Title
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Investigating hair cues as a mechanism underlying Black women's intersectional invisibility

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Significance Statement

Children during early childhood are slower to gender-categorize Black women pictured wearing natural hairstyles, but not Black women pictured wearing straightened hairstyles. These results highlight how prototypes of femalehood are biased against Black women, which may have important social and health consequences.

Abstract

Children psychologically exclude Black women from their representations of women, but the mechanisms underlying this marginalization remain unclear. Across two studies (*N*=129; 49 boys, 78 girls, 2 gender unreported; 79 White, 27 Black, 6 Latinx, 5 Asian, 12 unreported), the present work tests hair texture as one possible perceptual mechanism by which this might occur. In both studies, children gender-categorized Black, White, and Asian men and women using Mousetracker. Children were slower and had more complex patterns in categorizing Black women when they had textured hair (Study 1A), but not when they had straight hair (Study 1B). Implications for the development of gender as a social category are discussed.

Word count: 113

Keywords: gender, race, hair, intersectionality

Investigating hair cues as a mechanism underlying Black women's intersectional invisibility

Women comprise the vast majority of consumers for beauty products to become the "ideal woman" (Bureau of Labor Statistics, 2021). The notion that there is an ideal woman invites the question of what features (e.g., skin color, hair texture) might define this ideal. In the United States, people may be likely to consider White women to be the ideal woman, because of cultural ideologies (i.e., ethnocentrism) that center Whiteness (e.g., Purdie-Vaughns & Eibach, 2008; Lei et al, 2023). Psychological evidence for this premise include findings that people are more likely to accurately remember a White woman (versus a Black woman) as having been part of a conversation (Sesko & Biernat, 2010) and stereotypes of women are more closely aligned with stereotypes of White women compared to women of color (Coles & Pasek, 2020; Ghavami & Peplau, 2013).

To the extent that girls and women of color feel a sense of discrepancy between their sense of self and this (White) prototype, they may be motivated to try and align their gender presentation to the prototype (Collins, 1991)—such as using beauty products that help to approximate the appearance of White womanhood (e.g., straight hair). Perhaps unsurprisingly, the main consumer base for hair-straightening chemical products has traditionally been Black women (Council, 2022). These products may reflect a cultural belief that Black women's natural hair texture—which tends to be more coiled—is somehow incompatible with what it means to be a good exemplar of womanhood (Rosette & Dumas, 2007). However, such products have pernicious health consequences, causing short-term damage through chemical burns, and also long-term damage in increased cancer risk (Eberle et al., 2020). The connection between womanhood and Whiteness as it relates to hair is also psychologically damaging, as messages about Black hair being "bad hair" permeate through society (Robinson, 2011; Thompson, 2008) and can cause discrimination against Black women (Kurdi et al., 2021). For example, among adult perceivers, Black women with natural hairstyles are viewed as less competent and less professional than Black women with straight hairstyles, or White women with either straight or curly hairstyles (Koval & Rosette, 2021; Opie & Phillips, 2015).

Given these important implications, it is crucial to understand how and when children begin to develop a representation of womanhood that centers Whiteness and consequently might lead to expectations that Black women conform to a straight hair standard. While gender is one of the first categories that infants pay attention to (Quinn et al., 2002), and one of the first to guide preferences and affiliations (Shutts, 2015), children center some group members over others (Lei & Rhodes, 2021; Purdie-Vaughns & Eibach, 2008). For example, children are slower to categorize Black women as members of their gender group, more likely to mis-categorize their gender (Lei et al., 2020), and less likely to see Black women and girls as prototypical members of their gender group (Lei et al., 2022).

Yet the *mechanisms* of how children come to marginalize Black women in their prototypes of women remain unclear. Unlike adults (Johnson et al., 2012), top-down processes invoking abstract gendered-race stereotypes may not drive this phenomenon (Lei et al., 2020), even though children also endorsed stereotypes of Blackness as masculine and showed some evidence of Asianness as feminine. It may be that these abstract stereotypic associations are not yet strong enough to influence more basic processes. Instead, children in the early childhood period may be more influenced by concrete, low-level perceptual features.

According to Developmental Intergroup Theory (DIT; Bigler & Liben, 2006), perceptual discriminability is one of the main inputs that shape social categorization. For gender, one of the main perceptual discriminators is hair (Wild et al., 2000; Wright & Sladden, 2003). Previous work has primarily examined absence vs. presence of hair as a means of differentiating *between* gender groups (e.g., Lei et al., 2020; Wild et al., 2000). For example, when viewing images of women where the hair was pulled back or tight against the scalp for women, children were slower to gender-categorize women in general (Lei et al., 2020). Yet, other features of hair besides length can differ *within* gender group and may account for the marginalization of Black women demonstrated in previous work. Specifically, Black women tend to have natural hair textures that are more coiled and tightly-wound than White or Asian women (Richards et al., 2003).

Whether or not Black women's hair texture matters for how children gender-categorize them remains unclear. Thus, the present set of studies examines a few hypotheses with respect to how hair might matter for gender categorization. First, with respect to Black women specifically, we expect to replicate previous work demonstrating that children might be be slower to categorize (and have more difficulty categorizing) Black women who wore their hair in a natural hairstyle, but that the same would not be true for Black women who wore their hair straightened. Second, we test a few hypotheses about how the presence of hair cues might matter for gender categorization in general. One possibility is that children may still demonstrate a categorization bias in favor of male faces, as previous work found even when using stimuli minimizing hair cues (Lei et al., 2020; Wild et al., 2000). Alternatively, hair cues might result in a *female* bias in gender classification, given work showing a preference in looking times for female faces in infancy (Quinn et al., 2002).. Finally, a third potential pattern is that children gender-categorize men and women's faces equally fast when they have access to hair cues.

In Study 1A, we aimed to examine whether children would marginalize Black women with textured hair (by being slower to categorize them as women) compared to White women with straight hair. In Study 1B, we tested whether the marginalization of Black women would be attenuated if shown images of Black women with hair that more closely approximated White womanhood (i.e., straightened hair). In both studies, we also include images of Asian men and women's faces to examine whether children are considering Black womanhood per se, or potentially more basic ingroup-outgroup processes (for more details on methodological decisions underlying the 1A/1B design, please see Supplemental Online Materials (SOM)). Studies were not pre-registered. Data and analytic code are accessible at: https://osf.io/sk36r/?view_only=4e5068ee44384358b7a21ce62193b918.

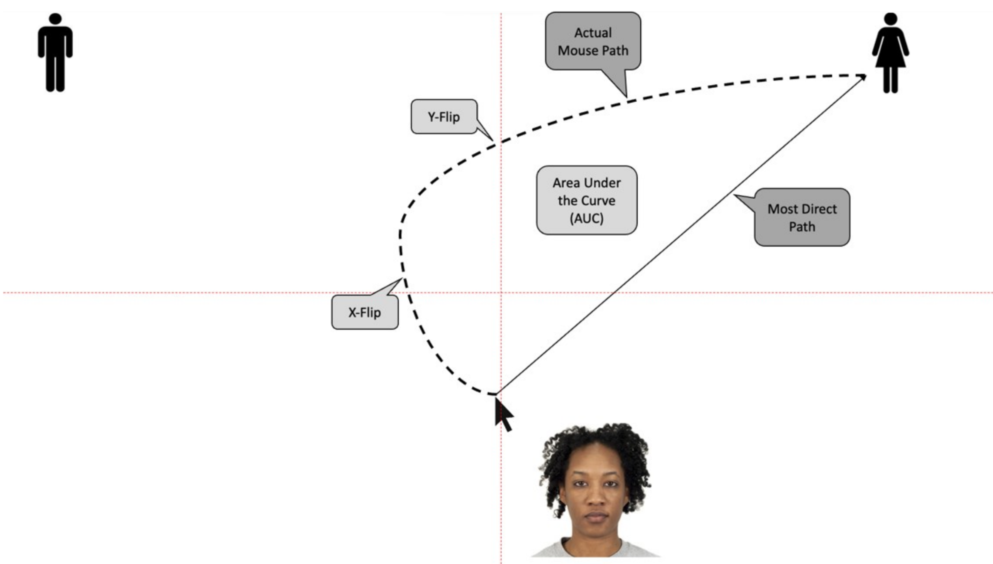
Study 1A

Method

Participants: We recruited 68 children both online from platforms such as Children's Helping Science[1] and in-person at local community partner sites. Children ranged from 3–8 years old (*M*=6.39, *SD*=1.45, and consisted of 36 girls, 31 boys). We focus on this age range because previous work has demonstrated that the marginalization of Black women emerges during the early childhood period (Lei et al., 2020). As indicated by parental self-report, participants were mostly White ($n = 44$), followed by Black ($n = 14$), Hispanic/Latinx ($n = 3$), Asian ($n = 2$), and five children whose racial group membership was unreported. Simulations using the SIMR package (Green & MacLeod, 2016) in *R* indicated that a sample of size of 60 participants would be sufficient to detect an effect as small as $f = 0.14$ for the key interaction with sufficient statistical power ($1\text{-}\beta = .80$).

[1] Children tested online were tested via Zoom and given remote control of the mouse in order to complete trials.

Procedure: Children were told that they were going to play a game to help the experimenter categorize different pictures, which had gotten mixed up. The task itself was a categorization task using MouseTracker software (Freeman & Ambady, 2010), where participants were asked to move the stimuli that appeared at the bottom-center of the screen to the correct category represented by symbols at the top left and top right corners of the screen (see Figure 1). Our primary dependent measures were reaction time (i.e., speed of categorization) and categorization errors. We also examined additional dependent measures MouseTracker captures to examine potential underlying dynamics of children's gender categorization. Specifically, MouseTracker also calculates measures of response conflict (i.e., the area under the curve (AUC) and maximum deviation) as well as response complexity (i.e., the number of times the mouse crosses the zero



point of the x- and y-axis, also called x-flips and y-flips); Freeman & Ambady, 2010).

Figure 1. A sample test trial. Figures at the top represented gender categories. The curved, dotted path represents a hypothetical participant mouse trajectory and the straight line is the most direct possible path (labeled in dark gray). Trajectory-related dependent measures are in lighter gray.

The MouseTracker task consisted of two phases: training and experimental trials. The training phase served to familiarize children with the task and validate that it worked as expected. For this phase, children first completed trials using images of birds and fish (Lei et al., 2020). Some images were more prototypical exemplars (e.g., robin), whereas others were less prototypical (e.g., penguin). Participants completed 12 animal categorizations (6 each for birds and fish, with three prototypical and three non-prototypical exemplars) and were instructed to classify each as quickly as possible. No feedback was given throughout the task.

Immediately after the training trials, children completed the critical experimental trials with images of people. We used adult faces from the Chicago Face Database (Ma et al., 2015) that varied by both gender (male or female) and race (White, Asian, or Black). We used faces from this database because all photos are standardized with extensive norming data, including age and subjective ratings of attractiveness. A total of 48 photos (eight examples of each race x gender) were shown in randomized order. For Study 1A, participants were shown images of Black women with textured hairstyles. Hair length ratings were created using a 1-7 scale from 1 being extremely short to 7 being extremely long hair. Ratings for all stimuli were independently coded by trained research assistants, and any discrepancies were discussed until an agreement for the hair length was met.

Analytic Strategy: Data were cleaned using the Mousetracker software (Freeman, 2010). We used linear mixed models to test our hypotheses, nesting stimuli within participant. Based on previous work (Johnson et al., 2012; Lei et al., 2020), we used a contrast code for stimulus race, coding Black as -1, White as 0, and Asian as 1. For categorization errors, we used zero-inflated negative binomial models. Although not the main focus of the manuscript, we also tested for interactions with participant race and age (see SOM for more detail).

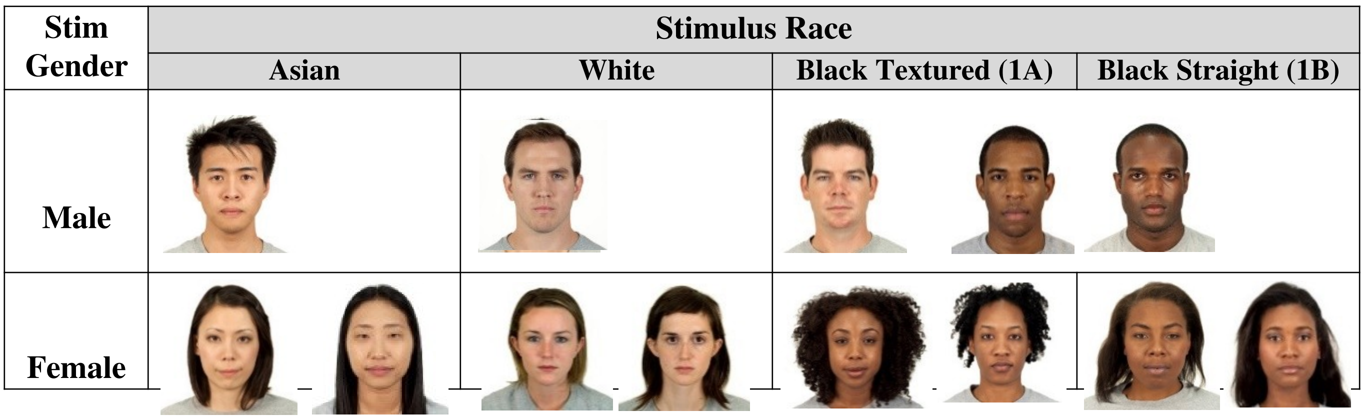


Figure 2. Sample stimuli of images of different race x gender groups shown to participants for categorization task. There were 8 images for each race x gender group for a total of 48 face stimuli.

Results

Training Trials: Replicating previous work, children were slower to categorize non-prototypical animals (*M*=2744, *SE*=117) relative to prototypical animals (*M*=2398, *SE*=116), *b*=-345, *SE*=96, *t*=-3.61, *p*=.003. There were no significant main effects for categorization errors (*b*=-0.30, *SE*=0.20, *z*=-1.52, *p*=.13), y-flips (*b*=-0.28, *SE*=0.26, *t*=-1.05, *p*=.29), x-flips (*b*=-0.02, *SE*=0.24, *t*=-0.06, *p*=.95), or AUC (*b*=0.03 *SE*=0.03, *t*=1.05, *p*=.29).

Experimental Trials

Table 1 shows the full set of results for each dependent variable.

DV	**Effects**	**beta**	***SE***	***t***	***p***	***p* (hair)**
Reaction	Gender	228.03	40.42	5.64	***p*<.001**	.46
Time (RT)	Race	-81.15	24.75	-3.28	**.001**	***p*<.001**
	Gender*Race	-119.46	49.45	-2.42	**.016**	***p*<.001**
AUC	Gender	-0.009	0.01	-0.68	.50	.44
	Race	-0.006	0.01	-0.71	.48	.37
	Gender*Race	-0.006	0.02	-0.42	.68	.46
Y-flips	Gender	0.03	0.16	0.18	.86	.98
	Race	-0.17	0.10	-1.71	.088	.16
	Gender*Race	-0.49	0.20	-2.51	**.012**	**.004**
X-flips	Gender	0.03	0.15	0.17	.86	.16
	Race	-0.16	0.09	-1.67	.096	**.022**
	Gender*Race	-0.11	0.19	-0.57	.57	.16
Errors	Gender	0.09	0.16	*z*=0.60	.55	**.032**
	Race	0.15	0.10	*z*=1.51	.13	**.016**
	Gender*Race	-0.35	0.20	*z*=-1.76	.078	.36

Table 1. Results for each dependent variable in Study 1A. The far-right column shows effects controlling for hair length.[2] Bolded numbers indicate significant *p*-values.

As in previous work, there was a significant interaction between stimulus gender and stimulus race in average response times, *b*=-119, *SE*=49.45, *t*=-2.42, *p*=.016 (see Figure 2). Breaking down this interaction by stimulus gender, participants were slower to categorize Black women (*M*=2239, *SE*=61) relative to White women (*M*=1999, *SE*=55) or Asian

[2] Although hair length and texture are correlated, all results are also robust to removing stimuli that exaggerate the correlation between hair length and texture (see SOM).

women (*M*=1954, *SE*=53), *b*=141, *SE*=36, *t*=3.88, $p<.001$. There was no effect of stimulus race for male stimuli (*p*=.51). Analyzed differently, participants were also slower to gender categorize Black women relative to Black men (*M*=1866, *SE*=51), *b*=-372.97, *SE*=74.50, *t*=-5.01, $p < .001$, much more so than for White women vs. White men (*b*=-163, *SE*=69.29, *t*=-2.36, *p*=.019) or Asian women vs. Asian men (*b*=131, *SE*=67.59, *t*=-1.94, *p*=.052.

Moving beyond the measures that replicate previous work, there was also a significant interaction between stimulus gender and stimulus race for y-flips, indicating that there was some degree of greater response complexity for images of Black women (interaction *b*=-0.49, *SE*=0.20, *t*=2.51, *p*=.012; see Figure 3). There were no main or interactive effects for any of the other measures. We also re-ran all our analyses controlling for hair length. Results for reaction times and y-flips do not change when controlling for hair length. However, a main effect of stimulus race emerged for both x-flips and errors when controlling for hair length, such that participants had fewer x-flips (i.e., less complexity) but greater errors in categorizing Asian vs. White or Black stimuli.

Discussion

In Study 1A, we replicated previous findings that children are slower to recognize Black women as members of their gender group relative to White or Asian women even when hair cues are present; in contrast, previous work had eliminated hair cues for women stimuli and thus could have artificially inflated errors and impeded categorization speed (Lei et al., 2020). We also used a larger set of stimuli from a different face database, which helps to address the generalizability of previous findings. However, it is unclear whether the marginalization of Black women would replicate if they were pictured with straightened hair. Thus, in Study 1B, we sought to examine whether showing Black women with straight hair would attenuate the effect observed in Study 1A and previous work.

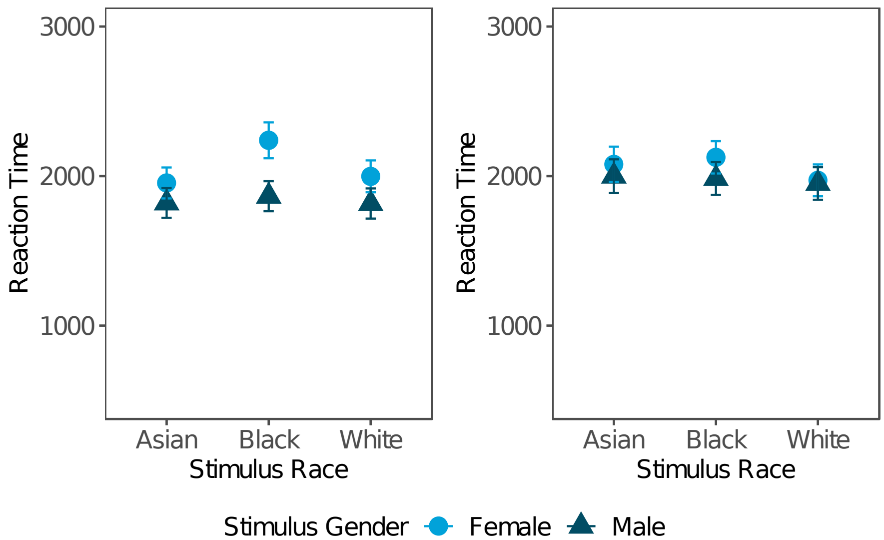


Fig. 3. Children's categorization speeds of stimuli for Study 1A (left) where pictures of Black women had textured hair and Study 1B (right), where pictures of Black women had straightened hair Smaller shapes represent individual means. Larger shapes represent group means. Error bars indicate 95% confidence intervals.

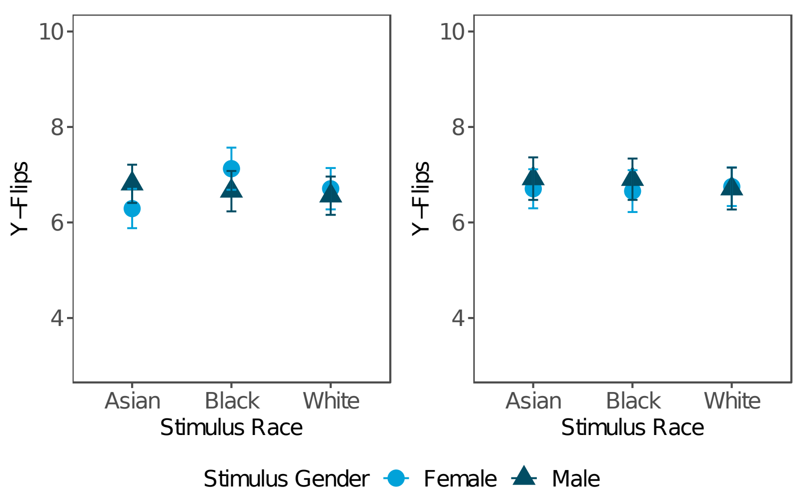


Fig. 4. Children's number of y-flips for Study 1A (left) where pictures of Black women had textured hair and Study 1B (right), where pictures of Black women had straightened hair Smaller shapes represent individual means Larger shapes represent group means by stimulus race and gender. Error bars indicate 95% confidence intervals.

Study 1B

Method

Participants

We recruited 61 children from online platforms such as Children's Helping Science and in-person at local community partner sites. Children ranged from 3-8 years old (*M*=6.23, *SD*=1.44, and consisted of 42 girls, 18 boys, and 1 unreported). Participants were mostly White (*n*=35), followed by Black (*n*=13), Hispanic/Latinx (*n*=3), and Asian (*n*=3), 7 race unreported, as indicated by parental self-report. We used the same power calculation as in Study 1 to determine our sample size.

Procedure and Materials

The procedure for Study 1B is identical to Study 1A, with one main difference. Instead of seeing Black women with textured hair, children saw images of Black women with straightened/relaxed hairstyles (see Figure 1). The analytic strategy was the same as in Study 1A.

Results

Training Trials

Replicating results from Study 1A, images of non-prototypical animals (*M*=2939, SE=128) were categorized slower than prototypical animals (*M*=2600, *SE*=126), *b*=-340, *SE*=115, *t*=-2.96, *p*=.003. There were also more y-flips for non-prototypical targets (*M*=7.84, SE=0.59) than prototypical targets (*M*=7.00, SE=0.9), *b*=-0.85, *SE*=0.34, *t*=-2.48, *p*=.013, as well as more x-flips for non-prototypical targets (*M*=7.98, *SE*=0.58) than prototypical targets

(*M*=7.20, SE=0.57), *b*=-0.78, *SE*=0.34, *t*=-2.30, *p*=.022. We found a marginally significant main effect for categorization errors with children making more errors for non-prototypical targets (*M*=0.12, *SE*=0.02) than prototypical targets (*M*=0.07, *SE*=0.02), *b*=-0.60, *SE*=0.24, *z*=-2.54, *p*=.011), and no significant main effect for AUC (*b*=-0.04, *SE*=0.03, *t*=-1.43, *p*=.15).

Experimental Trials

Table 2 has the full results of models for each dependent variable.

DV	**Effect**	**beta**	***SE***	***t***	***p***	***p* (hair)**
RT	Gender	80.04	42.55	1.88	.060	.21
	Race	-7.53	26.05	-0.29	.77	.80
	Gender*Race	-30.76	52.12	-0.59	.56	.62
AUC	Gender	-0.001	0.01	-0.04	.97	.42
	Race	-0.001	0.01	-0.12	.91	.57
	Gender*Race	0.001	0.02	0.05	.96	.97
Y-flips	Gender	-0.14	0.16	-0.85	.40	.70
	Race	0.02	0.10	0.15	.88	.65
	Gender*Race	0.02	0.20	0.09	.93	.88
X-flips	Gender	-0.09	-0.02	-0.53	.60	.99
	Race	-0.01	0.01	-0.07	.94	.99
	Gender*Race	-0.001	0.20	-0.005	.99	.99
Errors	Gender	0.14	0.17	*z*=-0.81	.42	.25
	Race	0.17	0.10	*z*=-1.66	.098	**.020**
	Gender*Race	0.28	0.21	*z*=0.85	.40	.25

Table 2. Results for each dependent variable task in Study 1B. Bolded numbers indicate significant *p*-values.

Looking first at reaction times, there was a marginal main effect of stimulus gender, *b*=80.04, *SE*=43, *t*=1.88, *p*=.060. Unlike Study 1A, however, there was no significant effect of stimulus race (*b*=-7.53, *SE*=26.05, *t*=-0.29, *p*=.77), nor was there a significant interaction between target race and target gender (*b*=-30.76, *SE*=52, *t*=-0.59, *p*=.56) for reaction times.

Although there were no significant main effects or interaction of stimulus race and stimulus gender for AUC, y-flips, or x-flips, we did unexpectedly find a marginal main effect of stimulus race on the number of errors made, b=0.17, SE=0.10, z=1.66, p=.098. There was no higher order interaction with participant age for either reaction times, b=-44, SE=37, t=-1.20, p=.23, or errors, b=0.007, SE=0.007, t=0.93, p=.36.

General Discussion

Across two studies, we examined whether children's gender categorizations would be sensitive to hair cues, and whether the impact of hair cues would differ for Black women depending on the specific hairstyle. When children viewed images of Black women with textured hair, we replicated previous work demonstrating the psychological marginalization of Black women from their gender group (Lei et al., 2020; Leshin et al., 2022). However, when children viewed images of Black women with straightened hair, children did not demonstrate the same sort of marginalization of Black women. Furthermore, accounting for hair length did not alter the main results.

Theoretically, these data provide some initial evidence for how children might integrate multiple category-relevant cues, suggesting a connectionist pattern of activation where the tapestry of a stimulus' features can either inhibit or facilitate category activation (e.g., Kunda & Thagard, 1996). In the context of the current work, Black women's natural or textured hair may constrain perceptions of femininity because it is does not conform to a cultural prototype; in contrast, when Black women wear their hair in a straightened style, it may facilitate female gender categorizations because it more closely matches that prototype. The greater response complexity in Study 1A may have arisen from competing perceptual cues when gender-categorizing Black women wearing a natural hairstyle. Secondarily, children's faster overall categorization of men also provide evidence for an androcentric bias, even when salient perceptual gender cues exist for both genders.

We focused on how hair cues might specifically impact categorization of Black women, but this work opens new questions about whether natural hair would influence categorization of Black men as well, and how children reason about gender atypical hair styles (e.g., locs) and textures more broadly. Although gender non-stereotypical hair may also impede gender categorization for Black men, it also may not impede gender categorization if children have dark skin color=masculine associations. Finally, whether these effects hold in other contexts where variation in Black hairstyles is common (e.g., in Africa) is also an open question. Future work should test these possibilities.

Narrowly defined gender prototypes can have a range of very real consequences, such as less media attention being directed towards missing women of color vs. White women (Slakoff & Fradella, 2019), as well as pressures for women and girls of color to conform to the category prototype (Collins, 1991). The present work suggests that the way that Black girls and women wear their hair may be one salient way that children begin to exclude Black girls and women from their representations of girl- and womanhood.

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