = 72 women, n = 69 men, n = 3 different gender, n = 3 did not report; M_{age} = 30.9, SD = 5.21, age range = 18-40), born in the United States, currently located there, fluent in English, majority straight (n = 98 heterosexual, n = 44 different sexual orientation, n = 5 did not report), and majority White (n = 108 White, n = 10 Black, n = 27 different race, n = 2 did not report). A sensitivity power analysis ($\alpha = .05$, $1 - \beta = .80$; Cohen's $f = .10$) suggested that a sample size of 147 participants had enough power to detect a small effect size (Cohen, 1988). Participants were paid £0.75 for taking part in the study.

5.1.2 Material and procedure

The material and procedure were the same as in Study 2a, except that the fourth passage cued stereotypes of gay men: "Jonathan is a Theatre Arts student in San Francisco. He is atheist, and in his spare time he often goes to the opera." Participants were prompted to indicate whether one category (option 1), or the conjunction (option 2) was more likely: "Which is more probable? Jonathan is African American. Jonathan is African American and gay."

5.2 Results

As in Study 2a, a conjunction fallacy was defined as indicating that the conjunction was more likely than the one category option. Seventy-seven of 147 participants (52%) made a conjunction fallacy error. A non-significant binomial test showed that participants were equally likely to choose each of the response options, p = .621.

5.3 Discussion

In Study 2a, 69% of participants, a statistical majority, committed a conjunction fallacy error, while in Study 2b 52% did, which did not reach statistical significance. Although not pre-registered, we conducted an exploratory analysis and found that the likelihood of the conjunction fallacy effect was statistically higher in Study 2a, where stereotypes of Black men were cued, than in Study 2b where stereotypes of gay men were cued, $\chi^2(1, N = 295)$ 8.45, $p = .004$.

As noted above, our research developed that of Kahneman and Tversky's (1983) by showing conjunction fallacies originating from both categories ("Black men" and "gay men"). The final study addressed the likelihood that a target would be categorized as both "Black" and "gay" if he is first categorized as Black or if he is first categorized as gay. Two findings that were not pre-registered, reported above, prompted this study. In Study 1, participants tended to be less likely to infer that a man stereotyped as Black was gay (or both Black and gay, Study 1a) than that a man stereotyped as gay was Black (or both gay and Black, Study 1b). Study 2 provided clearer evidence than Study 1 concerning this asymmetry. Indeed, in Study 2, more participants committed the conjunction fallacy error when the target was stereotyped as Black (Study 2a) than as gay (Study 2b). It appears that it is more difficult to cognitively combine the categories "Black" and "gay" if a target is stereotyped as Black than if he is stereotyped as gay. Study 3 directly tests this hypothesis by comparing the process of *updating* probability estimates with new information in both directions.

6. Study 3

Study 3 investigated updating as an explanation of the asymmetries observed in Studies 1 and 2. It aimed to assess whether updating one's impression of an individual may not occur symmetrically, as a result of asymmetry in the intersectional stereotyping process. We presented initial cues about an individual associated either with stereotypes of Black men or gay men, and then additional cues associated with either Black or gay men. Thus, the additional cues were either *consistent* (e.g., Black men + Black men) or *inconsistent* (e.g., Black men + gay men) with the

initial category cued. We expected that additional inconsistent cues would cause an updating of category probability estimates, and tested the hypothesis that the impression update would be larger when a man first seems Black and then seems also to be gay than when he first seems gay and then seems also to be Black.

6.1 Method

6.1.1 Participants

In line with our preregistration, we aimed to collect at least 400 participants. Data were collected from 426 participants and preregistration criteria was applied to exclude participants who did not agree to participate (n = 4) and did not provide a probability estimation for at least one category for the target of interest (n = 5). The final sample was comprised of 417 participants (n = 208 women, n = 199 men, n = 10 different gender; M_{age} = 31.1, SD = 5.63, age range = 18-56), born in the United States, currently located there, fluent in English, majority straight (n = 309 heterosexual, n = 97 different sexual orientation, n = 11 did not report), and majority White (n = 285 White, n = 45 Black, n = 83 different race, n = 4 did not report). A sensitivity power analysis (α = .05, $1 - \beta$ = .80; Cohen's f = .09) suggested that a sample size of 417 participants had enough power to detect a small effect size (Cohen, 1988). Participants were paid £1.45 for taking part in the study. The pre-registration for Study 3 can be found on OSF: https://osf.io/dt2px.

6.1.2 Material and procedure

All participants provided written consent to participate through Prolific and took part via Qualtrics. The instructions began with the following description:

> We are interested in how people form impressions of others with only limited information about them. This is common on social media platforms, for example, where we may have a first impression of someone based on only limited and specific available information. Sometimes, we learn more information about someone, which may or may not change our first impression of the person.

> This study presents a similar scenario. You will be provided with limited information about an individual and asked specific questions about your first impression. You will then be given additional information about the same individual and asked the same questions about your impression of the individual, in light of the new information.
>
> You will be asked questions about your impression of four individuals.

The first three of four trials were identical to those used in Study 1. As in other studies, the final trial tested the key hypotheses. This trial had two phases. During the *impression formation* phase, participants were provided with stereotypical information cuing one of two social categories: *Black men* or *gay men*. Participants then estimated the probability that he belonged to each of four categories, presented in a randomized order: *gay, straight, Black*, and *White*. Next, in the *updating* phase, participants read additional information cuing that the man was Black or gay, and estimated the likelihood that he belonged to each of the four categories once again.

Participants were randomly assigned to one of four conditions, defined by the categories cued in the two phases of the experiment. In the *Gay/Gay condition*, participants read information that cued stereotypes of gay men in both phases. In the *Black/Black condition*, participants read information that cued stereotypes of Black men in both phases. In the *Gay/Black conditio*n, participants read information that cued stereotypes of gay men in the impression formation phase, and information that cued stereotypes of Black men in the updating phase. In the *Black/Gay condition,* participants read information that cued stereotypes of Black men in the impression formation phase, and information that cued stereotypes of gay men in the updating phase.

We refer to the first two conditions as *stereotype consistent* conditions, and the latter two as *stereotype inconsistent* conditions. Updating was operationalized by the difference in probability estimates, for each of the four social categories, between the initial impression and updating phases, which we call *delta probability estimate*s.

The stereotypical information was the same as that used in Studies 1 and 2. We split the descriptions used to activate the stereotypes into two version descriptions.

Gay stereotypes 1

Gay stereotypes 2

Black stereotypes 1

Black stereotypes 2

In addition to the independent variables described above, we randomly assigned participants to receive either version 1 or 2 cuing each category. The full experimental material including both versions of the passages can be found in Appendix A.

6.2 Results

We analyzed the impression formation phase results to see if the materials more strongly cued either social category, and next analyzed the updating phase results, which tested the key hypothesis.

6.2.1 Impression formation phase

Estimates were analyzed using mixed model 2 x 4 ANOVA with category cued (gay men vs Black men) as a between-subject variable x probability estimations as a within-subject variable (gay vs straight vs Black vs White).

The main effect of the category cued was not significant, $F(1, 415) = 0.219$, $p = 0.64$, $\eta^2 = .000$. The main effect of the probability estimations was significant, $F(3, 1245) = 102$, $p < .001$, $\eta^2 = .000$. The category cued by probability estimations interaction was significant, $F(3, 1245) = 475$, $p < .001$, $\eta^2 = .446$ (see Table 1).

We interpreted the interaction using post-hoc analyses, applying the Bonferroni correction. When the materials cued Black men, probability estimates that the target was Black ($M = 79.9$, $SD = 19.6$) were higher than that he was White ($M = 19.9$, $SD = 20.7$), $t(415) = 24.94$, $p < .001$. Contrary to our hypothesis, however, targets ascribed stereotypical gay men attributes were not estimated more likely to be “gay” ($M = 50.5$, $SD = 21.4$) than “straight” ($M = 46.5$, $SD = 20.7$), $t(415) = 1.53$, $p = 1.00$.

When the materials cued stereotypes of Black men, the target was estimated more likely to be "straight" (M = 73.0, SD = 20.2) than "gay" (M = 23.0, SD = 20.2) $t(415) = -19.60$, $p < .001$, and targets ascribed stereotypical gay men cues were estimated more likely to be "White" (M = 68.8, SD = 18.1) than "Black" (M = 31.5, SD = 19.0), $t(415) = -15.48$, $p < .001$.

When the materials cued stereotypes of Black men, the target was estimated "straight" (M = 73.0, SD = 20.2) to a similar extent that targets ascribed stereotypical gay men cues were estimated "White" (M = 68.8, SD = 18.1), $t(415) = 2.17$, $p = 0.86$. However, targets ascribed stereotypical gay men cues were estimated to be more "Black" (M = 31.5, SD = 19.0) than targets ascribed stereotypical Black men cues were estimated to be "gay" (M = 23.0, SD = 20.2), $t(415) = -4.28$, $p < .001$.

Although not pre-registered, we conducted additional analyses to compare probability estimations made between the targets. Probability estimates on "Black" were higher when the material cued stereotypes of Black men (M = 79.9, SD = 19.6) than gay men (M = 31.5, SD = 19.0), $t(415) = -25.59$, $p < .001$, while estimates on "White" were higher when the material cued stereotypes of gay men (M = 68.8, SD = 18.1) than Black men (M = 19.9, SD = 20.7), $t(415) = -25.72$, $p < .001$. Additionally, estimates on "gay" were higher when stereotypes of gay men were cued (M = 50.5, SD = 21.4) vs Black men (M = 23.0, SD = 20.2), $t(415) = -13.46$, $p < .001$, and estimates on "straight" were higher when stereotypes of Black men were cued (M = 73.0, SD = 20.2) gay men (M = 46.5, SD = 20.7), $t(415) = 13.24$, $p < .001$.

6.2.2 *Updating phase*

As pre-registered, comparisons between the delta probability estimations made in different conditions were analyzed using the mixed model ANOVA: 2 (impression formation phase category: gay men vs. Black men) x 2 (updating phase category: gay men vs. Black men) as between-subject variables x 4 (delta probability estimations: gay, straight, Black, White) as a within-subject variable.

The main effect of the impression formation phase category was not significant $F(1, 413) = 0.05$, $p = 0.812$, $\eta^2 = .000$, and the main effect of the updating phase category was not significant

$F(1, 413) = 0.02$, $p = 0.902$, $\eta^2 = .000$. The impression formation phase category by updating phase category by delta probability estimations interaction was significant, $F(3, 1239) = 11.7$, $p < .001$, $\eta^2 = .015$.

Contrary to predictions, probability estimations from the impression formation to updating phase in the Black/Gay condition for "gay" ($M = 18.3$, $SD = 21.1$) did not significantly differ from those in the Gay/Black condition for "Black" ($M = 20.0$, $SD = 21.9$; $t(415) = -0.67$, $p = 1.00$). Similarly, probability estimations in the Black/Gay condition for "straight" ($M = -16.4$, $SD = 21.9$) did not significantly differ from those in the Gay/Black condition for "White" ($M = -17.5$, $SD = 21.2$; $t(415) = 0.47$, $p = 1.00$).

While not pre-registered, exploratory analyses can shed additional light on the updating process. The decrease in probability estimations on "Black" in the Black/Gay condition ($M = -3.9$, $SD = 17.9$) was significantly less than the decrease on "gay" in the Gay/Black condition ($M = -15.0$, $SD = 23.9$, $t(415) = -4.46$, $p = .001$. Similarly, the increase on "White" in the Black/Gay condition ($M = 3.1$, $SD = 15.1$) was significantly less than the increase on "straight" in the Gay/Black condition ($M = 14.5$, $SD = 23.8$, $t(415) = 4.62$, $p < .001$.

The supplementary material includes the survey material as a variable in analyses.

6.3 Discussion

Study 3 investigated the potential asymmetries in the cognitive combination of gay men and Black men, first through an impression formation phase analysis, and then through an updating phase analysis. As pre-registered, we found that cuing stereotypes associated with Black men resulted in higher probability estimates on "Black" than "White", but contrary to predictions, cuing stereotypes associated with gay men resulted in similar probability estimates on "gay" and "straight". In exploratory analyses, comparing the differences between targets, the Black target was perceived to be more Black and less White than the gay target, and the gay target was perceived to be more gay and less straight than the Black target. Hence, it seems that the material was relatively successful in cuing the intended categories, at least when targets are compared.

In line with the pre-registration, but contrary to our hypothesis, the gay target was estimated to be White (i.e., the default race) to a similar extent that the Black target was estimated to be straight (i.e., the default sexual orientation). However, and in line with our predictions, estimates that the gay target was Black were higher than estimates that the Black target was gay, suggesting that the representation of a man who seems gay as also Black may be easier than that of a man who seems Black as also gay.

Secondly, in line with the pre-registration, we examined the updating effects. In the Black/Gay condition, probability estimations for "gay" were not significantly different from those in the Gay/Black condition for "Black", and likewise, those for "straight" in the Black/Gay condition did not significantly differ from those for "White" in the Gay/Black condition. These findings seem to imply a symmetrical process of updating between the conditions. However, the exploratory analysis results provided greater insight: in the Black/Gay condition, estimations for "Black" decreased less than those for "gay" in the Gay/Black condition, and likewise, estimations for "White" in the Black/Gay condition increased less than those for "straight" in the Gay/Black condition. The latter analysis suggests that integrating the category "gay" into the representation of a man who seems Black does not alter the perception of his race as much as integrating the category "Black" into the representation of a man who seems gay alters the perception of his sexual orientation as gay.

7. General Discussion

The current studies addressed the strength of oppositional stereotypes between Black men and gay men (Study 1-2) and the manner in which perceivers combine stereotypes about Black men and gay men (Study 3). As observed in the first two studies, and particularly in Study 2, it appeared that the stereotype of gay men is more likely to accommodate the category of Black men, than vice versa. Guided by the suggested asymmetry, we found that in an updating paradigm, the category "Black" more easily integrated with gay than "gay" with Black.

The novelty of the current research lies in the investigation of the directionality of this cognitive combination. We first investigated this research question through a bi-directional, between-subject conjunction fallacy paradigm. As pre-registered, in Study 1, a conjunction fallacy effect was produced both through cuing stereotypes of Black men (Study 1a) and gay men (Study 1b). In Study 2, we used a within-subject design as a more stringent test of the conjunction fallacy effect. Although not pre-registered, a clear asymmetry emerged: the conjunction fallacy effect was stronger when stereotypes of Black men were cued (Study 2a), than when stereotypes of gay men were cued (Study 2b). Study 2, and in part Study 1, suggested that it is easier to cognitively combine the categories "Black men" and "gay men" if a target is stereotyped as a gay man than if he is stereotyped as a Black man. Kahneman and Tversky's (1983) "Linda Problem" showed the difficulty in combining two categories which are oppositional in stereotype content if one category is cued but did not utilize bi-directional stereotyping to assess whether the difficulty was symmetrical, i.e., occurred to a similar extent when each category was cued. This method provided preliminary evidence for the hypothesis that it is more difficult to integrate the category "Black" when the category "gay" has first been cued than the reverse.

Furthermore, a common practice in stereotyping research is inferring participants' views from what they report people in general think (e.g., Fiske et al., 2002; Ghavami & Peplau, 2013; Klysing, 2022). In the current studies, we directly asked participants about their personal views, which provided a measure of personal endorsement rather than cultural stereotypes. This research then contributes to the body of literature on stereotyping by providing direct evidence of participants' stereotypes on intersectional categories.

Study 3 directly investigated updating in the stereotyping process by presenting cues about an individual associated either with stereotypes of Black men or gay men, and then additional cues associated with either Black or gay men. In the impression formation phase, we found that as predicted, cuing stereotypes associated with Black men resulted in higher probability estimates on "Black" than "White", but contrary to predictions, cuing stereotypes associated with gay men

resulted in similar probability estimates on “gay” and “straight”. This finding may stem from the experimental material more successfully conveying stereotypes of Black men than gay men. Alternatively, the stereotypes associated with Black men may be stronger, easier to cue, or come to mind more easily than those of gay men. A third possible factor contributing to this discrepancy could be American participants perceiving Black people as more prevalent in the population than gay people. Actual population data concerning the cities cued in the survey material show that Detroit is 78.8% Black (United States Census Bureau, 2022), while the LGBT+ community in San Francisco makes up just 6.7% of the population (Conron, Luhur & Goldberg, 2021). Furthermore, American individuals tend to overestimate the population of non-White groups in the US, while more accurately estimating the LGBT+ population size (Gallagher, 2003; Overby & Barth, 2006).

In the updating phase, we predicted that the update would be larger when a man first seems Black and then gay than when he first seems gay and then Black. The pre-registered analyses we conducted did not find this effect: in the Black/Gay condition, probability estimations for “gay” were similar to those in the Gay/Black condition for “Black” (and likewise, those for “straight” in the Black/Gay condition were similar to those for “White” in the Gay/Black condition). However, the results of an exploratory analysis suggest a difference in updating between the two conditions: in the Black/Gay condition, estimations for “Black” decreased less than those for “gay” in the Gay/Black condition (and likewise, estimations for “White” in the Black/Gay condition increased less than those for “straight” in the Gay/Black condition). These results show that, contrary to predictions, greater updating occurred from “gay” to “Black” than from “Black” to “gay”. However, the causes of this difference are in line with our previously stated rationale that the category “Black” may be more easily integrated into the representation of a gay man than the category “gay” can be integrated in the representation of a Black man.

In effect, the individual who seemed to be a Black man continued to seem Black when gay stereotypes were added to his description. This result is not in line with previous evidence suggesting that the combination of the category Black man with gay man causes a decrease in the

stereotyping on the category “Black” (Petsko & Bodenhausen, 2019). By contrast, the individual who seemed to be a gay man seemed less gay, and more straight, when Black stereotypes were added to his description. This finding may result from the category “Black man” strongly cuing heterosexuality, such that its addition to a description causes perceivers to doubt whether the previously cued category “gay” applies, rather than integrating “Black” and “gay”. The implicit communication of “White” when the category “gay man” is cued can be overridden when Black stereotypes are added to the description. This allows perceivers to integrate the categories “Black” and “gay” more successfully. Thus, the asymmetry in the updating process of these intersectional categories may hinge on the stronger heterosexuality implied by “Black man” than Whiteness implied by “gay man”. This finding, in part, aligns with that of Petsko and Bodenhausen’s (2019) that Black gay men are “Whitened” in stereotype content through their categorization as gay.

Moreover, a distinction should be made between the current studies and research concerning word order. Previous studies that experimentally manipulated the order in which categories are presented (e.g., Black gay men vs. gay Black men) have failed to find a significant effect of category order on the stereotyping of these combined categories (Kunda, Miller & Claire, 1990; Coladonato et al., 2022; Petsko and Bodenhausen, 2019). In the current studies, we did not provide participants with both category constituents together, but rather presented participants with a description that was meant to cue a specific category and assessed the extent to which it accommodates an additional, opposing category. Particularly through the updating paradigm methodology, we were able to detect the effect of category order presentation and found a significant difference in the way two categories are cognitively combined depending on the first impression.

Several limitations in the present research should be acknowledged. Firstly, the studies were conducted with US participants, and the stereotypes utilized in the descriptions of the targets were based on US American conceptualizations of gay men and Black men. As stereotype content and the conceptualization of gay and Black men may be sensitive to cultural context, it remains unclear

how these categories would intersect cross-culturally. For example, future research might examine whether the category “Black” more readily accommodates the category “gay” in Black majority contexts, for example, South Africa. Secondly, our research was limited to the intersection “gay” and “Black”, with the explicit gender category “man”, and the implied age category “young”. Future research could additionally manipulate gender and age variables for a more comprehensive picture of intersectional stereotyping of the categories “gay” and “Black”. Thirdly, the ecological validity of this experiment is questioned by the reliance on top-down categorization (namely, semantically driven categorization) rather than bottom-up processes such as those driven by perceptual features, as more typical in daily life. Also, one should consider that judgments concerning an individual’s race are often made prior to judgments concerning an individual’s sexual orientation, especially due to visual cues more strongly prompting the former than the latter (Ito & Urland, 2003; Rule & Ambady, 2008; Lick & Johnson, 2013). This might imply that race categories are more cognitively available than sexual orientation categories due to their relative advantage in terms of frequency of activation in daily life. This greater cognitive accessibility of race than sexual orientation categories may underlie the finding that participants more readily categorize individuals based on their race than their sexual orientation, at least in the Study 2 and Study 3. Lastly, the stereotypes associated with the category intersection “gay Black men” were not examined in the present research. While the two categories are difficult to cognitively integrate, some previous research suggests that this particular dual-minority intersection may also be beneficial to some extent. Gay Black men were perceived as better leaders than members of the single categories “gay men” or “Black men” (Wilson, Remedios & Rule, 2017). Similarly, gay Black applicants received higher salary recommendations than straight Black applicants (Pedulla, 2014). Future research might futher investigate the stereotypes associated with integration of the categories “gay men” and “Black men”.

The research findings not only have theoretical implications, but also real-world relevance. Firstly, the strong association between the category “Black man” and heterosexuality may

contribute to the erasure of gay identity for Black gay men. Furthermore, the implicit communication of "Whiteness" when the category "gay man" is cued can be overridden by the addition of Black stereotypes. This suggests that prevailing stereotypes associated with "gay" may be more flexible and subject to change when intersecting with racial cues. In practical terms, the need to acknowledge racial diversity within the LGBT+ community has been raised by the campaign *More Color More Pride*, which added two additional colors to the rainbow flag to include gay people of color (Coleman, 2017). Similarly, the Black Lives Matter movement, founded by three Black women, two of whom identify as queer, has sought to be inclusive of the Black LGBT+ community (Salzman, 2020). Specifically, the Black Trans Lives Matter and All Black Lives Matter protests in the US have aimed to increase awareness of violence against gay and transgender Black people. Improving intersectional awareness is highly valuable for both communities, and may be particularly helpful within Black community movements, as there is a greater risk of the erasure of gay Black identities at the cognitive level when Black identities are foregrounded.

Previous research investigating the life experiences of gay Black men found that individuals at this intersection may integrate their race and sexual orientation in different ways. The most common integration method fell into the category classified as "interlocking conceputalization", whereby individuals considered their race and sexual orientation as inextricably linked with one another (Hunter, 2010). Alternative approaches were viewing one identity as more dominant than the other ("up-down model") or viewing race as a public identity as sexual orientation as private ("public-private model"). The current research suggests that at least from a perceiver's perspective, the categories "Black" and "gay" are indeed interlocked: cuing a given category implies a certain likelihood of intersecting categories. Furthermore, when a second social category is cued, it not only changes the perceived likelihood of belonging to that category, but also the former, orthogonal category. However, the present research suggests that these interlocked identities are not symmetrically intertwined as the category "Black" appears to be more cognitively dominant than "gay". The "public-private model" provides another possible explanation for this effect: if a racial

identity is more often part of the public sphere while sexual orientation is more often in the private sphere, racial identity may then become more perceptually dominant.

Within the literature on the lived experiences of gay Black individuals, a consistent theme is the difficulty involved in integrating these two identities. While race and sexual orientation may be intertwined, for both perceivers and those belonging to these groups, this does not imply the identity integration occurs without effort. This sentiment was expressed by Pat Parker in her book "Movement in Black":

> If I could take all my parts with me when I go somewhere, and not have to say to one of them, "No, you stay home tonight, you won't be welcome," because I'm going to an all-white party where I can be gay, but not Black. Or I'm going to a Black poetry reading, and half the poets are antihomosexual, or thousands of situations where something of what I am cannot come with me. The day all the different parts of me can come along, we would have what I would call a revolution.

Based on these considerations, policymakers, educators, and media professionals can also use these insights to develop interventions that challenge and reshape stereotypical thinking, fostering more inclusive and accurate representations of individuals with diverse identities.

Table 1: Impression Formation Phase Probability Estimates by Condition and Category Cued, Study 3 (Mean and Standard Deviation).

Category Estimates

	M	SD
Condition.		
Black		
Category Cued		
Black	79.9	19.6
White	19.9	20.7
Gay	23.0	20.2
Straight	73.0	20.2
Gay		
Target Category		
Black	31.5	19.0
White	68.8	18.1
Gay	50.5	21.4
Straight	46.5	20.7

Note: All targets are presumed to be men.

Table 2: Impression Formation Phase and Updating Phase Probability Estimates by Condition and Target Category, Study 3 (Mean and Standard Deviation).

Probability Estimates	IF		Updating		Delta	
	M	SD	M	SD	M	SD
Condition.						
Black/Black						
Target Category						
Black	79.7	18.7	83.0	20.9	3.3	12.3
White	19.0	18.3	16.0	18.9	-3.0	10.7
Gay	24.6	18.9	18.5	18.4	-6.1	13.9
Straight	70.8	19.8	77.0	19.5	6.2	15.7
Black/Gay						
Target Category						
Black	80.1	20.6	76.3	22.6	-3.9	17.9
White	20.7	23.0	23.8	24.2	3.1	15.1
Gay	21.5	21.5	39.8	25.3	18.3	21.1
Straight	75.4	20.3	59.0	24.0	-16.4	21.9
Gay/Gay						
Target Category						
Black	32.9	19.7	28.8	19.8	-4.1	13.7
White	68.7	16.9	72.1	20.4	3.4	13.0
Gay	51.4	22.2	60.2	26.1	8.8	15.0
Straight	47.0	20.8	39.6	23.6	-16.4	21.9
Gay/Black						
Target Category						
Black	29.9	18.3	50.0	21.0	20.0	21.9
White	69.0	19.3	51.4	21.1	-17.5	21.2
Gay	49.4	20.5	34.5	24.5	-15.0	23.9
Straight	46.1	20.7	60.6	25.4	14.5	23.8

Note: IF: Impression Formation. Delta: updating phase mean minus impression formation phase mean. All targets are presumed to be men.

Appendix A

Survey material used in version 1 and version 2

Condition	Survey Version	Time 1	Time 2
Gay/Gay (Consistent)	*Version 1*	Jonathan is a Theatre Arts student and he is atheist.	Jonathan lives in San Francisco and in his spare time he often goes to the opera.
	Version 2	Jonathan lives in San Francisco and in his spare time he often goes to the opera.	Jonathan is a Theatre Arts student, and he is atheist.
Gay/Black (Inconsistent)	*Version 1*	Jonathan is a Theatre Arts student and he is atheist.	Jonathan lives in Detroit and in his spare time he often listens to hip hop music.
	Version 2	Jonathan lives in San Francisco and in his spare time he often goes to the opera.	Jonathan is attending college on a basketball scholarship and he is Christian.
Black/Black (Consistent)	*Version 1*	Tyrone is attending college on a basketball scholarship and he is Christian.	Tyrone lives in Detroit and in his spare time he often listens to hip hop music.
	Version 2	Tyrone lives in Detroit and in his spare time he often listens to hip hop music.	Tyrone is attending college on a basketball scholarship and he is Christian.
Black/Gay (Inconsistent)	*Version 1*	Tyrone is attending college on a basketball scholarship and he is Christian.	Tyrone lives in San Francisco and in his spare time he often goes to the opera.
	Version 2	Tyrone lives in Detroit and in his spare time he often listens to hip hop music.	Jonathan is a Theatre Arts student and he is atheist.

8. Supplementary Material

Study 3: Survey material

We stated in our pre-registration that as exploratory analyses we would analyze survey material (version 1 vs. version 2) as a variable in Study 3. To assess whether the survey material interacts with other variables, we conducted two analyses, in the impression formation and updating phases.

8.1 Impression formation phase

Estimates were analyzed using mixed model ANOVA: 2 (The impression formation phase category: gay men vs Black men) x 2 (Survey material: version 1 vs. version 2) as between-subject variables x 4 (Category estimations: gay vs straight vs Black vs White) as a within-subject variable. The main effect of the impression formation phase category was not significant, $F(1, 413) = 0.230$, $p = 0.632$, $\eta^2 = .000$. The main effect of the survey material was not significant, $F(1, 413) = 0.209$, $p = 0.648$, $\eta^2 = .000$. The impression formation phase category by category estimations interaction was significant, $F(3, 1239) = 480$, $p < .001$, $\eta^2 = .391$. The survey material by category estimations interaction was not significant, $F(3, 1239) = 0.476$, $p = 0.699$, $\eta^2 = .000$. The impression formation phase category by survey material by category estimations interaction was significant, $F(3, 1239) = 7.291$, $p < .001$, $\eta^2 = .006$.

We interpreted the interaction using post-hoc analyses, applying the Bonferroni correction. None of the below reported impression formation phase category by survey material by category estimations interactions were statistically significant.

	%Black	*%Black*	*%White*	*%White*	*%Gay*	*%Gay*	*%Straight*	*%Straight*
	V1	**V2**	**V1**	**V2**	**V1**	**V2**	**V1**	**V2**
Black	80.5(1.87)	79.3(1.92)	20.3(1.88)	19.4(1.93)	19.4(1.99)	26.9(2.04)	77.2(1.94)	68.7(1.99)
Gay	31.9(1.90)	31.1(1.90)	69.7(1.91)	67.9(1.91)	52.5(2.02)	48.4(2.02)	43.0(1.97)	50.1(1.97)

Numerical values: *M(SE)*

8.2 Updating phase

We first assessed the role of the survey material variable through a four-way interaction using mixed model ANOVA: 2 (The impression formation phase category: gay men vs Black men) x 2 (The updating phase category: gay men vs Black men) x 2 (survey material: version 1 vs version 2) as between-subject variables x 4 (Delta probability estimations: gay vs straight vs Black vs White) as a within-subject variable. The impression formation phase category by updating phase category by survey material by delta probability estimations interaction was significant, $F(3, 1227) = 2.83$, $p = .037$, $\eta^2 = .003$.

To gain a better understanding of whether the suvey material version influenced delta probability estimations, we conducted two three-way ANOVAs separately, for each version of the survey material. Specifically, we analyzed estimates using mixed model ANOVA: 2 (The impression formation phase category: gay men vs Black men) x 2 (The updating phase category: gay men vs Black men) as between-subject variables x 4 (Delta probability estimations: gay vs straight vs Black vs White) as a within-subject variable, separately for version 1 and version 2 of the survey material.

The version 1 analysis were in line with that of the main analysis. The main effect of the impression formation phase category was not significant $F(1, 207) = 0.479$, $p = 0.490$, $\eta^2 = .000$, and the main effect of the updating phase category was not significant $F(1, 207) = 0.04$, $p = 0.850$, $\eta^2 = .000$. The impression formation phase category by updating phase category by delta probability estimations interaction was significant, $F(3, 621) = 8.37$, $p < .001$, $\eta^2 = .020$.

As in the main analysis, probability estimations from the impression formation to updating phase in the Black/Gay condition for “gay” ($M = 22.79$, $SD = 24.4$) did not significantly differ from those in the Gay/Black condition for “Black” ($M = 25.59$, $SD = 22.7$; $t(207) = -0.79$, $p = 1.00$), and probability estimations in the Black/Gay condition for “straight” ($M = -16.4$, $SD = 21.9$) did not significantly differ from those in the Gay/Black condition for “White” ($M = -17.5$, $SD = 21.2$; $t(207) = 0.86$, $p = 1.00$).

For version 2, the results were in line with the main analysis and the version 1 analysis. The main effect of the impression formation phase category was not significant $F(1, 202) = 0.08$, $p = 0.781$, $\eta^2 = .000$, and the main effect of the updating phase category was not significant $F(1, 202) = 0.10$, $p = 0.748$, $\eta^2 = .000$. The impression formation phase category by updating phase category by delta probability estimations interaction was significant, $F(3, 606) = 7.14$, $p < .001$, $\eta^2 = .018$.

As in the main analysis and version 1, in version 2, probability estimations from the impression formation to updating phase in the Black/Gay condition for "gay" ($M = 13.62$, $SD = 15.9$) did not significantly differ from those in the Gay/Black condition for "Black" ($M = 14.43$, $SD = 19.8$; $t(202) = -0.24$, $p = 1.00$), and probability estimations in the Black/Gay condition for "straight" ($M = -11.84$, $SD = 17.9$) did not significantly differ from those in the Gay/Black condition for "White" ($M = -11.55$, $SD = 19.4$; $t(202) = -0.08$, $p = 1.00$).

CONCLUSION

In Chapter 1, the research, rooted in prototype theories of category representation, investigated the hierarchical organization of race and gender categories. It introduced the novel methodological design of a gender-graded ranking structure for race categories and race-graded structure for gender categories. Findings from studies conducted in Italy, the United States, and South Africa confirm androcentrism (men judged as more representative of race categories) and ethnocentrism (White people judged as more representative of gender categories). While androcentrism was consistent across contexts, the ethnocentrism in gender categories varied. Black women, however, were consistently subjected to intersectional invisibility, ranked as neither typical of their race nor gender category. The study explored the cognitive maintenance of racial and gender disadvantage, revealing country-specific patterns. Notably, the US showed a hyper-inflation of White men's social status, while in South Africa, the low social status of Black women was linked to the perceived affluence of White men.

The research offered insight into the complexity of cognitive processes related to intersectional categories and negated several assumptions about the direct link between prototypicality, perceived prevalence, and social status. Limitations are acknowledged, such as the study's focus on White participants and the potential moderating role of participant race in ethnocentric defaults. The implications extend to language usage, emphasizing the importance of inclusive terminology, and practical policy interventions, suggesting a need to address not only disadvantage but also extreme advantage in certain groups. Overall, the study contributes to understanding cognitive processes underlying representations of marginalized groups and calls for efforts to enhance diversity and fairness in mental representations.

In Chapter 2, the research examined the cognitive challenges and directionality in intersectional stereotyping in combining the categories of Black men and gay men. Two main difficulties were identified: intersectional invisibility, where Black men are stereotypically

perceived as straight and gay men as White, rendering Black gay men overlooked, and the difficulty in combining categories with opposing stereotype content. The study explored the asymmetry in the cognitive combination of these categories, aiming to determine whether it is easier to integrate the category "Black" when stereotyping as "gay" is cued, or vice versa. Using a bi-directional conjunction fallacy paradigm in three studies conducted in the US, we found consistent evidence suggesting it is easier to combine the categories "Black" and "gay" when a target is stereotyped as gay rather than Black. Both Study 1 and Study 2 showed a stronger conjunction fallacy effect when stereotypes of Black men were cued compared to gay men. We then used an updating paradigm to examine how additional cues impact initial impressions. While the pre-registered analyses did not confirm the predicted effect, exploratory analysis suggested an asymmetry in updating: greater revision from "Black" to "gay" than the reverse.

Possible explanations for this asymmetry include the stronger heterosexuality implied by "Black man" and the implicit association of "White" when the category "gay man" is cued. Limitations were acknowledged, such as the potential influence of experimental material and population context on participants' responses. The findings emphasize the need to consider the order of stereotypical information presentation in shaping impressions of intersectional categories.

Chapter 1 and Chapter 2 provide insight into the way in which intersectional categories are cognitively combined through different measures (representativeness rankings, base rate estimations, salary estimations, conjunction fallacy paradigms, and updating paradigms). These measures demonstrate the complexity of intersectionality and the specific forms of disadvantage certain groups are subjected to, particularly dual-minority groups such as Black women and Black gay men. Additionally, they highlight the privilege of other groups such as straight White men. Thus, the measures used throughout the thesis have important theoretical implications as they bring research on intersectionality a step forward by picturing not only the invisibility of specific category intersections but also the privilege of other category intersections. Said

otherwise, the results, stemming from multiple measures, portray the complex underpinnings of social advantage and disadvantage of intersectional groups.

The use of multiple measures also allows for the comparison of patterns to examine which category conceptualizations may be related. Perceiving higher population prevalence of certain groups does not necessarily change the way we mentally represent those categories. Instead, their representation may depend on the specific attributes, or stereotypes, ascribed to the category. Likewise the conjunction fallacy and updating paradigms showed that the way in which an intersectional category is represented is not necessarily symmetrical, as cuing one social category vs the other may produce different effects.

Stereotypes and category defaulting cause people to cognitively represent normative intersecting social categories, i.e., "women" are represented by a White woman and "men" by a White man (Chapter 1), "gay man" is represented by a White man (Chapter 2), and "Black people" are represented by a man (Chapter 1) who is straight (Chapter 2). Thus, defaulting makes it difficult for non-prototypical intersections to come to mind.

As demonstrated in Chapter 1, defaulting to a normative intersecting category may be particularly likely when a non-normative category is referred to (e.g., "women" and "Black people"). This process may be a factor in the high frequency of conjunction fallacy errors participants made in relation to the categories "gay man" and "Black man". While some level of non-normativity may be conceptualized, it seems that a dual non-normative category intersection is particularly challenging for people to process (Chapter 1). Moreover, the effort required to process a dual non-normative category intersection is not equivalent in both directions (Chapter 2).

In Chapter 1, we anticipated asymmetry in the combination of intersectional categories which are composed of one normative and one non-normative category. The exemplar that comes to mind for "Black people" is a Black man, but the exemplar of a "man" is a White man. Likewise, "women" are represented by a White woman, but "White people" are represented by a

man. Chapter 2 demonstrated that asymmetry in the combination of categories may also emerge in the case of two non-normative, or marginalized categories. This asymmetry was apparent through the updating paradigm cuing stereotypes, showing that "gay man" is less at odds with "Black man" than "Black man" is with "gay man". Together, these research projects examined the intersectional representations of gender, race, and sexual orientation categories and the potential mechanisms at play in certain category intersections being overlooked while others are advantaged. The use of multiple categories in the research projects brings to attention how different marginalized identities also differ from one another. While "Black", "gay", and "woman" are all considered non-normative categories, they are not interchangeable in the way in which are they cognitively combined. Different semantic content and stereotypes results in different cognitive processes in the integration of these categories (e.g., Black + woman vs Black + gay).

The mental representations of intersectional social categories are complex and nuanced, which also makes them difficult to alter. We can strive towards less biased conceptualizations of people by promoting diverse representations of intersectional groups through language and image cues, encouraging more positive representations of these groups through the media, and promoting policies that advance gender, race, and sexual orientation equality through the representation of diverse and intersectional identities.

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