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CHILDREN'S BELIEFS ABOUT HIERARCHICAL STRUCTURES AND
RELATIONSHIPS

By

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College of Arts and Sciences of the University of Louisville
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in Experimental Psychology

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University of Louisville
Louisville, Kentucky

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By

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A Dissertation Approved on

April 14, 2023

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DEDICATION

I would like to dedicate this dissertation to my parents, Pleas and Carol Norris, who have supported me throughout my academic journey and whose love and encouragement have guided me in my pursuit of a PhD.

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ABSTRACT

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Megan N. Norris

April 14, 2023

Children are surrounded by social structures such as families, schools, and workplaces which are often arranged hierarchically with some people holding more power than others. This dissertation explores how children think about hierarchical relationships and more complex hierarchical structures. In Chapter 2, children were asked to evaluate the traits of people who hold hierarchically dominant and subordinate social roles. With age, 4- to 6-year-olds increasingly inferred that dominant individuals have social power and they deferred to their instructions (Chapter 2, Study 1). Furthermore, 5- and 6-year-olds attributed knowledgeable to individuals with dominant social roles but overall children did not prefer to ask those individuals for information (Chapter 2, Study 2). Chapter 3 extended these studies by presenting children with larger social structures depicting gender and racial inequality and asking children to recognize inequality (Study 1), rectify inequality (Study 2) and create social hierarchies (Study 3). Regardless of age, participants judged hierarchies with more than one woman or Black man in a position of power as fair. However, hierarchies with only one minoritized individual were judged as neutral in gender hierarchies or unfair in racial hierarchies (Chapter 3, Study 1). Children were also asked to rectify inequality by promoting individuals to positions of power in

unequal control (arbitrary non-social color groups), gender, and racial hierarchies. Children selected to promote majoritized individuals to positions of power when they were arbitrary groups and children's gender influenced their responses to gender inequality where girls promoted more women to positions of power than boys (Chapter 3, Study 2). Lastly, children created a social hierarchy without the influence of representations of inequality. In-group gender favoritism drove children's selections where girls selected more women than men for every tier of the hierarchy but boys were only influenced by gender when selecting someone for the top of the hierarchy. When making racial hierarchies, children selected both White men and Black men equally to be in positions of power (Chapter 3, Study 3). These studies suggest that children can infer power from simple hierarchical structures and that they are motivated to rectify inequalities in more complex social structures.

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CHAPTER I

CHILDREN'S BELIEFS ABOUT HIERARCHICAL STRUCTURES AND RELATIONSHIPS

Social Categories

The world is complex and made up of various objects, animals, and people. An important part of development is learning how to navigate this complex world, and children begin to do this by placing the world's components into categories. By grouping objects or people that are similar, children can easily encode and retrieve information about a group and use that information to make inferences about a novel group member (Gelman & Meyer, 2011). This process allows children to easily and quickly interact with their environment.

Children begin to categorize the social world in infancy (Lieberman et al., 2017) and can categorize faces by gender (Ramsey et al., 2005) and race (Kelly et al., 2005) early in development. Early work on infant's looking times in categorization tasks suggest that infants look more at women's faces and faces from their racial in-group than at men's faces or those from racial out-groups. However, better discrimination between and preferences for women's and in-group faces in infancy is based on familiarity and experience, rather than an innate preference for these faces (Bar-Haim et al., 2006; Ramsey et al., 2005; Sangrigoli & de Schonen, 2004). As children grow older, they begin to gather information about the people around them from their observations and experiences. A persistent question in psychology is how they use this information to form

categories. Do children use perceptual similarity to form categories, or do children have naïve or early emerging theories that guide their inferences about the kinds of things that belong together (see Gelman & Meyer, 2011 for review)? Research suggests that children attend to both perceptual features and less observable properties. For example, when young children have little information about objects, they will use perceptual features like shape to group them. But, when objects have a similar shape but differing functions, children use function as a mechanism for categorization (Diesendruck & Bloom, 2003).

Children's and adults' use of non-obvious features to facilitate categorization has been taken as evidence that human thought is influenced by psychological essentialism. Psychological essentialism is the belief that categories are unchanging, are not superficial, and that the observable features of entities reflect underlying, unobservable qualities, "essences" or insides (Gelman, 2003). The belief that categories are grouped by a deeper essence that goes beyond perception allows people to use categories to make inductive inferences about novel exemplars that are category members (Gelman & Markman, 1986). For instance, children know that skunks have a white stripe down their back and that they smell bad. However, if a raccoon is made to look exactly like a skunk, children will infer that the raccoon will not smell bad because the inner essence that makes that animal a raccoon has not changed with its appearance (Keil, 1989). Essentialist ways of thinking are also applied to children's intuitions about people. Haslam (2000) found that adults believe that social categories such as gender, race, and ethnicity are naturally occurring. Children also use essentialist reasoning when thinking about gender and race (see Heyman & Giles, 2006, Prentice & Miller, 2007, or Rhodes &

Mandalaywala, 2017 for review). For instance, children believe that gender is innately derived (Taylor, 1996) and race is unchanging over time (Roberts & Gelman, 2016).

One way to facilitate children's categorization is through the language used to talk about groups and group members (Gelman & Meyer, 2011). Labels play a key role in forming categories and supporting children's inductive inferences, especially about other people. For instance, when children learn about a child who is a "carrot-eater" they will use what they know about one carrot-eater to make inferences about another. However, they do not similarly extend what they learn to a child who "eats a lot of carrots."

Although the content of the two utterances is quite similar, one supports inductive inferences and the other does not (Gelman & Heyman, 1999). Children also use category labels to guide their inferences about unusual group members (Gelman & Coley, 1990). For example, even though a Dodo is an atypical and unfamiliar bird, children will use what they know about typical birds in making inferences about a Dodo (e.g., presuming that a Dodo will live in a nest). Labels like "carrot-eater" and "bird" are what are referred to as generic labels, phrases that allude to entire categories rather than a specific individual (e.g., "girls" or "bears" versus "this girl" or "that bear"). Generic labels provoke category formation, and information presented using generics (e.g., birds have hollow bones) is assumed to be typical of the broader category that the generic label references. Toddlers use generics to form distinct social categories even when two people look exactly the same (Rhodes et al., 2018). Additionally, when hearing generics, children are more likely to associate a trait with that category member's essence. When children hear that "Flarpies like flowers" they associate liking flowers with other members of the group as well. In contrast, if children hear that "this Flarpie likes

flowers,” they attribute that preference to the individual and not the broader group (Cimpian & Markman, 2011).

Children often hear people referred to by their social role labels which communicate how people relate to one another. Children understand that roles such as ‘mother,’ ‘teacher,’ ‘husband,’ or ‘chef,’ communicate information about some of the responsibilities or skills that one may have (Noyes et al., 2021), and children can use those roles to make inferences about people. For example, when playing with dolls, children as young as 4-years-old know that a doctor doll will ask a patient doll questions and examine them while the patient doll answers the doctor’s questions, an interaction that follows real-life scripts and reflects differences in authority, knowledge, and status. By age 6, children believe that a doctor doll can also act as a patient, so that they might fall into more than one social category simultaneously (Watson & Fischer, 1980). This research shows that, in early childhood, children use not only natural kind labels (e.g., ‘bear’ or ‘man’) but they also use social role labels to guide their inferences about how someone will behave in relation to those with complementary roles and can even conceptualize a single person holding multiple social roles.

Although useful for making inferences about others, use of generic labeling and essentialist beliefs can lead to dangerous over-generalizations about people based on their group membership. Bigler and Liben (2006) developed a theory for stereotype development called the Developmental Intergroup Theory which posits that, among other things, explicit labeling and use of labels increases the psychological salience of a person’s attributes, leading to categorization based on the labeled dimension and eventually social essentialism of that category. Bigler and Liben propose that this process

ultimately leads to the development of stereotypes and prejudices associated with salient social groups. Other factors that bolster the development of stereotypes include in-group bias and communicating, implicitly and explicitly, the traits to group members.

The categorical, group-based cognition described above is not necessarily problematic on its own, but preferences for in-group members, and perhaps biases against out-group members are present in early infancy. As mentioned above, infants show a preference for the faces of people that they are familiar with (Bar-Haim et al., 2006; Sangrigoli & de Schonen, 2004) and those people tend to be members of their racial in-group. In-group favoritism persists into childhood (Aboud, 2003) and affects how children interact with the people around them. For example, when accuracy is held constant, children trust information from people who share their accent (Kinzler et al., 2011), sex (Taylor, 2013), and race (McDonald & Ma, 2016). In-group biases are not limited to familiar, real-world groups. They are measurable even for groups with apparently arbitrary membership (for a review, see Dunham, 2018). A perceptual feature as basic as a shared shirt color paired with a label is sufficient to generate a social group and provoke in-group preferences and out-group bias. Minimal group membership is powerful enough to guide who children want to befriend (Sparks et al., 2017; Plotner et al., 2015), who to allocate resources to (Tajfel, 1970; Diehl, 1990), and who to learn from (Hetherington & Hendrickson, 2014, MacDonald et al., 2013).

Divisions between groups can have harmful effects when positive and negative attributes of the group are explicitly or implicitly communicated (Bigler & Liben, 2006). Although explicitly communicating a group or group member's negative traits is not a common occurrence, when it does occur, it is especially powerful and informative

because it both marks the group using a label and provides justification for why a group may be ‘othered’ or low status. For example, saying, “girls are bad at math,” marks girls as different from boys and in a way that communicates that girls may not be as smart as boys. Explicit communication of stereotypes like “girls are bad at math” can have a cyclical effect where this stereotype is used as an explanation for implicit communication of stereotypes such as only boys being shown on science and math posters in a school (Bigler et al., 2001), and these stereotypes guide people’s expectations about group members. Stereotypes, reflecting real or imagined differences, are sufficient to influence people’s person judgements and to yield changes in behavior, leading to underrepresentation and perpetuating harmful stereotypes (Reyna, 2000). For example, the stereotype that boys are better at math than girls may communicate to young girls that they are bad at math – whether or not it is true – which causes them to become disinterested in STEM or to disengage from pursuing careers in STEM fields (Bian et al., 2018). People then see that girls are not represented in fields where knowledge of math is used, and women’s underrepresentation in STEM fields reinforces the existing harmful stereotype. Teachers may then believe that this stereotype is true and do less to encourage girls to engage with valuable activities, such math clubs or math team, further reducing their representation in STEM fields (Reyna, 2000).

In-group favoritism and communication of stereotypes work together to create intergroup bias and prejudice. For example, Patterson and Bigler (2006) conducted a study where teachers put their students into red and blue shirts. In one classroom, the teacher explicitly labeled students as red or blue (providing labels) and then used group membership to organize their classroom by calling on children using the color groups and

decorating their cubbies according to their group color (implicit and explicit use of group membership). The teacher in the other classroom ignored the color groups. In both classrooms, children developed biases against their out-group, but the effect was exaggerated when the teacher communicated the group membership through labels and treating group members differently. These results suggest that simply making groups perceptually discriminable is sufficient to cause children to develop biases against out-group members, but the addition of explicit references to group membership significantly increases bias in children. A classic exercise by Jane Elliott used a similar paradigm. She divided her class by eye color, giving students with blue eyes privileges that the brown eyed students did not have (Peters, 1987). This was an eye-opening – if ethically questionable – demonstration of the development of group-level bias. The groups in Elliot’s classroom were relatively random, but there are real class-, race-, and gender-based stereotypes that are associated with social groups that contribute to the perpetuation of systemic inequality and the oppression of minoritized individuals.

Social Power and Hierarchies

Social categories are labels for groups of people and include concepts such as race (Chen et al., 2018; Roberts & Gelman, 2015), gender (Gulgoz et al., 2018; Taylor & Gelman, 1993), and ethnicity (Birnbaum et al., 2010; Diesendruck & HaLevi, 2006). In addition to providing information about individuals in a group, social categories also often reflect relationships *among* group members. For example, groups of people, such as schools, families, and businesses are often hierarchically structured, with some group members having status and authority over other group members. It is, however, unclear how our understanding of hierarchical social structures emerges and changes over the

course of development, or how these structures contribute to real-world social inequality. Thus, the goal of this dissertation is to explore children's understanding of social power and the inequalities that are reflected in human social groups.

Social categories may facilitate children's understanding of the power dynamics between individuals. For example, children may categorize teachers as people who are in charge or knowledgeable, and then infer that they should listen to the instructions of teachers, even when those teachers are unfamiliar. However, categorizing people can go wrong and lead to harmful group stereotypes that perpetuate inequality. My dissertation has two goals: 1) To investigate whether children use dominant social roles like "Mother" and "Teacher" to guide their inferences about social power and knowledgeability, and 2) to understand how children perceive and respond to underrepresentation of social groups (e.g., women and Black men) in social hierarchies.

Children's initial sensitivity to power structures is apparent even in infancy. Infants appear to believe that numerical and physical size are indicators of social power, inferring that bigger individuals and larger groups will be more physically dominant than smaller individuals and groups (Pun et al., 2016; Thomsen et al., 2011). These intuitions become more nuanced over time. As young as 3-years-old, children believe that having control of resources, achieving goals, and giving others permission to use objects are signs of having power (Gulgoz & Gelman, 2017). As children get older, they include setting norms and giving orders as indicators of social power (Gulgoz & Gelman, 2017). Similarly, Enright et al. (2020) found that children associate wealth, physical dominance, decision-making power, and prestige with being 'in charge' and having high status. Similar findings have been replicated cross-culturally. For instance, French children infer

social dominance from decision-making power, having access to resources, and physical supremacy (Bernard et al., 2016; Charafeddine et al., 2015) and Mayan children use physical dominance to guide their inferences about who is powerful (Castelain et al., 2016). Children also use non-verbal cues such as posture and eye contact to decide who has more social power (Brey & Shutts, 2015). Furthermore, children understand that institutions may grant people in certain roles authority (Noyes et al., 2020). For example, schools empower ‘teachers,’ and this power is not only about physical size or age, as similar authority is not necessarily attributed to other adults, but it may be attributed to other children, if an institution invests them with the power to tell others what to do. (e.g., children judged that non-teacher adults are not authorities, while child hall monitors are authorities, see Laupa, 1994). As children begin to recognize cues to social power they are laying the foundation to conceptualizing hierarchies and differential social power between groups and individuals within the same group.

In addition to simple labels and physical or behavioral cues, children use social categories like race and gender to infer social power and form beliefs about status hierarchies. For instance, Dukler and Liberman (2022) found that children use race and posture to infer who has social power. They asked 3- to 11-year-olds to decide who was in charge, and children inferred that White individuals had more power than the Black individuals when only race was varied between individuals. However, when race was presented in conjunction with posture (e.g., a Black man with his hands on hips and a direct gaze), children used posture more than race to decide who was in charge. Children’s use of race as an indicator of social status has been demonstrated in the literature. Children believe that White people are wealthier than Black people

(Mandalaywala et al., 2020) and Black children attribute more low status jobs to Black people (Bigler et al., 2003). Children hold similar beliefs about gender. Children rate boys as having higher status (Mandalaywala et al., 2020) and as being more intelligent than girls (Bian et al., 2017; Jaxon et al., 2019). However, regardless of their own race, children believe Black men to be less brilliant than Black women (Jaxon et al., 2019). Stereotypes about gender and intelligence often lead women to believe they are not fit for high status occupations (Bian et al., 2018), likely increasing underrepresentation of women in high power jobs.

Beyond stereotypes about the relationships between race, gender, and power, there are also issues with how people think about representation and power asymmetries. Asymmetries in social power and status among different groups advantage some groups or identities over others, but there is also disagreement about the seriousness and nature of these such inequalities. For example, Americans tend to underestimate the magnitude of differences between groups (Arsenio, 2018). Norton and Ariely (2011) found that adults recognize that wealth inequality exists, and they prefer that social structures be egalitarian. However, adults have a poor understanding of how inequitably wealth is actually distributed. When adolescents are asked to judge wealth inequality, they underestimate wealth inequality more than adults and they exhibit even stronger preferences for egalitarian hierarchies than adults (Arsenio & Willems, 2017). Furthermore, 6- to 8-year-olds prefer when decision-making is egalitarian rather than a single group member making decisions for the group (Thomas et al., 2022). Despite children being aware of stereotypes that individuals in different, often minoritized, groups have less social power and authority than individuals in majoritized groups

(Bigler et al., 2008), little is known about how children think about inequality within social hierarchies. Elenbaas and colleagues (2020) suggest a model for understanding how children reason about social inequality. The Social Reasoning Developmental (SRD) model theorizes that reasoning about social inequality is informed by three forms of knowledge: Morality (e.g., fairness, rights, other's welfare), Group Identity (e.g., group dynamics, perceptions of group status), and Psychological Knowledge (e.g., mental state knowledge, attributional intention). Additionally, the SRD framework outlines that the best ways to explore these three forms of knowledge are to research how these concepts are applied to children's development of 1) awareness of social inequalities, 2) explanations for social inequalities, and 3) behaviors that rectify or perpetuate inequality.

Research shows that infants become aware of resource inequality in the first year of life (Sommerville, 2018). By kindergarten children are aware of wealth inequalities and how wealth inequalities relate to social categorization, and they are even able to identify rich and poor peers (Hazelbaker et al., 2018), suggesting an early awareness of social stratification. Children are also able to explain these inequalities, often using merit as an explanation for people being near the top of social hierarchies and as a means for upward social mobility (Enesco & Navarro, 2003; Rizzo et al., 2020). However, when using these types of explanations about social groups, children may attach negative stereotypes about work ethic and competence to social groups that have been historically oppressed (Pauker et al., 2016) which promote beliefs that perpetuate the inequality within society. When generating explanations about social stratification of groups rather than individuals, adolescents are more likely to give structural explanations than younger children, but even then these explanations are coupled with assumptions about

differences in group effort and ingenuity (Godfrey et al., 2019). Lastly, when assessing children's behaviors, it appears that children are averse to structural inequality, choosing to rectify inequality when someone was disadvantaged because of their gender, but to perpetuate inequality that was merit-based (Rizzo et al., 2020). Additionally, adolescents choose to give disadvantaged groups more opportunities (e.g., choosing them to go to an expensive camp) when members of that group were previously excluded from opportunities because of their lack of wealth (Elenbaas, 2019).

Although children generally seem to be aware of social inequality and motivated to rectify it, individual differences play an important role in how children approach social inequality. Children's own status or the status of their in-group, for example, can lead them to attribute less positive attributes to poor people (Mistry et al., 2015) and even minimize or deny the extent of social inequalities. For example, 3- to 8-year-olds who were randomly assigned to an advantaged novel group were more likely to say that inequality was fair and to support perpetuation of that inequality (Rizzo & Killen, 2020). However, in a similar paradigm that extended the age range to 10- and 11-year-old children and used racial in- and out-groups, older children rectified inequality no matter their status, citing the importance of having equal access to resources (Elenbaas et al., 2016). Additionally, children's beliefs about group-based hierarchies may be influenced by their parents' social dominance orientation. Research has shown that parents who have low support for hierarchy tend to have children who allocate more resources to an out-group member in a resource allocation task than the children of parents with high support for hierarchy (Reifen-Tagar et al., 2017).

The Current Project

The studies included in this dissertation address how children think about social hierarchies. In Chapter 2, research is reported where 4- to 6-year-old children were asked to evaluate the traits of people who hold hierarchically dominant and subordinate social roles. This work investigates whether or not children attribute social power to people with dominant social roles. The goal of this research was to establish a basis for understanding how labels communicate hierarchical relationships to children. Establishing that children are attending to the label to decide who has power (Chapter 2, Study 1) shows that young children are aware of social hierarchies and use them to make inferences about people's knowledgeable ability (Chapter 2, Study 2). Chapter 3 extends these studies in three ways: 1) children were presented with social groups that were arranged in structural hierarchies rather than individuals in relational hierarchies, 2) children were presented with structural inequality within a hierarchy, and 3) the age range was extended to include 7- to 9-year-olds. Chapter 3 also addresses facets of the SRD model by examining whether children *recognize* inequality (Chapter 3, Study 1) and then *behave* to rectify it (Chapter 3, Study 2). This work also examines whether children create status hierarchies (Chapter 3, Study 3) that are equitable, probing children's moral and group reasoning to identify how children's views on social inequality emerge and change with age. Together, the studies in this dissertation address how children think about social hierarchies at different levels of social interaction, contributing to our knowledge of how people think about hierarchical social structures and systemic inequalities.

The goal of this dissertation is to develop a better understanding of how people think about and respond to structural inequality. Do people reject the notion of structural

racism and sexism because perceiving structural inequalities is more difficult than perceiving other kinds of inequality (e.g., resource inequality, which children perceive and address when given opportunities to do so, see Shaw & Olson, 2012; 2013; Li et al., 2014), or are even children sensitive to structural inequalities and – through a combination of exposure and denial – they make themselves blind to the inequalities around them? The research reported here represents the critical first steps in answering these important questions.

CHAPTER II

LISTEN TO YOUR MOTHER: CHILDREN USE HIERARCHICAL SOCIAL ROLES TO GUIDE THEIR JUDGEMENTS ABOUT PEOPLE

Imagine a child in their school classroom. The classroom is a context with a distinct, hierarchical structure that determines the relative power, rights, knowledge, and responsibilities of each person in the room. Some of this structure is communicated explicitly, but much of it is assumed or implied. The children in the room may vary on many social and cognitive dimensions, but they are all “students” and therefore subordinate to a “teacher.” In this context, the teacher holds significant power over their students; they are more knowledgeable than their students, and their students are required to follow their directions, conform to their rules, and receive information from them. However, a teacher’s power is coupled with a responsibility to educate and care for their students. These reciprocal relationships can be expressed by the social role that a person holds but it is unclear at what age children begin to use the labels associated with social roles to infer a person’s social power and knowledgeability.

Children use categories to navigate the world, placing objects, animals (e.g., see Dolgin & Behrend, 1984; Jipson & Gelman, 2007), and people into social categories. Children can use an individual’s features and attributes to categorize them into informative, socially constructed groups, including races (Roberts & Gelman, 2015; 2016) and ethnicities (Diesendruck & HaLevi, 2006). Beyond simply grouping and

labeling individuals, social categories support children’s inductive inferences. Children and adults can use what they know about a social category to infer a person’s unobserved – or unobservable – features (Gelman & Markman, 1986), to make predictions about their future behaviors (Liu et al., 2007), and to interact with them appropriately (Gelman & Meyer, 2011). People may also categorize others by the role that they hold, such as ‘chef,’ ‘spouse,’ or ‘caregiver’ and use those roles to guide their inferences. For example, adults are more likely to use a person’s occupation than their gender to infer the rights that they hold, their personality traits, and their skills (Noyes et al., 2021a), and 8- and 9-year-olds believe that occupying a certain social role can dictate how one acts in the world (Noyes et al., 2020).

Researchers commonly seek to understand how the boundaries between social groups influence children’s intuitions and judgements about group members and non-members (Ho et al., 2015; Roberts & Gelman, 2015), and how those intuitions may or may not change over the course of development. This construal of social categorization, defined by boundaries between groups, is not the only context for thinking about group membership. Instead of focusing on how social categories separate people from one another, studying social categories through the lens of social roles creates an opportunity to explore how social categories relate to one another in a complementary fashion.

Watson (1984; Watson & Fischer, 1980) contextualized group membership in terms of “social roles,” social categories defined by their interactions with – and obligations to – complementary social categories, such as a teacher and a student.¹

¹ Not to be confused with Social Role Theory (Eagly & Koenig, 2021; Koenig & Eagly, 2014), which is concerned with how over-representation of a social group in an occupational role leads to stereotypes (e.g., women are stereotyped to be nurturing

Children begin to understand the structure of social roles early in development.

Relational reasoning emerges in infancy and becomes more sophisticated through the preschool years (Holyoak & Lu, 2021). For example, Watson and Fischer (1980) mapped the developmental trajectory of social role understanding. They found that 4-year-olds played with dolls in a manner that demonstrated that they understood the nature of their complementary social roles (e.g., the ‘doctor’ doll examined and cared for the ‘patient’ doll). By age 6, children were able to navigate scenarios where dolls held more than one complementary social role (e.g., a doctor who was also the father of his patient).

Similarly, Haight and colleagues (1985) used more direct tests to demonstrate that 4- and 5-year-olds understand that doctors and patients hold complementary roles where the doctor asks questions and conducts medical exams and patients answer questions and give personal information. These findings suggest that children exhibit an understanding of the power dynamics between complementary social roles early in development, and that they can flexibly shift to consider different social roles, even when they are held by the same person.

In addition to communicating asymmetries in power, social roles also communicate asymmetries in knowledge. Children are attentive to individuals’ attributes when deciding whether they are a good source of information, including previous accuracy (Koenig & Harris, 2005), benevolence (Landrum et al., 2013), confidence (Brosseau-Liard et al., 2014), and attractiveness (Bascandziev & Harris, 2016; see Tong et al., 2019, for a meta-analysis of children’s selective trust). Children’s familiarity with

because they are over-represented in caregiving professions), rather than the relationship *between* complementary social roles.

an informant also influences their trust in them. Children prefer to learn from their mothers and familiar teachers compared to adult strangers (e.g., Corriveau & Harris, 2009; Corriveau et al., 2009). In these studies, social role is not studied directly. Instead, familiar social roles are used to communicate and manipulate variability between individuals on several salient dimensions. For example, mothers and teachers are socially powerful, familiar, knowledgeable, and benevolent informants relative to strangers.

Referencing these social roles is a very useful shortcut that children may use to make social comparisons or person judgements. However, social roles are not freestanding group labels. They exist within hierarchically organized institutions that establish and enforce the powers, rights, and responsibilities of individuals. Institutions may be informal (e.g., a family or peer group) or formal (e.g., a school or business), but both kinds of institutions may incorporate complementary social roles, and social roles are often defined by obligation and power asymmetries. Powerful, knowledgeable, dominant individuals (e.g., doctors, parents, teachers, etc.) have obligations to, and power over, subordinates (e.g., patients, children, students, etc.), and subordinates have obligations to dominant individuals, but subordinates know less and often have little power over them.

Children's understanding that institutions empower individuals to act in certain ways develops in early childhood (Noyes et al., 2020). Children increasingly judge that group membership is driven by institutions and have a sophisticated understanding that being a member of a group requires understanding of norms within the group (e.g., being a teacher requires following the rules of the school; Noyes & Dunham, 2020). Moreover, by ages 8 and 9, children begin to understand that certain kinds of actions, such as

punishing people or making rules, can only be undertaken by individuals sanctioned by a community (Noyes et al., 2020). Thus, older children understand that certain social roles are imbued with power from society.

The current study focuses on directly studying young children's understanding of *complementary* social roles. Children are familiar with many social roles, but it is unclear what the structure of these roles suggests about the individuals holding them. Certainly individuals holding dominant positions in a hierarchy tend to have both social power and knowledge, but do children understand that different positions in a social hierarchy communicate different degrees of relative social power and knowledge, or do they believe that the features of a given social role are relatively independent of its placement in a social hierarchy? In other words, does the hierarchical structure of complementary social roles contribute to children's intuitions that some individuals are more powerful and knowledgeable than others?

By investigating the development of children's understanding of social roles, we can determine whether children are sensitive to the power asymmetries implied by hierarchical social roles and explore how children use these roles to make judgements about others. We are particularly interested in how children respond when *only* hierarchical social roles are presented as pertinent cues to power and knowledgeability. Previous studies have shown that children as young as age 5 can judge someone as "in charge" using non-verbal cues like posture and eye contact (Brey & Shutts, 2015), and children can use information about past decision-making (Bernard et al., 2016), physical dominance (Charafeddine et al., 2015), knowledgeability (Brosseau-Liard & Birch, 2011; Koenig et al., 2004; Koenig & Harris, 2005), and benevolence (Landrum et al., 2013) to

make judgements about an individual. In many cases, children must make inferences about individuals with little information, knowing only that they are a “teacher” or a “parent.” Because social roles are familiar, complementary, and hierarchically arranged, the structure of these roles may provoke children to treat them as powerful and informative cues that support their inferences about others when relevant historical and trait information is unavailable. Indeed, children use social role as an indicator of authority, suggesting that individuals should be obedient to institutionally recognized individuals, such as teachers and hall monitors (Laupa, 1991; 1994; Laupa & Turiel, 1986).

In Experiment 1, we investigate whether children are sensitive to the asymmetries in social power between individuals holding complementary social roles. Specifically, we measure whether 4-, 5-, and 6-year-old children use social role as an indication of social power when two individuals are otherwise very similar. In Experiment 2, we assess the degree to which social roles are generalizable. Does holding a dominant social role, such as parent or teacher, imply that the role holder is generally “superior” to an individual holding a complementary (and subordinate) social role (e.g., child or student), or is the information communicated by social role relatively domain-specific? We elected to test 4-, 5-, and 6-year-olds because previous literature suggests that children in this age range have developed a concept of social role (Watson, 1984; Watson & Fischer, 1980) and demonstrated an understanding of social power (Bernard et al., 2016, Brey & Shutts, 2015; Charafeddine et al., 2015) and relational reasoning (Holyoak & Lu, 2021). These studies investigate how the hierarchical structure of social roles influences children’s intuitions about the individuals who hold them. More generally, the results of these

experiments will contextualize prior studies that incidentally reference hierarchical social roles, and provide support for future investigations that use complementary social roles as stimuli.

Experiment 1

In Experiment 1, we investigated children's judgements about the relative social power held by people with dominant and subordinate social roles. Four-, 5-, and 6-year-olds were shown two informants who held hierarchical social roles (e.g., a mother and daughter). The informants provided conflicting instructions to a third target character. Participants chose which instructions the target character should follow and which informant "can tell others what to do." Together these questions assess whether children think people who hold dominant social roles have more power than those who have subordinate social roles. Prior studies show that children trust testimony from teachers and mothers over that of strangers (Corriveau & Harris, 2009; Corriveau et al., 2009), and that children attribute authority to teachers (Laupa & Turiel, 1986). These studies indirectly included factors such as familiarity and position of authority as features of individuals viewed as "trustworthy" or "informed," and these individuals were only presented in contrast to less trustworthy or authoritative informants (e.g., strangers). We are not aware of any prior studies that *directly* investigate whether children are sensitive to how placement in a hierarchical structure relates to social power.

In order to ensure that children focused on the social roles attached to each informant, we carefully matched informant pairs on as many dimensions as possible so that orthogonal features of informants (e.g., age, attractiveness, race, gender, clothing, etc.) would minimally influence children's inferences. If children privilege the

instructions the dominant informant provides, then we can conclude that children are sensitive to the power asymmetries communicated by social roles within hierarchical social structures. However, if children choose the subordinate informant's instructions, or if they select instructions randomly, it would suggest that children are relatively insensitive to the differences implied by hierarchically structured social roles. In order to more explicitly probe children's intuitions about the relative power of different social roles, we also asked children to identify the more powerful informant. Recent work shows that children respond differently when asked to evaluate information presented by two informants versus evaluating the informants themselves (see Tong et al., 2019). Thus, these two questions provide opportunities to investigate the emergence and development of children's implicit and explicit understanding of social roles and social power.

Method

Participants

Participants included 20 4-year-olds ($M = 4.51$, $SD = 0.29$, 9 girls and 11 boys), 21 5-year-olds ($M = 5.47$, $SD = 0.29$, 10 girls and 11 boys), and 20 6-year-olds ($M = 6.54$, $SD = 0.29$, 12 girls and 8 boys). Children were recruited from local private schools and from a database of families living in a South Eastern city. Eighty-five percent of participants were White, 11.5% were African American, 1.6% were Asian, and parents of the remaining 1.6% of our sample did not provide this demographic information. In this sample, 3.3% of participants were Hispanic, 95.1% were not Hispanic, and parents of 1.6% of our sample did not provide this demographic information. An a priori power analysis was performed using G* Power (Faul et al., 2007) which showed that with a

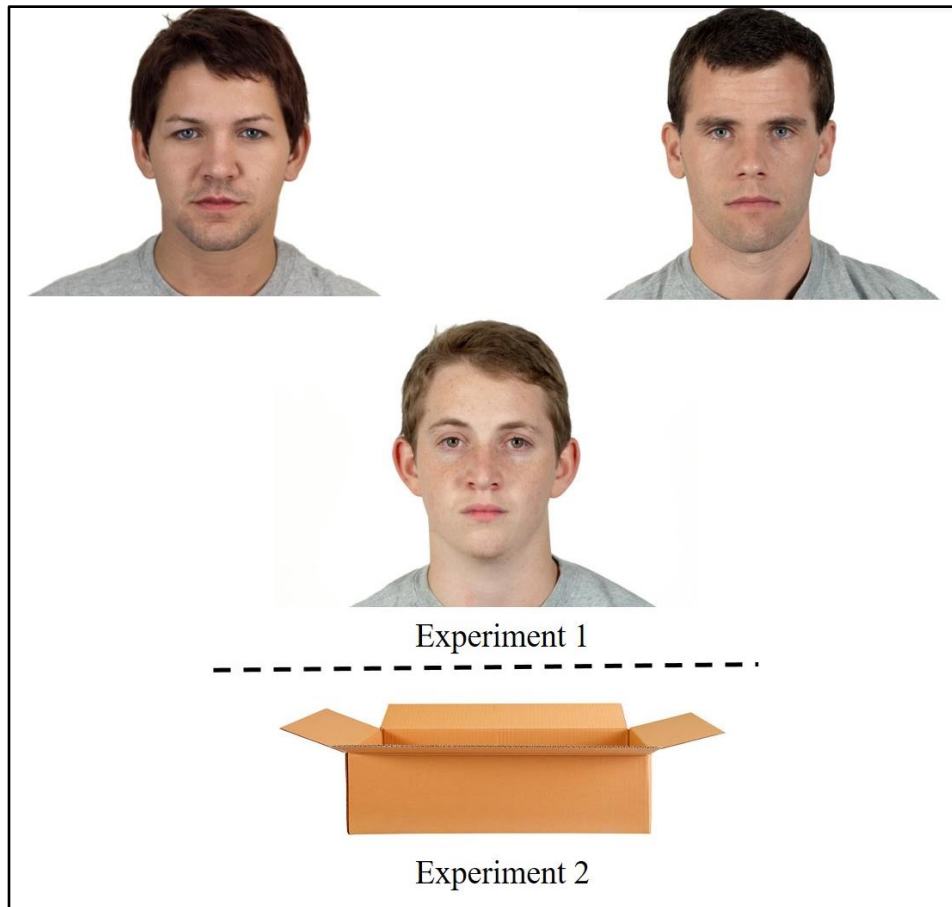
moderate effect size of .45, alpha set at .05, and power of .80, a sample size of 51 was large enough to detect significant effects using one-way ANOVAs.

Materials

Materials included photographs of 6 male and 6 female adult faces from the Chicago Face Database (Ma et al., 2015). Each face in the Chicago Face Database is rated on a variety of dimensions by independent raters. These ratings were used to select images from the database that differed minimally on the dimensions of age, gender, race, trustworthiness, and attractiveness. The informants' mean age was 24.13 years ($SD = 3.03$ years), and their mean trustworthiness and attractiveness ratings were 3.71 ($SD = 0.34$) and 3.97 ($SD = 0.57$), respectively, on 7-point-Likert scales (with higher values indicating more trustworthiness or attractiveness). Informant pairs did not differ from each other on these ratings by more than 1 point. Each informant pair was matched to a target character of the same gender, age, and race as the informants. All informants (8 faces) and targets (4 faces) were White, visible from the shoulders up with neutral expressions, and wore identical plain gray shirts. Informants were positioned at the top of the screen with the target's face shown below, equidistant between the two informants, see Figure 1.

Figure 1.

Example stimuli from Experiment 1 (two informants above a centered target individual's face) and Experiment 2 (two informants above a centered open box).



Design

The experiment consisted of four trials, each showing two informants and a target. There was one mother-daughter pair, one father-son pair, and two teacher-student pairs, one male and one female. We used these pairs because these roles and relationships are familiar to young children. Investigating the contrast between these pairs of roles is also informative because, although both sets of roles are hierarchical, the relationship between parents and children reflects both conventional and biological elements, while the

relationship between teachers and children is primarily conventional. We did not expect this difference in role to be salient to children, but we included both roles so that we could collect more measurements per participant. Because the parent-child trials were gender-specific, one teacher-student pair featured males and the other featured females in order to balance gender across the experimental session. Trials were presented in the following order: male teacher-student pair, mother-daughter pair, female teacher-student pair, and father-son pair. The positioning of informants was counterbalanced so that the informant label, instructions, and informant positioning differed across participants.

By presenting informants and targets of the same age, we intentionally reduced the likelihood that children would conclude that the two informants were in a complementary relationship with each other (e.g., because they were the same age, it is unlikely that children concluded that the “mother” was the biological mother of the “daughter,” and no child in our sample made a comment to that effect). We wanted to focus children on evaluating the informants based on their social role, and to make it less likely that participants would conclude that a dominant informant was the parent or teacher of the specific subordinate informant presented alongside them. We also aimed to minimize participants’ reliance on other factors shown to be informative in prior studies, such as age, experience, benevolence, etc. Removing these cues likely weakened the impact of social roles on children’s intuitions, making this approach a strong test because the recorded effects can be attributed most directly to the social role and not to these other factors. If effects of social role persist, then it can be concluded that these social categories influence children’s intuitions independent of other factors. However, if social

role has little influence on children's responses in the current study, then we can conclude that prior effects resulted from these other factors, and not from the label itself.

Procedure

This experiment was conducted in person and stimuli were displayed on a computer screen. The experimenter introduced the task by saying, "I have some friends who are going to tell people to do things. I don't know what the people should do, so it is your job to decide who the people should listen to." In each trial, children were introduced to two informants and a target. The informants were only referred to by their label (e.g., "she is a mother") and the target was referred to by name (e.g., "This is Emily").

Immediately following introductions, children heard conflicting instructions from the informants (see Table 1 for informant pairs and instructions). For example, instructions given by the informants were designed to be neutral and minimally different, focusing the children more directly on the contrast between the two informants, e.g., "The mother tells Emily to jump to the left and the daughter tells Emily to jump to the right." Children then answered an Instruction Question and a Power Question. First, children answered the Instruction Question by choosing which instruction the target should follow, e.g., "What should Emily do? Should she jump to the left or should she jump to the right?" Children were then asked the Power Question, "Who can tell Emily what to do, the mother or the daughter?" After children completed all four trials, they were thanked for their participation and given a small prize.

Table 1.

Informant Pairs with their Instructions

Informant Pair	Instructions
Teacher-Student	Sit on the chair vs. Sit on the couch
Mother-Daughter	Jump to the right vs. Jump to the left
Teacher-Student	Cut out a triangle vs. Cut out a circle
Father-Son	Pick up the green ball vs. Pick up the blue ball

Results

Preliminary Analyses

The stimuli used and the data gathered in Experiments 1 and 2 can be found at https://osf.io/thzjb/?view_only=4501706226404d5dbb7e9edfd4d025be. Before performing our analyses of interest, it was necessary to determine whether or not children's responses to parent-child trials were different than their responses to teacher-student trials. Since the Instruction and Power Questions focused on different concepts (Tong et al., 2019), it was also necessary to analyze children's responses to each question separately. Children's responses were scored as a "1" for each selection of a dominant informant and a "0" for each selection of the subordinate informant, resulting in a composite score ranging from 0-2 for each Question and informant pair. For each Question Type (Instruction Question and Power Question), we conducted a mixed factorial ANOVA with Trial Type (parent and teacher) as a within-subjects factor and Age (4-, 5-, and 6-year-old), Gender (male and female), and Presentation Order (4 different orders) as between-subjects factors. There were no significant effects of Trial Type, Gender, or Presentation Order on children's responses for either Question Type, *ps*

> .05. The only significant factor in both analyses was Age, $ps \leq .001$. Thus, consistent with the approach used in the selective trust literature, we combined the Trial Type items into a composite score for each item ranging from 0 to 4, with higher values indicating more selections of the dominant informant and we included only Age as a factor in our main analyses.

Although these analyses determined whether there were differences between age groups in their preferences for dominant informants, these analyses did not address the character of those differences. Thus, we also planned to directly test whether children's preferences for informants differed from random responding using one-sample t -tests. These tests provided a mechanism for determining whether children's responses are best described as shifts in relatively random responding, or if children's responses differed qualitatively across age groups (e.g., do children of some ages select informants randomly while other groups select the dominant informant at rates that differ meaningfully from chance?).

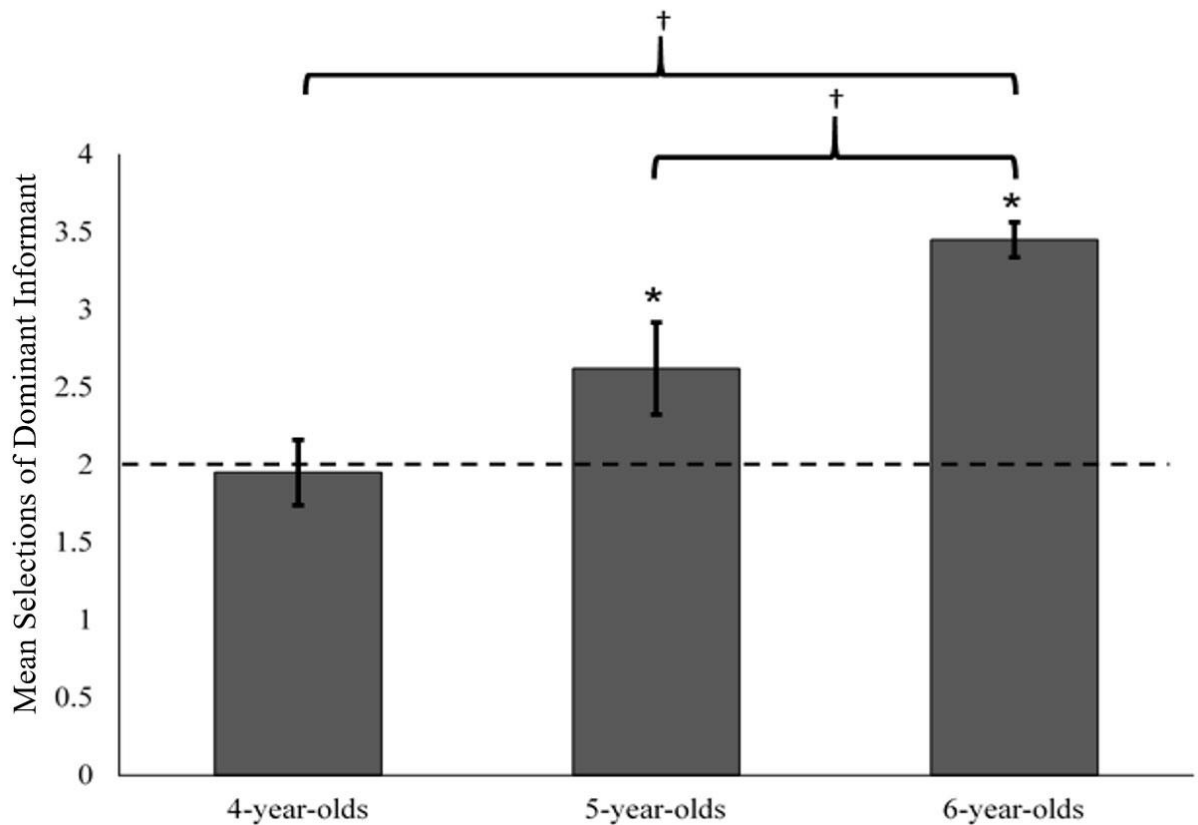
Main Analyses

Instruction Question. Out of four trials, 4-year-olds selected the dominant individual an average of 1.95 times ($SD = 0.95$), 5-year-olds selected the dominant informant an average of 2.62 times ($SD = 1.36$), and 6-year-olds selected the dominant informant an average of 3.45 times ($SD = 0.51$). A one-way ANOVA with Age (4-year-olds, 5-year-olds, and 6-year-olds) as a between-subjects factor showed a significant main effect of Age, $F(2, 60) = 11.13, p < .001$, partial $\eta^2 = 0.28$, on children's selection of the dominant informant when presented with Instruction Questions. Bonferroni-corrected post-hoc analyses revealed that 6-year-olds ($M = 3.45, SD = 0.51$) selected the

dominant informant's instructions more often than 4-year-olds ($M = 1.95$, $SD = 0.95$), $p < .001$, and 5-year-olds ($M = 2.62$, $SD = 1.36$), $p < .05$. However, 4- and 5-year-olds did not differ in their responses to the Instruction Question, $p = .113$, see Figure 2. One-sample t -tests revealed that, when responding to the Instruction Question, 4-year-olds selected informants randomly, $t(19) = -0.24$, $p = .815$. However, 5-year-olds, $t(20) = 2.09$, $p = .050$, $d = 0.46$, and 6-year-olds, $t(19) = 12.70$, $p < .001$, $d = 2.84$, selected the dominant informants' instructions at rates that were significantly above chance (chance = 2).

Figure 2.

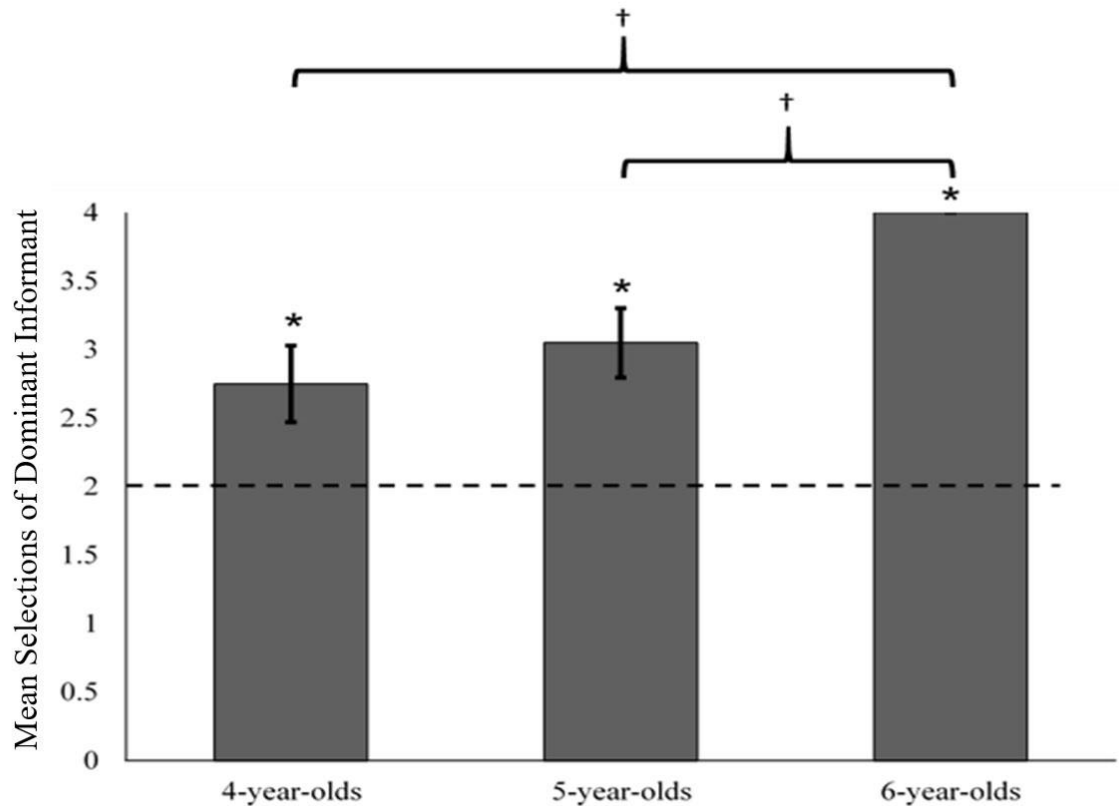
Children's selections of the dominant informant for the Instruction Question



Note. Asterisks denote responses that significantly differ from chance. Brackets indicate significant age differences. Alpha = .05.

Power Question. Out of four trials, 4-year-olds selected the dominant individual an average of 2.75 times ($SD = 1.25$), 5-year-olds selected the dominant informant an average of 3.05 times ($SD = 1.16$), and 6-year-olds selected the dominant informant an average of 4 times ($SD = 0.00$). A one-way ANOVA with Age as a between-subjects factor revealed a significant effect of Age, $F(2, 60) = 8.75, p < .001$, partial $\eta^2 = .23$, on children's responses to the Power Question. Bonferroni-corrected post-hoc analyses revealed that 6-year-olds ($M = 4.00, SD = 0.00$) indicated that the dominant informant could tell others what to do significantly more often than 4- ($M = 2.75, SD = 1.25$), $p < .01$, and 5-year-olds ($M = 3.05, SD = 1.16$), $p < .05$, see Figure 3, but 4- and 5-year-olds' responses did not differ from one another, $p = 1.00$. One-sample t -tests revealed that, when responding to the Power Question, 4- ($M = 2.75, SD = 1.25$), $t(19) = 2.68, p = .015$, $d = 0.59$, 5- ($M = 3.05, SD = 1.16$), $t(20) = 4.14, p = .001, d = 0.91$, and 6-year-olds ($M = 4.00, SD = 0.00$, every 6-year-old selected the dominant informant on every trial) selected the informant with the dominant social role at rates significantly greater than chance (chance = 2).

Figure 3.
Children's selections of the dominant informant for the Power Question



Note. Asterisks denote significant differences from chance and brackets indicate significant age differences. Alpha = .05.

Exploratory Analyses

To test whether children's age predicted their evaluations of the dominant individual's instructions and power, we conducted two linear regression analyses. When assessing whether age predicted whether children selected the dominant individual's instructions, we found that children's tendency to select the dominant individual's instructions increased with age, $F(1, 60) = 17.81, p < .001, R^2 = .23, \beta = .48$. A similar, but stronger, pattern of results was found when assessing the impact of child's age on the power question, $F(1, 60) = 28.32, p < .001, R^2 = .32, \beta = .57$, suggesting that children selected the dominant individual as the more powerful individual more often with age.

Discussion

The purpose of this experiment was to assess whether children connect dominant social roles to social power. The results of Experiment 1 suggested a clear pattern of quantitative and qualitative change across the tested age groups. Six-year-olds inferred that individuals should defer to people with dominant social roles and reported that those people held more social power than individuals with subordinate social roles. Five-year-olds selected fewer dominant informants than 6-year-olds, but they selected significantly more dominant than subordinate informants overall, exhibiting a pattern of responses that was similar to that of older children, if significantly more variable. In contrast, 4-year-olds did not exhibit a preference for instructions given by individuals with dominant social roles, but – on average – they recognized that the person with the dominant social role had more power than the person with the subordinate social role. Interestingly, 4-year-olds recognized that parents and teachers have social power, but they did not consistently judge that instructions provided by these powerful individuals should be followed. Additionally, our exploratory analyses confirmed that children's endorsement of people with dominant social roles increased with age. Children appear to have an explicit understanding that people holding dominant social roles are socially powerful. However, the age-related differences reported here suggest that it takes time and experience to understand the relationship between social roles and social power.

Experiment 2

In Experiment 1, children used social roles to make inferences about social power. However, it is unclear whether children construed hierarchical social roles as domain-specific signifiers of social power, or if they treated social roles as more domain-general

cues to superiority or competence. It is reasonable to assume that children would view dominant hierarchical social roles as communicating superiority across many dimensions because powerful figures in children's lives, such as parents and teachers, are often powerful in many ways, including social power, knowledge, physical power, etc. However, these dimensions are separable for adults. A person may be socially powerful without being physically powerful or knowledgeable. Is it clear to children from an early age that different kinds of power are distributed unevenly across individuals, or do children need time and experience to learn that hierarchical social roles communicate power that is context-specific and limited in scope? In Experiment 2, we leveraged prior research investigating children's selective trust. This study explores children's intuitions about knowledgeability to determine whether hierarchical social roles specifically influence children's inferences about social power, or if hierarchical social roles influence children's judgements in a more domain-general manner.

Most of the information that children receive comes to them in the form of testimony from others, especially their parents and teachers. The question of how children know what other people know has been studied extensively using selective trust paradigms. By age 4, children privilege the testimony of accurate individuals over inaccurate or ignorant ones (Koenig & Harris, 2005; Pasquini et al., 2007). Furthermore, children use group membership and expertise to guide their preferences for informants (Elashi & Mills, 2014; Landrum et al., 2013; Lutz & Keil, 2002; VanderBorghet & Jaswal, 2009). Preschoolers prefer information from experts when learning about topics within an expert's domain of expertise (Landrum et al., 2013) and children can infer expertise from a person's knowledge and occupation. For example, children know that mechanics know

how to fix cars, and doctors know how to heal bodies (Lutz & Keil, 2002). Based on evidence that children as young as 4 trust some informants over others, we used a selective trust paradigm to investigate whether children judge individuals holding dominant hierarchical roles to be more knowledgeable than those who hold subordinate hierarchical roles.

We presented children with judgements about food because children as young as age 3 know that adults are knowledgeable about food (VanderBorghet & Jaswal, 2009), and the characteristics of individuals providing information about food influence children's trust in their evaluations of foods as "healthy" or "yummy" (Nguyen et al., 2016). Nguyen (2012) found that 3- and 4-year-old children trusted individuals with dominant social roles – teacher and mother – to provide accurate information about food more than they trusted a child or a cartoon character. However, this design did not emphasize the contrast between individuals holding social roles in the same hierarchical structure, and the informants presented to children differed on other important dimensions as well (e.g., child versus adult informants and real versus fantasy informants). Thus, in Experiment 2, we presented children with the same informant pairs presented to children in Experiment 1. However, instead of making judgements about the social power of the informants, we asked children which informants' evaluation of food they would trust (i.e., is a novel food "healthy" or "junk?") and who they would ask to learn about a new food. Although each of these questions probe different judgements (see Tong et al., 2019), together they represent a holistic representation of the relative knowledgeability of individuals labeled with dominant and subordinate hierarchical social roles.

If children exhibit more trust in informants holding dominant hierarchical social roles, this would suggest that children treat hierarchical social roles as domain-general cues to superiority. However, if children show no strong preferences or if they trust the individual with the subordinate hierarchical social role, this would suggest that children treat hierarchical social roles as relatively domain-specific cues to social power.

Method

Participants

Participants included 20 4-year-olds ($M = 4.47$, $SD = 0.29$, 13 girls and 7 boys), 20 5-year-olds ($M = 5.32$, $SD = 0.32$, 12 girls and 8 boys), and 20 6-year-olds ($M = 6.52$, $SD = 0.31$, 10 girls and 10 boys). One additional child was excluded from analysis for refusing to speak to the experimenter. None of these children participated in Experiment 1. Eighty-five percent of participants were White, 5% were Asian, 6.7% were mixed race, and parents of the remaining 3.3% did not provide a response. Five percent of participants were Hispanic, 88.3% were not Hispanic, and parents of the remaining 6.7% did not provide this information. Sample size was determined using the same power analysis as Experiment 1.

Materials and Design

The materials used in Experiment 2 were identical to those used in Experiment 1 except that the target characters were removed and replaced with images of open boxes (see Figure 1, Experiment 2) and test items involved food. We presented children with boxes, rather than actual foods, in order to minimize the influence of children's preexisting knowledge on their judgements of the informants' claims. Photo editing software was used to make several boxes that varied only in color, so that a visually

distinct box appeared in each trial. Positioning and references to the images in each trial were counterbalanced as in Experiment 1.

Procedure

Participants were tested individually in a quiet space in front of a computer. The experimenter gave the following instructions: “I have some boxes and there is a food inside each box. I don’t know anything about the foods in the boxes, so my friends are going to tell you if they think the foods are healthy or junky, and you get to decide who is saying the right thing.” Language about food as “healthy” or “junky” was adapted from Nguyen (2008). In each trial, children were presented with two informants who were referred to by their social role label, as in Experiment 1, with a box was placed equidistant between the two informants. The informants were described as provided conflicting testimony about the healthiness of the food in the box. For example, “The mother says the food in the box is healthy, and the daughter says the food in the box is junky.” After hearing the claims attributed to each informant, children were asked an *Endorse Question* followed by an *Ask Question*. When answering the Endorse Question, children were asked to endorse one of the conflicting statements by choosing who was “saying the right thing.” After children answered the Endorse Question, the box that appeared between the informant pair disappeared, and a new box of a different color replaced it. Children were then presented with the Ask Question (e.g., “Who would you ask about the food in this box, the mother or the daughter?”). Children were presented with a new, different color box for each question so that they would not feel that they needed to provide responses to Ask Questions that were consistent with their responses to Endorse Questions. For example, if children endorsed the mother’s claim about the food

in the blue box, then they might feel pressured to select the same mother for the Ask Question, if the Ask Question referenced the *same box*. More generally, a meta-analysis of selective trust studies by Tong et al. (2019) suggests that Endorse and Ask questions probe different intuitions, indicating that it is worthwhile to present each query as independently as possible. After children completed four trials of Endorse and Ask Questions, they were thanked for their participation and given a small prize. As in Experiment 1, data for each target question were analyzed separately and children's overall response patterns were tested to determine whether they differed from chance.

Results

Preliminary Analysis

As in Experiment 1, children's responses were used to generate composite scores ranging from 0-4 for the Endorse and Ask Questions. Preliminary analyses were conducted to assess the impact of Age, Gender, Presentation Order, and Trial Type on each question. Because these queries probed separable intuitions, we analyzed them separately, as in Experiment 1. For the Endorse Question, no significant main effects or interactions were found for Gender, Presentation Order, or Trial Type, $ps > .151$, so these factors were excluded from analyses of children's responses to the Endorse Question.

For the Ask Question, there are no main effects of Gender, Presentation Order, or Trial Type. However, there was a significant interaction between Age and Gender, $F(2, 36) = 6.04, p = .005$, partial $\eta^2 = 0.86$. Thus, Gender was included along with Age in our main analyses of children's responses to the Ask Question. We also recorded a significant three-way interaction between Age, Presentation Order, and Trial Type, $F(6, 36) = 2.58, p = .035$, partial $\eta^2 = .30$. Bonferroni-corrected post-hoc analyses indicated that this

interaction resulted from two groups of children selecting dominant informants more than other children under different testing conditions. A group of 6-year-olds ($n = 5$) in one testing order selected more teachers in teacher-student trials ($M = 1.80$, $SD = 0.45$) than two of the other orders presented to 6-year-olds ($M = 0.80$, $SD = 0.84$, $p = .013$, and $M = 0.40$, $SD = 0.55$, $p < .001$), but not the fourth order ($M = 0.80$, $SD = 1.10$). This same group also selected teachers more than 5-year-olds in the same order ($n = 5$; $M = 0.80$, $SD = 0.84$), $p = .003$. The responses of this small number of 6-year-olds appears to have contributed to the effects of Presentation Order in this three-way interaction. Similarly, a group of 4-year-olds ($n = 5$) in one order – not the same order as the six-year-olds – selected more dominant informants in the teacher trials ($M = 1.60$, $SD = 0.55$) than they did in the parent trials ($M = 0.80$, $SD = 0.45$), $p = .034$, contributing to the reported effects of Trial Type. Because this three-way interaction appears to be an artifact attributable to the random assignment of a very small number of children, and there are no other significant effects of Presentation Order or Trial Type elsewhere in our data, we elected to exclude Presentation Order and Trial Type from our main analyses.

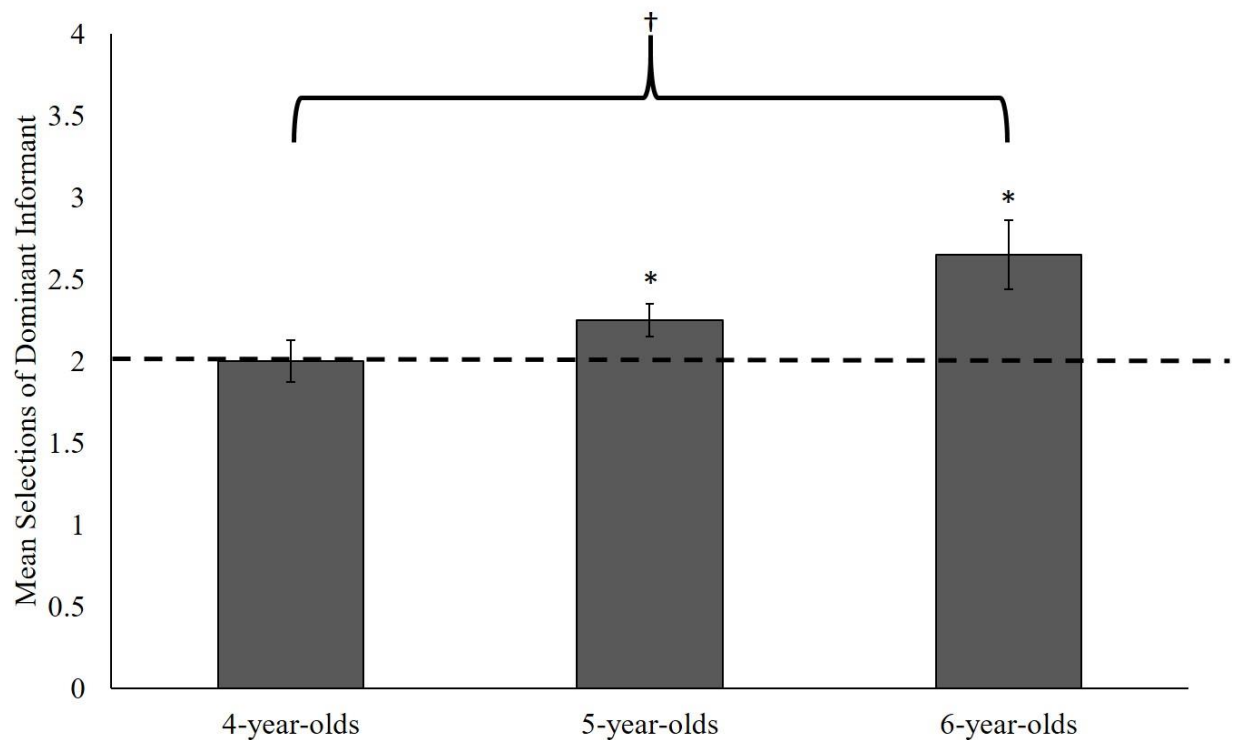
Main Analysis

Endorse Question. Out of four trials, 4-year-olds selected the dominant individual an average of 2 times ($SD = 0.56$), 5-year-olds selected the dominant informant an average of 2.25 times ($SD = 0.44$), and 6-year-olds selected the dominant informant an average of 2.65 times ($SD = 0.93$). A one-way ANOVA was conducted to investigate the influence of Age (4-year-olds, 5-year-olds, and 6-year-olds) on children's responses to the Endorse Question. A significant main effect of Age was found, $F(2, 59) = 4.66$, $p = .013$, partial $\eta^2 = 0.14$. Bonferroni-corrected post-hoc analyses revealed that 6-year-olds

($M = 2.65$, $SD = 0.93$) selected significantly more dominant informants than 4-year-olds ($M = 2.00$, $SD = 0.56$), $p = .011$, and five-year-olds ($M = 2.25$, $SD = 0.44$) responded in a manner that did not differ from 4-year-olds or 6-year-olds, p 's $> .20$, see Figure 4. We used one-sample t -tests to compare children's responses to the Endorse Question to chance (chance = 2), and we found that 5-year-olds, $t(19) = 2.52$, $p = .021$, $d = 0.57$, and 6-year-olds, $t(19) = 3.12$, $p = .006$, $d = 0.70$, selected the dominant informant's testimony significantly more often than was expected by chance. In contrast, 4-year-olds showed no preference for either informant's testimony, $t(19) = 0.00$, $p = 1.00$.

Figure 4.

Children's selections of the dominant informant for the Endorse Question

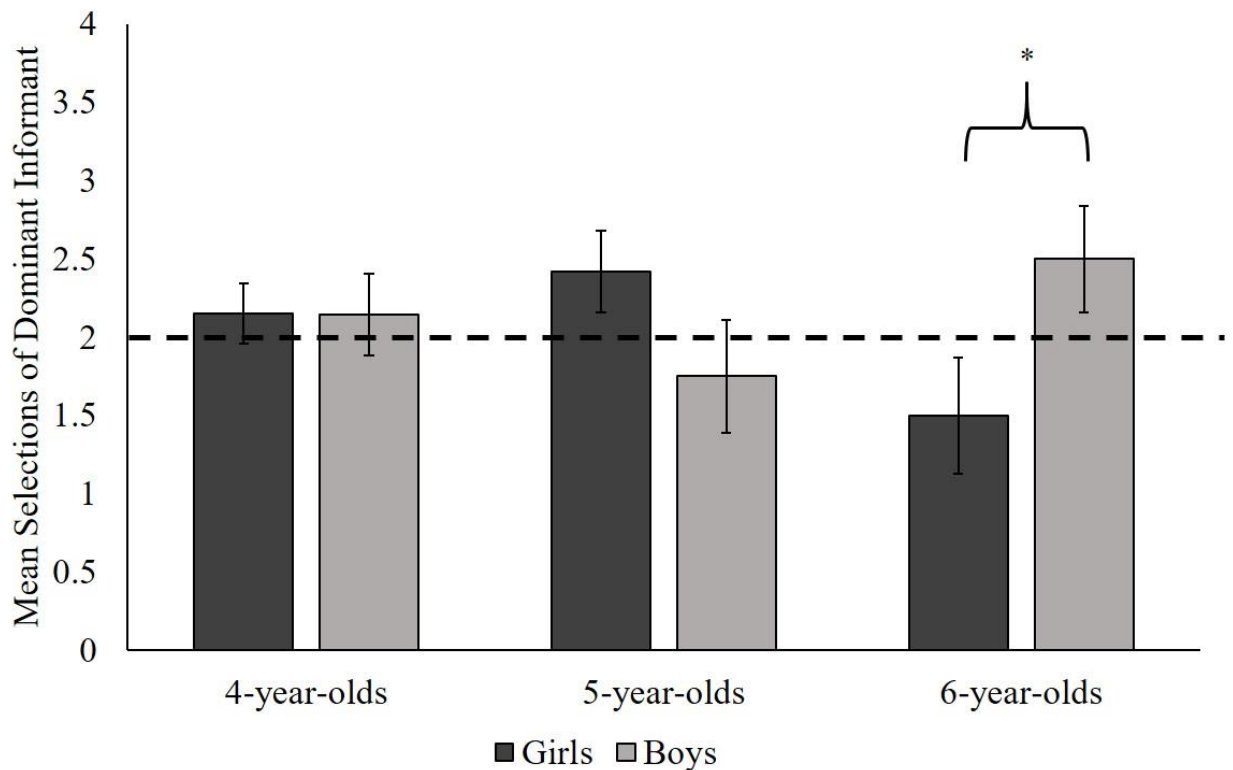


Note. Asterisks denote significant differences from chance and brackets indicate significant age differences. Alpha = .05.

Ask Question. Preliminary analysis showed that Gender and Age influenced children's responses. Out of 4 trials, 4-year-old girls selected the individual with the dominant social role an average of 2.15 times ($SD = 0.69$) and boys selected the dominant individual an average of 2.14 times ($SD = 0.69$). Five-year-old girls selected the dominant informant an average of 2.42 times ($SD = 0.90$) and 5-year-old boys selected the dominant informant an average of 1.75 times ($SD = 1.04$). Six-year-old girls selected the dominant individual an average of 1.50 times ($SD = 1.18$) and 6-year-old boys selected the dominant individual an average of 2.50 times ($SD = 1.08$). To assess children's responses to the Ask Question, a 3 (Age: 4-year-olds, 5-year-olds, & 6-year-olds) X 2 (Gender: boy & girl) factorial ANOVA was conducted. There were no main effects of Age, $F(2, 60) = 0.12, p = .888$, or Gender, $F(1, 60) = 0.19, p = .668$, but the interaction between these factors was significant, $F(2, 54) = 3.90, p = .026$, partial $\eta^2 = 0.13$. Post-hoc Bonferroni-corrected analyses revealed that 6-year-old boys ($M = 2.50, SD = 1.08$) selected dominant informants significantly more often than 6-year-old girls ($M = 1.50, SD = 1.18$), $p = .021$, but this effect was not present in 4- or 5-year-olds, $ps > .126$, see Figure 5. We then separated children's data by Age Group and Gender and used one-sample t -tests to determine whether children preferred one informant over the other. We found that children's responses to the Ask Question were random across all six Age X Gender groups, $ps > .330$.

Figure 5.

Children's selection of the dominant informant for the Ask Question by Age and Gender.



Note. Brackets indicate significant Gender differences. Alpha = .05. Children's responses did not significantly differ from chance (chance = 2).

Exploratory Analyses

As in Experiment 1, we wanted to investigate whether children's age predicted how they responded to questions about people with dominant social roles. Thus, we conducted two linear regressions with Age predicting selections of the dominant individual for the Ask and Endorse Questions. We found a significant positive relationship between Age and selections of the dominant individual for the Endorse Question, $F(1, 59) = 12.56, p = .001, R^2 = .18, \beta = .42$. However, we found no significant

relationship between Age and selections of dominant individuals for the Ask Question, $F(1, 59) = 0.25, p = .622, R^2 = .004, \beta = -.07$.

Discussion

When choosing who to trust for information about the healthiness of food, 6-year-olds selected dominant informants at rates that exceeded chance, and they endorsed the testimony of dominant informants significantly more often than 4-year-olds, who selected informants randomly. Six-year-olds' intuitions differed qualitatively and quantitatively from those of 4-year-olds. Five-year-olds selected the dominant informant more than 4-year-olds and less than 6-year-olds, but their responses did not significantly differ from either group. That said, 5-year-olds endorsed significantly more dominant informants than would be predicted by random selection. These findings indicate that the influence of hierarchical social roles on 4-year-olds' judgements of knowledgeability is minimal, and the influence of social roles on older children's judgements is greater. Given the opportunity to choose an informant to provide information about a new food, children in all age groups made random selections, and their selections did not differ by Age. The only significant pattern of results revealed by our analysis of the Ask Question was a tendency for 6-year-old boys to select dominant informants more often than 6-year-old girls, and we hesitate to interpret this finding because neither groups' responses differed from chance.

Taken together, children's responses to our two target questions indicate that children do not explicitly judge informants with dominant hierarchical social roles as more knowledgeable than informants with subordinate roles when the two informants are otherwise comparable, but hierarchical social roles may still subtly influence older

children's endorsement of claims made by dominant informants. Older children, more than younger children, implicitly trust statements made by dominant informants more than statements made by subordinate informants, even when they do not explicitly judge one informant to be more knowledgeable than the other.

General Discussion

The purpose of this study was to explore how social roles influence children's judgements about people. Experiment 1 investigated American children's sensitivity to the differences in social power implied by hierarchical social roles. We found that 4-year-olds judged individuals holding dominant social roles to be more powerful than individuals holding subordinate social roles, but they did not believe that instructions provided by dominant informants should be followed more often than instructions provided by a subordinate informant. By age 5, children judged that instructions provided by a dominant informant should be followed, and they judged that dominant informants were more powerful than subordinate informants. This pattern was present, and significantly more pronounced, in 6-year-olds as well.

In Experiment 2, we investigated whether American children treat hierarchical social roles as relatively circumscribed cues (e.g., relating only to power in interpersonal relationships), or if children treat social roles as domain-general cues that extend beyond social power. Intuitively, do children see individuals who hold dominant social roles as being generally "better" than subordinates, or do they understand that social power is often decoupled from other attributes, such as knowledgeability, competence, etc.? Our results suggest that hierarchical social roles do not influence children's explicit judgements of people's knowledgeability. American children believe that an adult who is

a “mother” is not necessarily more knowledgeable than a similar adult who is a “daughter.” However, social role influenced children’s treatment of each informant’s claims. Five- and 6-year-olds, but not 4-year-olds, endorsed the dominant informant’s statements at rates significantly greater than chance.

Children’s responses across both experiments suggest two new and important findings about primarily White, American children’s understanding of hierarchical social roles. First, children recognize the power asymmetries communicated by hierarchical social roles early in development. Even the youngest age group, 4-year-olds, reported that individuals holding dominant social roles were more powerful than individuals holding subordinate social roles. Second, American children’s explicit understanding of complementary social roles is established early, but over time these roles are increasingly treated as if they reflect important underlying differences between individuals. Four-year-olds treated social roles as relatively circumscribed cues, indicating that a person was powerful but not lending any extra authority to their instructions. Five-year-olds treated social roles as a stronger indicator of social power than 4-year-olds, and the influence of social roles on 6-year-olds’ judgements was greater still. Together, these findings suggest that children’s understanding of hierarchical social roles undergoes significant development between ages 4 and 6.

The current findings connect to previous investigations in important ways. Charafeddine and colleagues (2015) demonstrated that children as young as 3 attribute social power to people who they see making decisions, and Laupa (1991) found that children attribute social power to individuals based on social role by age 6 or 7. However, these studies also varied factors such as age, resource availability, physical dominance,

etc. Our experiments control or remove many of these factors, revealing that American children understand some aspects of social power very early in development, while other aspects of their understanding develop over time with experience.

Our findings also have implications for research exploring children's evaluations of adult claims about food. Prior work (Nguyen, 2012) suggests that children trust teachers and mothers more than other informants when learning about food. In the current study, we pitted these trusted sources against informants holding subordinate social roles (students and offspring), and we found that children endorsed the claims of teachers and parents, but that they did not select them as preferred informants. These results diverge from those reported by Nguyen et al. (2012), but we do not believe that our findings necessarily contradict prior claims because our methods differed from those used by Nguyen and colleagues in two ways. First, in Nguyen's studies children could choose to trust all sources or none, and they were only asked to evaluate sources individually, whereas we pitted two sources directly against each other. Our task was likely more cognitively demanding than Nguyen's task because it required children to hold two representations and to compare them, rather than evaluating each informant separately and individually. Second, although our task effectively probed the breadth of the influence of hierarchical social roles on children's intuitions and judgements, Nguyen's experimental method was fundamentally more similar to children's naturalistic experiences than our method. Ostensibly, children receive information about food most frequently from one knowledgeable person with high social and physical power, and Nguyen's approach reflects that structure. That said, our studies confirm prior findings

that many factors, including the social power attributed to informants, influence how children evaluate both informants and their claims.

Although we found age-related changes in children's judgements, there are some important caveats to our conclusions and important areas for future research. First, we recorded a gender-based effect where 6-year-old boys preferred to ask dominant informants about foods more often than 6-year-old girls. Neither group differed significantly from random responding, so this result does not support any strong claims. However, this unexpected effect of gender resulted in the need to split our sample, which reduced the sensitivity of our tests. We also found some apparently random, but significant, effects where two groups of children selected more dominant informants than other groups in Experiment 2. We believe the former to be a real effect and the latter to be a result of random assignment and variability in children's responses, but these findings might disappear or become more exaggerated and interpretable if we had more power. Thus, future studies should include larger samples and further explore gender differences.

Second, in the current study, we carefully controlled and equated several variables that are informative in real-life interpersonal interactions. For example, both the dominant and subordinate informants were adults, which may have caused our measured effect to be smaller than it would be in naturalistic interactions. In real-life scenarios, individuals holding dominant roles may have many attributes emphasizing power differentials (e.g., children are usually younger, smaller, and less knowledgeable than parents) and contrasts in relative power and knowledge may be clearer. Also, as noted above, real-life interactions are often complex and feature a single informant in isolation

or an individual who holds multiple social roles (e.g., they are a mother and a daughter, or a teacher and a mother). Future research should investigate how children think of dominant and subordinate informants in isolation and how children think about power when a person simultaneously holds both dominant *and* subordinate social roles. Third, although 6-year-olds exhibited quite clear response patterns in our experiments, it is possible that children may increasingly view social power as a proxy for other competencies and attributes over time. It may be informative to include older children and adults in future studies to determine how early children's judgements begin to resemble adult judgements.

More generally, future studies should explore the variables that contribute to children's understanding of social power and power structures, and how individual differences in cognitive or social competencies contribute to variability in children's understanding and representation of social hierarchies. For example, linking children's concepts of social power to theory of mind could show that children's understanding of complementary social roles develops along with their ability to represent the goals and beliefs of other people. The results reported here also represent a starting point for more directly investigating how the structure of social roles influences person judgements and epistemic trust over the course of development. Our current claims about hierarchical – relative to non-hierarchical – social roles are made largely by analogy, but a direct comparison between hierarchical and non-hierarchical social roles in the same study would provide an opportunity to identify exactly which aspects of children's judgements are linked to their representations of hierarchy.

Another potential direction for future research is to investigate how children's experiences with power influence their concepts of hierarchical social roles and their judgements about them. For example, parents' authoritarianism may influence children's representation of hierarchy or, more generally, cultures' representations of social structures – and the social roles within them – may differ over time and from place to place (see Charafeddine et al., 2019). In Experiment 2, older boys judged the dominant person to be more knowledgeable than older girls did. However, these children were recruited primarily from private schools. Thus, it is possible that their home and school environments were relatively more authoritarian than average school and home environments. In the future, studies should include individual difference measures focusing on parent authoritarianism, as well as measures probing children's experiences with powerful figures.

One limitation of the current study is that the sample is WEIRD (Western, Educated, Industrialized, Rich, and Democratic), and it is possible that the features of this population influenced children's intuitions. That said, a large proportion of the world's non-WEIRD population lives in nations with autocratic or authoritarian governments, and it is an empirical question whether a democratic Western nation like the U.S. would be different because concepts of power are *less* evident (e.g., the U.S. is a relatively 'free' democracy compared to most autocracies), more evident, or about the same.

More generally, future work should focus on how people learn about the conventional, often formalized, power that leaders and other authorities exercise over others, but it is similarly important to explore how children learn about "soft" power differentials between individuals that are generated by relationships and shared – or

conflicting – attitudes and beliefs. Understanding how humans represent social power and hierarchy is important because these concepts are critical to navigating social interactions in both interpersonal and professional contexts. Relatedly, another fruitful avenue for future research would be to directly explore the limits of social power and authority. The instructions presented by characters in the current study were neutral, but it is unclear how the morality of a directive might interact with the person giving it (e.g., would a child believe that a character should perform a good action, even if doing so goes against an authority, or would children continue to endorse the instructions of a powerful authority, even when their directives are immoral?).

Humans live in a complex web of interpersonal relationships, and these relationships are often complementary and asymmetrical. The current studies show that primarily White, American children’s understanding of hierarchical social roles emerges at a young age, changes over time, and influences their judgements in nuanced ways. These findings represent an important step in exploring how humans learn about the power that they have over others and the power that others have over them.

CHAPTER III
RECOGNITION TO RECTIFICATION: CHILDREN'S EVALUATIONS OF
UNEQUAL SOCIAL HIERARCHIES

Most societal structures are hierarchical. Consider the workplace. It has employers, managers, and workers with each have varying levels of power within the structure. Those at the top, such as Chief Executive Officers (CEOs), have the most power and power diminishes as you move down the hierarchy. An unfortunate truth in our society is that, within such structures, power is not shared equally across different social groups. According to a report by Fortune analyzing 800,000 employees from 16 Fortune 500 companies, White men hold 72% of the leadership positions in the United States' largest companies (Jones, 2017). It is unclear where our tolerance for these structural inequalities comes from. Are we initially sensitive to inequality, but then learn to ignore it as we are encultured, or does a tolerance for inequality appear relatively early in development and persist over the lifespan? Using a developmental approach we can characterize the role of early experiences on how people view social inequality within systems of power. In the three studies, we address children's recognition of and views on structural inequality by exploring their perspectives on hierarchies that reflect gender- and race-based inequalities.

Children begin developing a sense of fairness early in life. Researchers have found that at as early as 4 months old, infants expect fairness in simple allocation tasks (Buyukozer-Dawkins et al., 2019). When witnessing more complex tasks, 9-month-olds

(Buyukozer-Dawkins et al., 2019) and 19-month-olds (Sloane et al., 2012) also expect others to allocate resources fairly. Research with older children has focused on how they allocate resources as either a third-party allocator or a possible receiver of resources themselves. Shaw and Olson (2012) found that 3- to 8-year-olds have an aversion to inequity, often discarding a resource in order to equally distribute them between two other children. Interestingly, 6- to 8-year-olds will even throw away an extra resource when deciding how many resources to give to themselves or another child in order to avoid allocating resources unequally (Shaw & Olson, 2012); however, this behavior only occurs when the child is observed while making allocations (Shaw et al., 2014). In order to further test this aversion to inequity, Shaw and Olson (2013) told 6- to 8-year-olds a story about two children who had an unequal number of resources (i.e., one child had 3 erasers and one had 1 eraser) and allowed children to allocate resources of varying values to the individuals. When the resources were of equal values (i.e., 2 erasers), children distributed resources based on number and gave more to the individual with fewer resources. However, when the resources had higher values (i.e., two \$20 bills), children took into account the value of the resource and were less likely to give more to the child with fewer resources. These results suggest that children notice and are motivated to rectify inequalities. They will allocate resources in order to reduce inequality between themselves and others, but they also take into account the value of resources when addressing inequalities.

Concerns about fairness may also be influenced by an individual's gender, race, or socioeconomic status (SES). Group membership influences children's social preferences (Dunham, 2018), evaluations of social alliances (Rhodes, 2012), and

expectations about resource allocations (Rutland & Killen, 2017). Children expect in-group members to help members of their own group (Rhodes, 2012). These expectations influence how fairly they treat others when allocating resources. For example, a sample of primarily White 3- to 5-year-olds allocated more resources to same-gender White children than to other-gender Black children due to their expectation that same-gender and same-race children would be more likely to help them in the future (Renno & Shutts, 2015). These in-group biases develop early (Aboud, 2003) and often contribute to negative stereotypes and prejudices of salient groups (Bigler & Liben, 2007).

Children can distinguish between different genders and races before they are a year old (Quinn et al., 2011); however, their preferences for in-group members develop at different rates across childhood. By age 3, children develop robust preferences for their own gender group but do not show racial in-group preferences (Shutts, 2015). As children grow older, they begin to display explicit gender biases. For example, Bian et al. (2017) found that 6-year-old girls feel that boys are more suited to games that require smart children and girls are more suited to games that require children who ‘work hard.’ These findings suggest kindergarteners are already biased to use gender when making attributions about intelligence and use that bias to guide their decisions (i.e., choosing who to be on their team for certain games). Furthermore, this gender-brilliance stereotype, which promotes the idea that men are more brilliant than women, is held both explicitly (Bian et al., 2017) and implicitly (Storage et al., 2020) by elementary-aged children. This stereotype may influence how children think about status, specifically in the workforce, as many adults associate brilliance with higher status jobs (Bian et al., 2018).

Evidence of explicit racial bias appears around ages 4 and 5 (Shutts, 2015). However, the developmental trajectory of racial bias is difficult to observe. Research has shown that implicit racial bias is steady across age (Baron & Banaji, 2006), but explicit bias decreases with age (Raabe & Beelman, 2011) as children begin to understand that explicit racial bias breaks a social norm (Rutland, 2004) and act to suppress expressing racial bias (Rutland et al., 2005), even when it would be advantageous to do so (Apfelbaum et al., 2008). Additionally, racial bias is strongly tied to social status. For example, children from high-status racial groups (e.g., White children) show in-group favoritism whereas children from low-status racial groups (e.g., Black children) do not favor their in-group (Jordan & Hernandez-Reif, 2009; Shutts et al., 2011). Furthermore, children associate wealth with White people (Mandalaywala et al., 2020) and Black children associate more low status jobs with Black people (Bigler et al., 2003).

Children are also aware of overrepresentation of White men in high status positions of power, such as the presidency (Bigler et al., 2008). In fact, 5- to 10-year-old children identify gender and racial discrimination as the reasons for historical exclusion of Women, Black people, and Latinx people from the position of U.S. President (Bigler et al., 2008). Furthermore, as 3- to 7-year-old children get older, they expect boys to have more resources and decision-making power than girls and White people to have more wealth than Black people (Mandalaywala et al., 2020). Roberts et al. (2020) posit that representations of White men in power influence whether children conceptualize Black men as fit for leadership positions. For example, Christian Black and White children conceptualized God as a White man, which was predictive of children perceiving White men as more boss-like than Black men. However, perceiving God as a man did not

predict children's perceptions of men as more suited to being bosses than women. The race finding was replicated with non-Christian participants using novel groups (e.g., Hibbles and Glerks), suggesting that conceptualization of the group membership of a godlike being influences how others perceive leaders (Roberts et al., 2020).

Representation of God as a White man appears to promote hierarchy-enforcing beliefs about the affiliation between White men and positive attributes such as being good, kind, and boss-like. These results suggest that overrepresentation of White men in positions of power (e.g., CEOs, Doctors, etc.) perpetuates gender and race stereotypes about power and status.

Systemic inequality may, at first glance, seem too complex and nuanced for children to grasp. However, previous research suggests that the development of concepts relating to fairness, group membership, and power begin in early childhood. Rizzo et al. (2020) found that children begin distinguishing between individual and structural reasons for inequality at around age 6. For instance, 6- to 8-year-olds expected a group leader to perpetuate resource inequalities regardless of whether they were based on merit (an individual cause of inequality) or gender (a structural cause of inequality). However, 3- to 5-year-olds only expected merit-based inequality to be perpetuated by the leader. Interestingly, all children perpetuated merit-based inequality, but not gender inequality, when given the chance to give resources themselves, suggesting either an aversion to perpetuating structural inequalities or a desire to rectify them. Furthermore, children judge rectification of gender-based inequality to be more fair than its perpetuation (Rizzo et al., 2020).

The current studies explore how 4- to 9-year-olds think about and attempt to rectify inequality of *social power* rather than resource inequality. In Study 1, children were shown hierarchical structures that varied in gender or racial representation and were asked to judge the fairness of the hierarchies. In Study 2, children were shown an unequal social hierarchy and were given the opportunity to either perpetuate or rectify the inequality by selecting people to promote in the hierarchy. Lastly, in Study 3, children were provided with a blank hierarchical structure and asked to construct a hierarchy. For the purposes of these studies, we have included gender (men and women) and racial (White and Black) inequality as the groups of interest and have chosen to not include Black women. Although intersectionality plays an important role in systemic inequality and would most likely influence how children respond, in these first steps of this research we have chosen to take a more controlled approach by separating race and gender categories. Additionally, we are studying how these concepts develop from preschool to middle childhood. By age 4, children have developed a sense of gender and race categories and have a robust preference for their gender and race in-groups. It will be interesting to see how children's perspectives about inequality change as they become more aware of gender and racial inequality around age 6 (Mandalaywala et al., 2020) and more averse to expressing and perpetuating it around age 8 (Rutland et al., 2005; Shaw & Olson, 2013).

Study 1

The majority of people are working in unequal hierarchical structures but are 1) not responsible for its composition and 2) possibly blind to the inequalities within it. In Study 1, 4- to 9-year-olds and adults judged hierarchies that varied in their distribution of

Women or Black bosses as fair or unfair. As previously mentioned, children develop a sense of fairness in infancy (Sloane et al., 2012) and display an aversion to inequality around age 6 (Shaw & Olson, 2012; 2013). In this study, children viewed three-tiered hierarchies that reflected different degrees of race- or gender-based inequality and then judged the fairness of the hierarchies.

Four- to 6-year-olds may have difficulty recognizing the inequality within the structure, but 7- to 9-year-old children and adults may judge unequal hierarchies to be less fair than more equitable ones. Furthermore, children may be more likely to notice gender inequality than race-based inequality, as that is a more salient social category earlier in development (Shutts, 2015), and girls may be more sensitive to gender-based inequality than boys. Alternatively, there may be differences in how children judge fairness based on the position someone is in the hierarchy. It is unclear whether children will perceive positions 'higher' in the hierarchy to be more powerful or 'valuable' in the way that they view \$20 bills to be more valuable than erasers in studies of resource inequality. Children may value absolute equality, only taking into account the overall number of people in each social category. Shaw and Olson (2013) found that 6- to 8-year-olds account for the value of resources when rectifying inequalities, suggesting that older children and adults may also use both representativeness and the power of positions to judge the fairness of a hierarchy. However, if adults and children are relatively insensitive to the ways in which power is distributed in social hierarchies, then children may simply attend to the overall representation of race and gender across a hierarchy without consideration of the differences in power and status between individuals at different levels.

Methods

Participants

To determine the appropriate sample size for Study 1, an a priori power analysis was conducted using G*Power (Faul et al., 2007). We estimated an effect size of 0.25 for a two-tailed test with power of .80, 8 measurements, and alpha of .05. Our analysis revealed that our design was sufficiently sensitive to detect significant effects with a total sample of 30 participants per age group. We collected data from 94 participants and excluded data from three participants: one 4-year-old was excluded due to parent interruption during the study and one 6-year-old and one adult were excluded due to technological issues. One extra 6-year-old was tested due to experimenter error, resulting in a total sample of 91 participants.

Participants included 31 4- to 6-year-olds ($M_{age} = 5.57$, $SD_{age} = 0.93$; 16 boys and 15 girls), 30 7- to 9-year-olds ($M_{age} = 8.55$, $SD_{age} = 0.89$; 16 boys and 14 girls), and 30 adults (8 men and 22 women). Sixty percent of child participants were White, 20% were Asian, and .02% were mixed race with Black identified as one of the races, and 15% were mixed race with races that do not include Black (parents of the remaining .02% chose not to report demographic information). Ninety-three percent of children were not Hispanic or Latino, 1 child was identified as Hispanic or Latino, and 2 parents did not provide information about ethnicity. Adult participants were undergraduate students recruited using a university-based online recruitment tool. The adult version of this experiment was deemed 'exempt,' but a condition of this status was that no demographic data would be gathered from adult participants. Adults received course credit as

compensation for their participation and children received \$5 Amazon gift cards. All data was collected online with children and adults who resided in the United States.

Design and Materials

In Study 1, participants were presented with a screen showing three tiered hierarchies with a single face at the top, a middle tier consisting of four faces, and a bottom tier with six faces. The study consisted of two within-subjects conditions: a Gender Condition and Race Condition. In the Gender Condition, participants were shown White men and women and in the Race condition participants were shown White men and Black men. Within each condition, 4 trials that varied based on the distribution of people of different genders or races within the hierarchy were shown to participants. The trials were presented in two blocks, one race-based and one gender-based. The positioning of the faces in each hierarchy was determined using a random number generator.

Faces included in the hierarchical structures were drawn from the Chicago Face Database (Ma et al., 2015). Faces were chosen that were judged to be similar on the following dimensions: age, how male or female they presented, how White or Black they presented, attractiveness, and how prototypic of their race they appeared, See Table 1 for average ratings for each social group across the 3 current studies. Each group did not differ on average by more than a single point on a seven-point scale. We took this step to minimize the influence of the characteristics of the specific images on children's judgements, and to focus participants on the variables of interest: race and gender.

Table 1. Ratings of each social group for Studies 1, 2, and 3

	N	Age	Gender Rating	Race Rating	Attractiveness Rating	Prototypicality Rating
<u>Study 1</u>						
White Men	12	28.02	.99	.94	3.35	3.68
White Women	5	26.51	.99	.99	4.02	4.36
Black Men	5	24.14	.99	.96	3.95	3.80
<u>Study 2</u>						
White Men	18	27.38	.99	.96	3.38	3.84
White Women	6	27.43	.99	.99	3.92	4.29
Black Men	6	25.09	.99	.97	3.79	3.84
<u>Study 3</u>						
White Men	22	28.29	.99	.96	3.37	3.81
White Women	11	26.50	.99	.98	4.11	4.12
Black Men	11	27.15	.99	.97	3.46	3.81

Table 1: Faces used in Studies 1-3 were selected to be emotionally neutral and to be similar across variables that might affect children’s fairness judgements.

Each hierarchy was constructed of three tiers. The top tier showed a single face of a person introduced as the ‘Big Boss,’ the middle tier showed four faces in the ‘Little Boss’ position, and the bottom tier showed six faces in the ‘Worker’ position of the hierarchy. These tiers provided labels for each person in the hierarchy and communicated the power differences in the hierarchy in a way that young children could understand.

Procedure

Children were tested online via a Zoom call and adult participants were tested using Microsoft Teams. Participants were seated in front of a computer or tablet viewing slideshow software shared to their screen. First, the experimenter made sure the participant could clearly see the screen by asking them to identify an image they were viewing (e.g., a blue square). Once children responded, the experimenter began the study

session. Participants were introduced to the three-tiered hierarchy using a homogenous hierarchy with silhouettes as stand-ins for the target faces. The experimenter introduced the hierarchy as a group made up of ‘Big Bosses,’ ‘Little Bosses,’ and ‘Workers,’ and that, “a boss is someone who can tell people what to do.” Each level was introduced with an arrow pointing to the tier that was being discussed. Big Bosses were described as someone who can, “tell everyone what to do,” and the Little Bosses can, “tell the workers what to do.” When describing the workers, participants were told that Bosses told Workers what to do.

Next, participants were told that they were going to be shown groups and they were to decide whether the group was fair or not. Participants were then shown a block of four trials: A White man as the Big Boss with 3 White men and 1 White woman/Black man as Little Bosses (MA75 trial), A White man as the Big Boss with an equal distribution of White men and White women/Black men as Little Bosses (MA50 trial), A White woman/Black man as the Big Boss with 3 White men and 1 White woman/Black man as Little Bosses (MI75 trial), and A White woman/Black man as the Big Boss with an equal distribution of White men and White women/Black men as Little Bosses (MI50 trial), see Figure 1.

Figure 1. Race and Gender Hierarchies

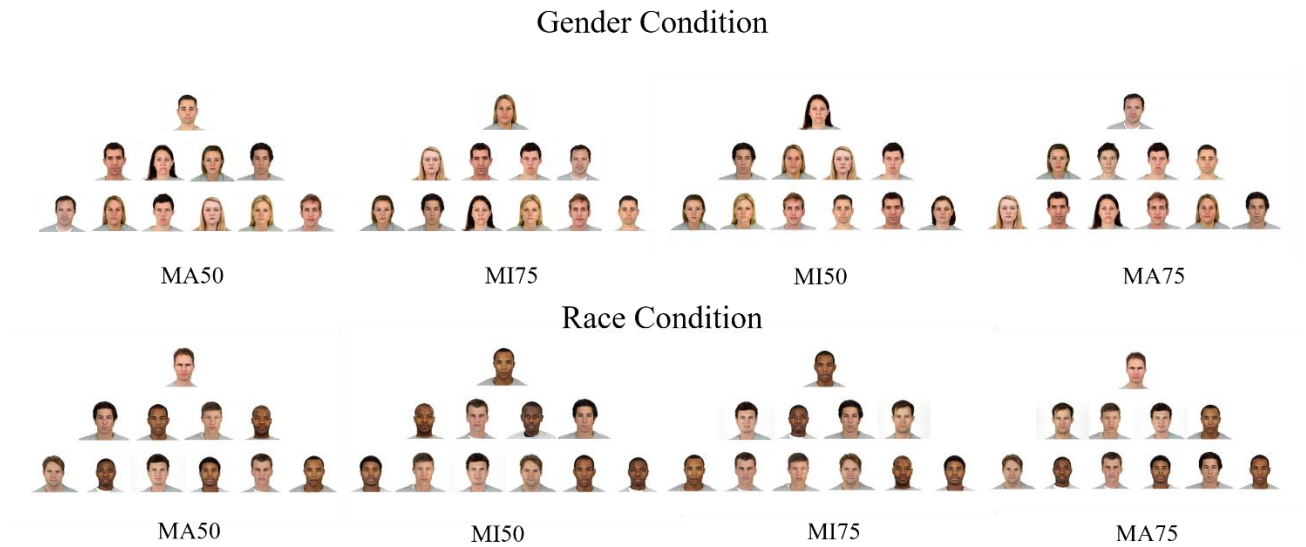


Figure 1: Children were presented with race- and gender-based hierarchies and asked to judge the fairness of each hierarchy.

The ordering of the gender and race blocks was counterbalanced across children. When introducing the Race block, the experimenter said, “First, we are going to talk about White people and Black people. People of all colors work together. Both White people and Black people can be bosses and workers, but a lot of White people are bosses.” The Gender block was similarly introduced using terms men and women rather than White people and Black people. Using these statements to introduce the hierarchies in each block highlighted the potential inequality in the groups as well as communicating the gender or racial group that is typically in power.

In each block, participants were shown a hierarchy made up of diverse faces. First participants were asked whether the group was fair, answering yes or no. Then, the experimenter asked how fair or unfair the group was depending on their previous answer.

Participants were given the option to respond with a little (un)fair or very (un)fair. Once the participant responded to both questions, the experimenter progressed to a blank slide that served to distinguish the previous hierarchy from the subsequent one and to de-emphasize differences between the two hierarchies' composition. Participants responded to these questions on each of the four trials in each block for a total of 16 total questions.

Once participants responded to both blocks, they were again shown the initial homogenous hierarchy and were asked two exploratory Desirability Questions. The experimenter reiterated that the person at the top was the boss, with an arrow pointing at that position, and asked whether people want to be the boss. The experimenter then asked whether the participant wanted to be the boss. Participants could answer with a 'yes' or 'no.' These questions probed how participants viewed the appeal of the big boss position and provided information about how children specifically understand the power held by people in this position. Once children completed the study, they were thanked for their participation and their parent was emailed their compensation.

Results

Children's selections were coded on a scale from -2 to +2 with -2 = very unfair, -1 = a little unfair, 1 = a little fair, and 2 = very fair. Their scores were then averaged to create a fairness score for each Trial Type in each Condition.

Preliminary Analyses

I conducted an 3 (Age Group: 4- to 6-year-olds, 7- to 9-year-olds, and adults) X 2 (Condition: Race and Gender) X 4 (Trial Type: MA75, MA50, MI75, and MI50) X 2 (Participant Gender: Boys/Men and Girls/Women) X 2 (Presentation Order: Gender presented first and Race presented first) repeated-measures factorial ANOVA with

Condition and Trial Type as within-subjects variables and Age Group, Participant Gender, and Presentation Order as between-subjects variables. We found a significant main effect of Trial Type, $F(3, 237) = 27.82, p < .001, partial \eta^2 = 0.26$, a significant two-way interaction between Trial Type and Age Group, $F(6, 237) = 5.84, p < .001, partial \eta^2 = 0.13$, and a significant two-way interaction between Trial Type and Order, $F(3, 237) = 3.02, p = .030, partial \eta^2 = 0.04$. These results were embedded in two significant 3-way interactions: a Trial Type X Age Group X Participant Gender interaction, $F(6, 237) = 2.65, p = .017, partial \eta^2 = 0.06$, and a Trial Type X Age Group X Presentation Order interaction, $F(6, 237) = 3.21, p = .005, partial \eta^2 = 0.08$. Additionally, we found a significant interaction of Condition by Trial Type, $F(3, 237) = 3.56, p = .015, partial \eta^2 = 0.04$.

Although the preliminary analysis revealed two significant 3-way interactions, we hesitate to interpret these findings. The a priori power analysis used for this study did not assume that some of these factors would be relevant. Thus, tests focusing on complex interaction may not be sufficiently powered. At the same time, the characteristics of these findings suggest that they might reflect an overarching four-way interaction that revolves around Presentation Order that may be apparent with a larger sample size. It is clear from these initial results that these factors, Presentation Order in particular, influence participants' judgements. Something about judging race- or gender-based hierarchies changes participants' subsequent judgements in meaningful ways. Rather than attempt to interpret results discovered with under-powered analyses, we elected to exclude some data from analysis in order to remove some factors less central to the goals of the study from consideration. We focused on Presentation Order, because the variable was a

significant contributor to several interactions, and it was easy to remove with manageable data loss. Because the Condition (Race and Gender) were within-subjects variables presented in counterbalanced blocks, we were able to remove Presentation Order as a variable by simply focusing on the first block of each experimental session, as only judgements about the second block could possibly be influenced by Presentation Order.

After splitting the data in this way, our primary analyses of children's fairness judgments included a total of 45 children's responses in the Gender Condition with 16 4- to 6-year-olds ($M_{age} = 5.71$, $SD_{age} = 0.99$; 10 boys, 6 girls), 14 7- to 9-year-olds ($M_{age} = 8.50$, $SD_{age} = 0.97$; 6 boys and 8 girls), and 15 adults (4 men and 11 women) and a total of 46 children's responses in the Race Condition with 15 4- to 6-year-olds ($M_{age} = 5.43$, $SD_{age} = 0.86$; 6 boys, 9 girls), 16 7- to 9-year-olds ($M_{age} = 8.59$, $SD_{age} = 0.84$; 10 boys and 6 girls) and 15 adults (4 men and 11 women). Focusing on only the first block of each participants' data, we conducted separate analyses of children's fairness judgements in the Gender and Race conditions. Analyses of the final queries about bosses included data from all children collapsed across condition.

Primary Analyses: Fairness Judgments

Gender Condition. A 4 (Trial Type: MA75, MI50, MI75, and MA50) X 3 (Age Group: 4- to 6-year-olds, 7- to 9-year-olds, and adults) X 2 (Participant Gender: Male and Female) Repeated Measures Factorial ANOVA with the Gender Condition and Trial Type as the within-subjects variable was conducted on the participants that saw the Gender Condition first. We found a significant main effect of Trial Type, $F(3, 117) = 5.37$, $p = .002$, $partial \eta^2 = 0.12$. There were no other significant main effects of or interactions with Age Group or Participant Gender in these data, $ps > .05$. Bonferroni-

corrected post-hoc analyses indicated that participants judged the MA75 trial ($M = 0.22$, $SD = 1.80$) to be significantly less fair than the MA50 trial ($M = 1.42$, $SD = 0.89$), $p = .003$. Neither the MA75, nor MA50 trials significantly differed from the MI50 ($M = 1.07$, $SD = 1.30$; $p_{MA75} = .116$, $p_{MA50} = .450$) or MI75 ($M = 0.93$, $SD = 1.40$; $p_{MA75} = .416$, $p_{MA50} = .364$) trials, and MI50 and MI75 trials did not differ from each other, $p = 1.00$, see Figure 2.

Figure 2. Gender Fairness Judgements

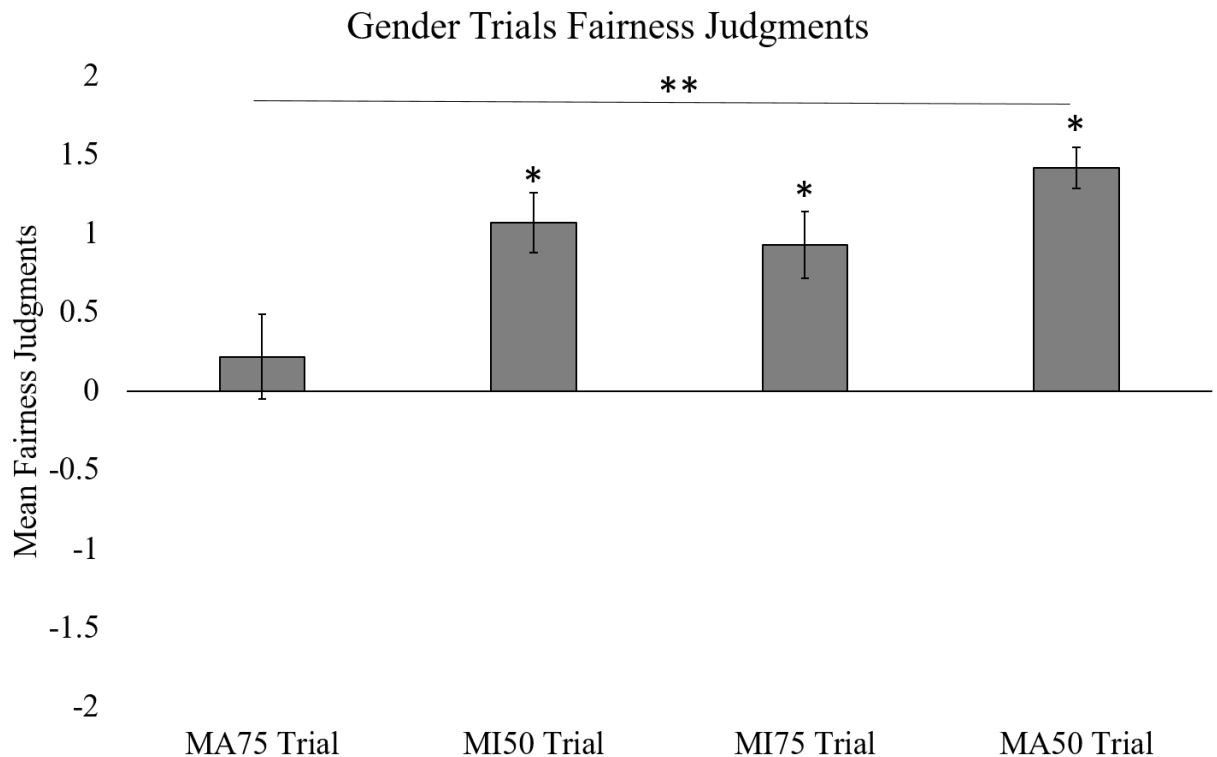


Figure 2. Participants judged MA75 trials to be neutral, and all other hierarchies were judged to be fair, despite reflecting some degree of gender-based inequality. Horizontal lines with asterisks represent group differences ($>.05^*$, $>.01^{**}$, $>.001^{***}$) and asterisks above the bars represent differences from chance ($>.05^*$).

To further characterize participants' fairness judgements, we conducted single sample *t*-tests to compare participant responses to neutral responding (neutral = 0) to determine whether participants' responses were neutral, or if they reflected overarching response patterns. We found that participants' ratings of the MA75 trials were neutral and not different from chance, $t(44) = 0.83, p = .411$. However, participants rated MI50, $t(44) = 5.49, p < .001, d = 0.82$, MI75, $t(44) = 4.56, p < .001, d = 0.67$, and MA50, $t(44) = 10.70, p < .001, d = 1.60$, trials as significantly more fair than neutral.

Race Condition. A 4 (Trial Type: MA75, MI50, MI75, and MA50) X 3 (Age Group: 4- to 6-year-olds, 7- to 9-year-olds, and adults) X 2 (Participant Gender: Male and Female) Repeated Measures Factorial ANOVA with the Race Condition and Trial Type as the within-subjects variables was conducted on the data of participants that saw the Race Condition first. We found a significant main effect of Trial Type and Age Group, but there was no significant interaction between the two factors, $F(6, 120) = 2.00, p = .070$. We further explored the main effect of Trial Type, $F(3, 120) = 16.95, p < .001, partial \eta^2 = 0.30$, using Bonferroni-corrected post-hoc analyses. These analyses revealed that the MA75 trial ($M = -0.57, SD = 1.47$) was rated as less fair than the MI50 ($M = 1.17, SD = 1.27; p < .001$), MI75 ($M = 0.61, SD = 1.45; p = .003$), and MA50 ($M = 1.03, SD = 1.37; p < .001$) trials. No other trials significantly differed from each other, $ps > .05$. We conducted single sample *t*-tests comparing participant's responses to neutral (neutral = 0) for Trial Type and Age Group. We found that participants rated the MA75 trial as unfair, significantly below neutral, $t(45) = -2.61, p = .012, d = -0.38$. However, participants' fairness judgements of the MI50, $t(45) = 6.27, p < .001, d = 0.92$, MI75,

$t(45) = 2.84, p = .007, d = 0.42$, and MA50, $t(45) = 5.04, p < .001, d = 0.74$, trials were all significantly above neutral and fair, see Figure 3.

Figure 3. Race Fairness Judgements by Trial Type

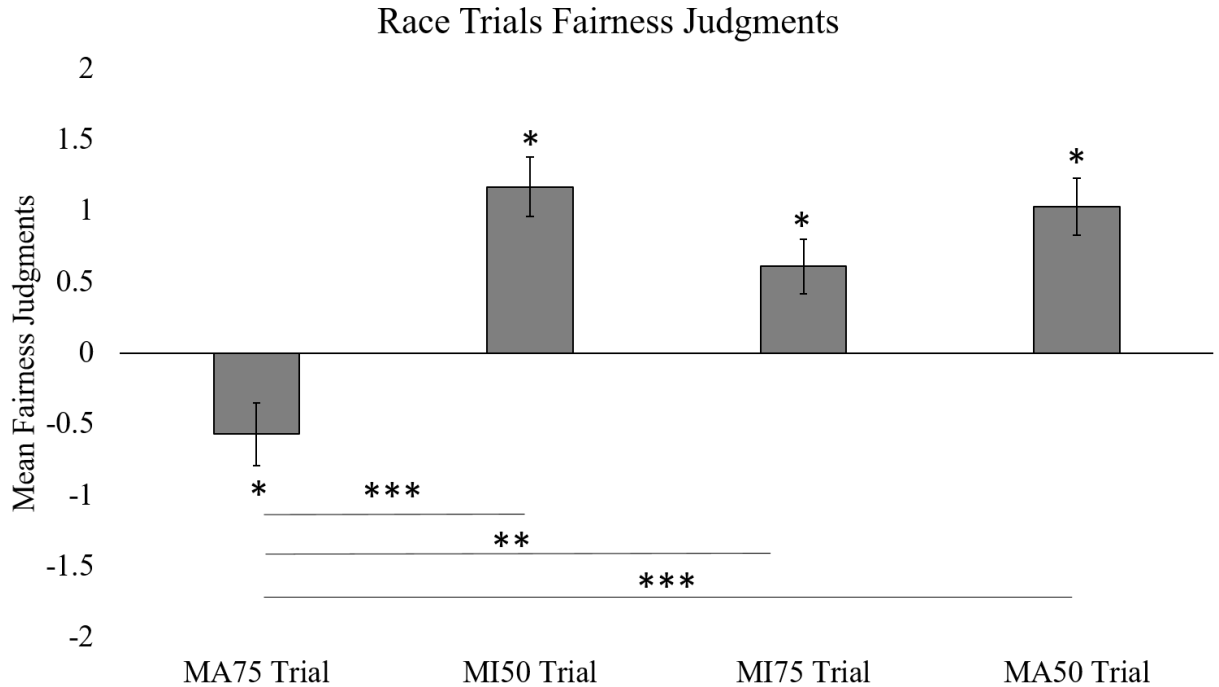


Figure 3. Participants judged the MA75 trial to be unfair, but all other hierarchies were judged to be fair and significantly fairer than MA75. Horizontal lines with asterisks represent group differences ($>.05^*$, $>.01^{**}$, $>.001^{***}$) and asterisks above the bars represent differences from chance ($>.05^*$).

Further analyzing the significant main effect of Age Group, $F(2, 40) = 5.93, p = .006$, *partial* $\eta^2 = 0.23$, post-hoc analyses revealed that 4- to 6-year-olds ($M = -0.02, SD = 0.10$) rated the Race Condition Trials as less fair than the 7- to 9-year-olds ($M = 1.05, SD = 0.85; p = .005$) but not statistically different from adults ($M = 0.62, SD = 0.53; p = .10$). Older children's and adults' fairness ratings did not differ, $p = 1.00$. Looking more

closely at the patterns of responses by Age Group, we found that older children, $t(15) = 4.94, p < .001, d = 1.24$, and adults, $t(14) = 4.48, p < .001, d = 1.16$, judged hierarchies to be significantly more fair than neutral. However, younger children's judgements did not differ from neutral, $t(14) = -0.07, p = .949$, see Figure 4. These results suggest that younger children generally judged all hierarchies to be more neutral than older children and adults, but their judgements only significantly differed from those of adults and not older. We hesitate to interpret these main effects too strongly, because each effect collapses across Trial Type, which was itself a significant factor, and the entire analysis likely lacked the sensitivity required to detect an underlying significant interaction. However, it is notable that – when the data were collapsed in this way – none of the Age Groups judged the hierarchies, which were designed to be unequal, as being unfair.

Figure 4. Race Fairness Judgements by Age

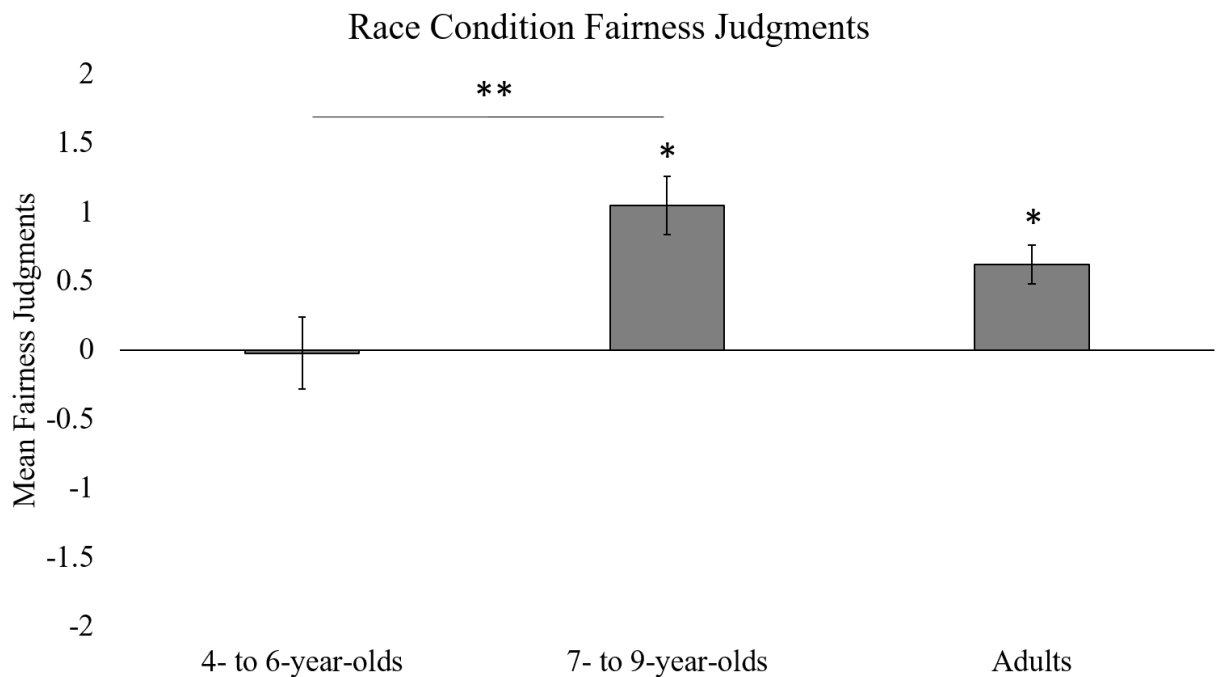


Figure 4. Overall, older children and adults judged unequal hierarchies to be fair, and younger children judged them to be neutral. None of the hierarchies, which were designed to be unequal, were judged to be unfair. Horizontal lines with asterisks represent group differences ($>.05^$, $>.01^{**}$, $>.001^{***}$) and asterisks above the bars represent differences from chance ($>.05^*$).*

Primary Analyses: Boss Desirability Questions

Before the conclusion of the study, children were shown a homogenous hierarchy and were asked whether people generally want to be the boss and whether they, the participant, wanted to be the boss. “Yes” responses were coded as a 1 and “No” responses were coded with a 0. This question was added to the end of the study after the start of data collection, resulting in a total of 75 participants ($N_{4- \text{ to } 6\text{-year-olds}} = 24$, $N_{7- \text{ to } 9\text{-year-olds}} = 25$, and $N_{\text{adults}} = 26$) of the total 80 answering this question. Because this was a different kind of judgement than the fairness judgements, we felt justified in reporting data for all participants together.

We conducted a Chi-square of Test of Independence for each question and used Age Group as a grouping variable. We found that when answering whether people wanted to be a boss, Age Group influenced participant’s responses, $\chi^2(2, 75) = 8.54$, $p = .014$, with the proportion of participants who judged that people wanted to be a boss increasing across Age Group. We found that 70% of 4- to 6-year-olds, 84% of 7- to 9-year-olds, and 100% percent of adults responded that generally people would want to be a boss (85% of all participants). Although the proportion of participants who wanted to be a boss themselves increased across Age Group, the increase was not significant, $\chi^2(2,$

75) = 4.11, $p = .128$. We found that 50% of 4- to 6-year-olds, 68% of 7- to 9-year-olds, and 77% of adults responded that they would want to be a boss (65% of all participants).

Discussion

Recognizing inequality in hierarchical structures is the first step toward rectifying inequalities. However, it was unclear whether children recognize when positions of power were disproportionately held by one group of people and whether gender or racial inequality are more salient. We found that the kind of inequality observed initially – race- or gender-based – affected participants’ subsequent judgements. However, the current study was underpowered to adequately characterize these effects. Rather than attempt to explain nuanced order effects with insufficient power, we elected to limit our analyses to data unaffected by order effects. Despite lacking the power to really make strong claims about how exposure to different kinds of inequality might affect judgements of fairness, our data demonstrate that these exposures shift participants’ fairness attributions. Thus, future studies will be needed to directly investigate these effects.

Focusing on only data unaffected by presentation order, we found different response patterns for hierarchies depicting gender- versus race-based inequality. Participants rated hierarchies reflecting gender inequality as relatively fair, with the lowest fairness ratings being attributed to the trial with the fewest women as bosses. However, this hierarchy was still judged to be neutral and not “unfair.” Interestingly, participants were relatively insensitive to differences in power between genders. If there was only one woman, then participants judged the hierarchy to be ‘neutral,’ but if there were at least two women, regardless of their position in the hierarchy, then participants

judged the hierarchy to be fair. These results suggest that minimal representation of women in positions of power is considered sufficient to judge a hierarchy to be fair. The only trial that was statistically more fair than the neutral trial still showed a man in the highest position of power, a position that 70% or more of participants said was desirable, suggesting an underlying gendered glass ceiling effect where women need not be represented in the most powerful positions in social hierarchies in order for them to be fair.

Similar to ratings of gender-based hierarchies, race-based hierarchies that included more than one Black man in a position of power were considered fair. However, when there was only one Black man in a boss position, people considered it unfair rather than neutral and more unfair than all other hierarchical distributions of Black and White men. Participants may find racial inequality to be more salient than gender inequality resulting in a sensitivity to tokenism and lower fairness judgements of token race representations compared to token gender representations. Alternatively, participants may have viewed a single White woman in a group of men to be ‘good enough’ representation, while judging a single Black man in a group of Black and White men to be ‘bad’ tokenism. Future research should focus on the development of attitudes toward tokenism in both children and adults.

Lastly, participant age influenced recognition of racial inequality where the youngest children generally rated all hierarchies as less fair – but neutral – relative to older children, who generally rated them as fair. We did not see this same effect when children viewed gender inequality. Altogether, these findings suggest that children are relatively insensitive to race- and gender-based structural inequalities. If anything, it

appears that our youngest participants were the most sensitive to inequality, suggesting that individuals may become more comfortable with structural inequality with age and experience.

Study 2

In Study 1, participants were asked to judge social hierarchies that varied in how fair they were. Participants exhibited some sensitivity to hierarchical inequalities, but only judged racialized token representation to be “unfair” and they judged gender-based tokenism to be neutral (i.e., neither fair, nor unfair). This pattern of results suggests that children are, at best, sensitive to underrepresentation, but only in its most extreme forms, or at worst, that structural inequality is gradually seen as fairer over time.

In Study 2, we explored whether children will act to address underrepresentation or perpetuate it when given the opportunity to change unequal hierarchies. Studies of resource inequality reveal that children are highly motivated to create or maintain equality (Shaw & Olson, 2013), but given participants’ attitudes toward unequal social hierarchies in Study 1, it is unclear whether they will act to make them more fair and – if they act – whether they will intervene differently on race- versus gender-based hierarchies. Given the findings of Study 1, it is possible that children may simply perpetuate unequal hierarchies or address racial – but not gender – inequalities.

In order to test investigate these possibilities, we presented 4- to 9-year-old children with an unequal hierarchy and asked them to “promote” people in them to open positions of power. Children had the option to move people who were underrepresented in leadership positions (i.e., White women or Black men) to make the structure more fair, or to promote White men, perpetuating or increasing preexisting inequalities. Previous

research has shown that children may be motivated to rectify inequality in resource allocations (Shaw & Olson, 2013), especially structural inequalities (Rizzo et al., 2020). However, it is unclear how children will respond to inequalities in power and authority rather than in resources.

Results from Study 1 indicate that children judge hierarchies that include a single minoritized individual in a boss position as less fair than those that include more than one minoritized individual. This structure was presented to children at the beginning of the experimental session for Study 2. Thus, participants should judge the given structure as neutral (for gender-based hierarchies) or unfair (for race-based hierarchies) and be motivated to create a more equitable structure. However, previous research has also shown that depicting people from certain groups in positions of power perpetuates perceptions that they are worthy of their privileged position (Roberts et al., 2020). Thus, children may alternatively preserve the original hierarchical representation by continuing to promote overrepresented people (i.e., White men) into leadership positions because they believe people in the overrepresented group are more boss-like.

Methods

Participants

To determine the appropriate sample size for Study 2, an a priori power analysis was conducted using G*Power (Faul et al., 2007). We estimated a conservative effect size of .25 for a two-tailed test with power of .80 and alpha of .05. Our analysis revealed that our design was sufficiently sensitive to detect significant effects with a total sample of 40 participants per age group. We collected data from 80 participants. Participants included 40 4- to 6-year-olds ($M_{\text{age}} = 5.62$, $SD_{\text{age}} = 0.73$; 22 boys and 18 girls) and 40 7-

to 9-year-olds ($M_{\text{age}} = 8.32$, $SD_{\text{age}} = 0.74$; 22 boys and 18 girls). Seventy-three percent of child participants were White, 11.3% were Black, 3.8% were Asian, and 5% were mixed race with Black identified as one of the races, and 1.3% were mixed race with races that do not include Black (parents of the remaining 5% chose not to report demographic information). Children were recruited from elementary schools, preschools, and a database of families in and around a large Southern city. As compensation, children received small prizes and a certificate. All data were collected in person in 2019.

Design and Materials

Children were presented with three within-subjects conditions: a Control Condition, Gender Condition, and Race Condition. The Control Condition included non-human entities shown as orange and green triangles called Egets and Zazes, respectively. Non-human entities were used as a control to test whether children attended to the composition of the structure and how they responded to the inequality within the structure when no prior stereotypes or biases are present to influence their selections. Previous research has shown that colors can be used to create minimal groups and that such grouping influences children's judgements about group members (see Dunham, 2018). The Gender Condition presented children with White men and women and the Race Condition presented children with White and Black men. The order in which children were presented with each condition was counterbalanced, with the Control Condition always presented first and the order of presentation of the Gender or Race Condition counterbalanced across participants. Each condition included two trials where children could move individuals into boss and worker positions. The first trial always had

the same initial set up, but the gender and race representation present in the second trial varied in composition depending on the child's previous trial 1 "promotions."

Photographs of people's faces were used in the Gender and Race Conditions. All photographs were from the Chicago Face Database (Ma et al., 2015) and were also included in Study 1. Eight additional faces were included in Study 2 that were not present in Study 1. These faces were selected using the same standards as in Study 1 and did not differ in ratings by more than a single point on any of the previously described dimensions, see Table 1. Triangles and faces were printed onto a white background, cut into small 1" X 1.5" cards, and laminated with a single hole punched directly above the image.

Children were presented with a pegboard. The pegboard was made of wood, with multiple holes to place pegs, and was propped up with two legs. Hooks were positioned in the pegboard prior to the beginning of the experimental session to form the structure of the hierarchy: 1 hook at the top center for the 'Big Boss', 4 hooks at the middle for the 'Little Bosses,' and 6 hooks at the bottom for the 'Workers' all equidistant from one another and formed a triangle shape. The placement of the faces was randomly determined using a random number generator with the constraints of the proportion of each demographic in each level. Additionally, boss positions were marked with stars using miniature clothespins with gold-colored foam sparkle star stickers (see Figure 5). The Big Boss was marked with a 'Big Star' that was larger than the four 'Little Stars' marking the Little Bosses. Stars were used to mark the people in positions of power and provide children with an embodied task to complete that emphasized the importance of each position in the hierarchy.

Figure 5. Example Pegboards

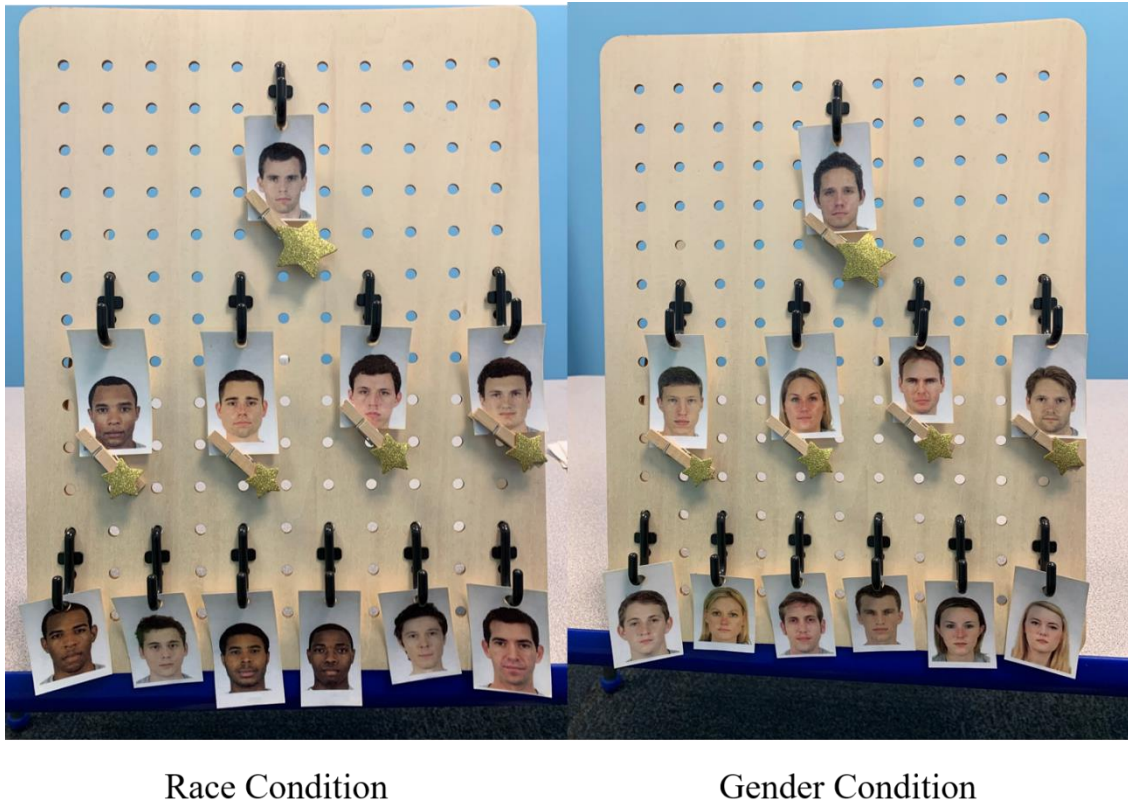


Figure 5. Example pegboards with big bosses and little bosses identified by both position and stars.

Procedure

Children sat in front of a pegboard in a quiet space. The pegboard was preset with orange and green triangles when it was introduced to them. The pegboard was always preset in the first trial in the same composition order with the same faces in each position for each condition: a majoritized individual (i.e., Eget or White man) at the top in the Big Boss position, 3 majoritized individuals and 1 minoritized individual (i.e., a Zaz, woman, or Black man) in the middle Little Boss positions, and 3 majoritized and 3 minoritized individuals in the bottom Worker positions.

Children were initially told that we were going to play a game, “where you move cards on this board.” Then children were shown the Control Condition with the orange and green triangles introduced as Egets and Zazes. At the beginning of each condition, the experimenter would give instructions that, “Egets/Men/White people and Zazes/Women/Black people all work together. Both Egets/Men/White people and Zazes/Women/Black people can be bosses and workers but a lot of Egets/Men/White people are bosses.” These instructions highlighted the inequality within the structure and informed children of the typical societal power imbalances across different gender and racial groups. After children were introduced to the condition and the people on the pegboard, they were introduced to the structure of the pegboard. The experimenter pointed to each tier of the hierarchy and stated the labels for the people in each tier.

After introductions, the experimenter said, “the Big Boss just retired and is leaving the company,” and removed the individual in the Big Boss position, removed their star, and placed them to the side. Children were then asked, “Who can move up to be the new Big Boss?” Children then selected from the middle tier of Little Bosses someone to move into the Big Boss position. If needed, the experimenter would prompt children to move the card they selected themselves and place the Big Star on the card they just selected for Big Boss. Children were not allowed to promote individuals from Worker to Big Boss, only promotions from subordinate tiers were prompted. Then, the experimenter would ask children to select a Worker to promote into the new open position on the Little Boss tier. Children would then put the Little Star on the new Little Boss. At the end of trial 1, the experimenter presented two new cards, one majoritized

and one minoritized individual, and the child was prompted to select one to fill the empty position on the bottom Worker tier of the structure, see Figure 6.

Figure 6. Example Promotion

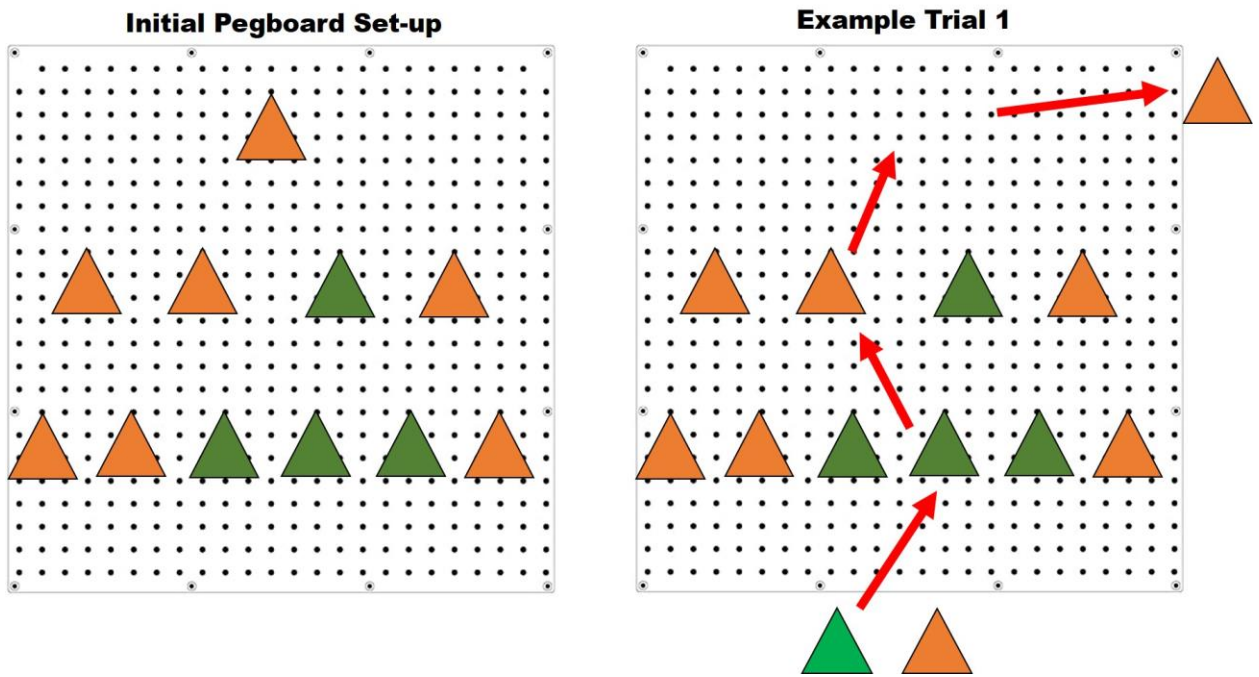


Figure 6. Participants viewed a completed pegboard. The big boss was removed, and participants were prompted to promote from each subordinate tier until all the positions in the hierarchy were filled.

In the Control Condition, children only made one set of promotions, but in the Race and Gender Conditions, the experimenter again ‘retired’ the Big Boss and prompted children to make a second round of promotions. This method let children make multiple selections of who they wanted to be in the boss positions, providing children with the opportunity to further increase or decrease the inequality of the hierarchy. At the beginning of the 2nd trial, children were told that it had, “been a few years and the Big

Boss is retiring and leaving the company,” and were then asked to repeat to make promotions as they had in trial 1. Upon completing both trials in each of the three conditions, children were thanked and compensated with a small prize and certificate.

Results

Children were scored on their tendency to promote majoritized individuals (‘Egets’ in the Control Condition). They received a score of 1 when time they promoted a White man or Eget and a zero when they promoted a White woman, Black man, or Zaz. Our initial analyses collapsed across trials 1 and 2 in order to characterize children’s overall tendency to select minoritized versus majoritized individuals.

We conducted a 3 (Condition: Control, Gender, and Race) X 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 2 (Participant Gender: Boys and Girls) X 2 (Presentation Order: Gender Condition First and Race Condition First) repeated measures factorial ANOVA on children’s combined selections of majoritized individuals across trials 1 and 2 with Condition as the within-subjects variable and Age Group, Participant Gender, and Presentation Order as between-subjects variables. We found a significant main effect of Condition, $F(2, 144) = 14.39, p < .001, partial \eta^2 = .17$, which was embedded in two significant interactions: a Condition X Gender interaction, $F(2, 144) = 7.56, p < .001, partial \eta^2 = .10$, and a Condition X Presentation Order interaction, $F(2, 144) = 3.11, p = .048, partial \eta^2 = .04$.

Bonferroni-corrected post-hoc analyses were conducted to further explore the two significant interactions. Boys ($M = 3.67, SD = 1.60$) selected men significantly more than girls ($M = 2.61, SD = 1.62$) in the Gender Condition, $p = .005$, but there were no other gender differences in the Control or Race Conditions, $ps > .05$. Furthermore, Girls

selected more majoritized individuals in the Control Condition ($M = 4.44$, $SD = 1.28$) than in the Race Condition ($M = 3.36$, $SD = 1.43$), $p = .003$, and both Control ($p < .001$) and Race ($p = .024$) Conditions significantly differed from girls selections in the Gender Condition. Children’s selections did not differ by Presentation Order for each Condition, $ps > .05$. However, children who saw the Gender Condition first selected majoritized individuals more in the Control Condition ($M = 4.04$, $SD = 1.41$) than in the Race Condition ($M = 3.24$, $SD = 1.68$), $p = .023$. When children saw the Race Condition first, all Conditions differed from each other, with the most selections of majoritized individuals in the Control Condition ($M = 4.32$, $SD = 1.46$), then the Race Condition ($M = 3.59$, $SD = 1.55$), and the least in the Gender Condition ($M = 2.86$, $SD = 1.70$), $ps < .05$, see Figure 7.

Figure 7. Selections of Majoritized Individuals for Trials 1 and 2 Combined

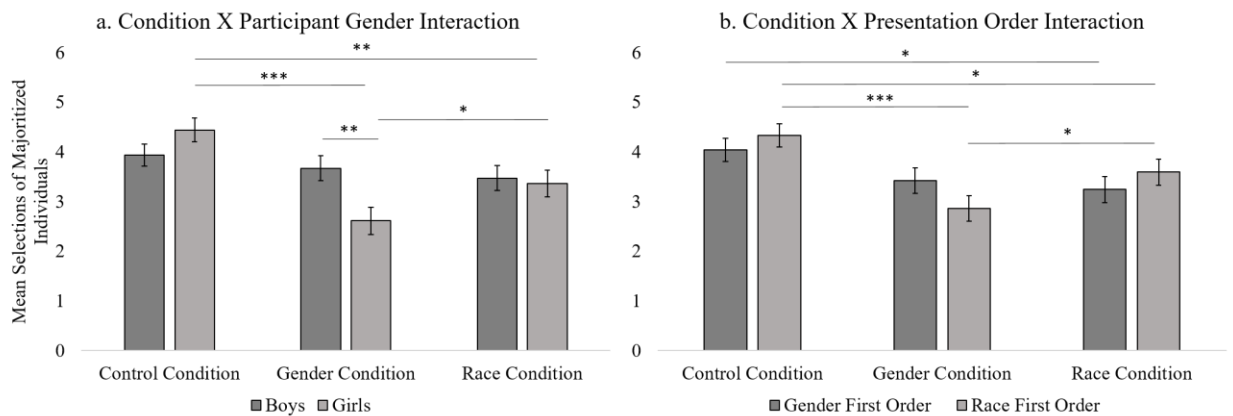


Figure 7. A.) Girls selected fewer majoritized individuals in the Gender Condition compared to the Control and Race Conditions and girls selected less majoritized individuals in the Gender condition than boys. B.) Children selected less majoritized individuals in the Gender Condition than the Control or Race Condition when they viewed the Race Condition first. In both orders, children selected more majoritized

individuals in the Control Condition than in the Race Condition. Horizontal lines with asterisks represent group differences ($<.05^$, $<.01^{**}$, $<.001^{***}$) and asterisks above the bars represent differences from chance ($<.05^*$).*

As in Study 1, Presentation Order was a significant factor in these analyses. However, the data for this study are further complicated by the fact that each promotion affects the probability and availability of individuals to promote (i.e., it is possible that promotion of minoritized individuals from the middle tier may result in no minoritized individuals to promote in trial 2). Because the magnitude of this effect is difficult to measure with the full data set, and because there are obvious order effects, we conduct targeted analyses on participants' trial 1 responses, which have the same structure for every child.

Preliminary Analysis of Trial 1 Responses

Studies 1, 2, and 3 were designed and data collection underway before the effect of Presentation Order reported in Study 1 was discovered. Knowing the effect that this variable had on Study 1, we performed a preliminary analysis to determine whether Presentation Order was also relevant in Study 2 for the first trial. If, as we suspect from the combined Trial 1 and 2 data, an effect of Presentation Order is present, we will focus on data that is unaffected by Order by only analyzing the first two Conditions that children responded to. We prefer to trade power for interpretability so that we might design more targeted studies in the future to explore the influence of Presentation Order on participants' judgements in the future. Additionally, because the probability of selecting a minoritized Big Boss was 25% and selections for Little Boss and worker were

at 50% (putting the Big Boss tier on a different scale than the other tiers), we analyzed Big Boss promotions separately from Little Boss and Worker promotions, and we did not compare responses between the Big Boss tier and the other levels of the target hierarchy.

Big Boss Preliminary Analyses

We conducted a 3 (Condition: Control, Gender, and Race Condition) X 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 2 (Participant Gender: Boys and Girls) X 2 (Presentation Order: Gender Condition First and Race Condition First) repeated measures factorial ANOVA on children's overall selections of majoritized individuals to the Big Boss Tier in trial 1 with Condition as the within-subjects variable and Age Group, Participant Gender, and Presentation Order as between-subjects variables. We found a significant main effect of Condition, $F(2, 144) = 7.57, p < .001, partial \eta^2 = .10$, and no other significant main effects or interactions, $ps > .05$.

Big Boss Primary Analyses

To further explore the effect of Condition on children's selections of who to promote to Big Boss, we conducted a Repeated Measures ANOVA with Condition as the within-subjects variables. All other variables that were not significant and were removed to better understand the singular impact of Condition. The significant main effect of Condition was still detected, $F(2, 158) = 6.68, p = .002, partial \eta^2 = .08$, see Figure 8. Bonferroni-corrected post-hoc analyses indicated that children promoted more majoritized individuals in the Control Condition ($M = .83, SD = .38$) than in the Gender ($M = .65, SD = .48$), $p = .011$, or Race ($M = .60, SD = .49$), $p = .002$, conditions. Children's promotions in the Gender and Race Conditions did not differ, $p = 1.00$.

When analyzing children's responses in comparison to chance (chance = .75) responding for each condition, we found that children's responses to the Control Condition, $t(79) = 1.75, p = .083, d = 0.20$, and Gender Condition, $t(79) = -1.86, p = .066, d = -0.21$, did not significantly differ from chance. However, children's selections of White men in the Race Condition were significantly below chance, $t(79) = -2.72, p = .008, d = -.30$, suggesting that children promoted a Black man to Big Boss significantly more often than expected if children were selecting White men or choosing at random. Altogether, these results suggest that children were sensitive to the social categories being presented and that they made different selections based on social category than they did in the non-social Control Condition. However, these selections only differed from chance in the Race Condition. We suspect that the selection of women would have also been detectably different from chance with a larger sample size.

Figure 8. Big Boss Selections of Majoritized Individuals

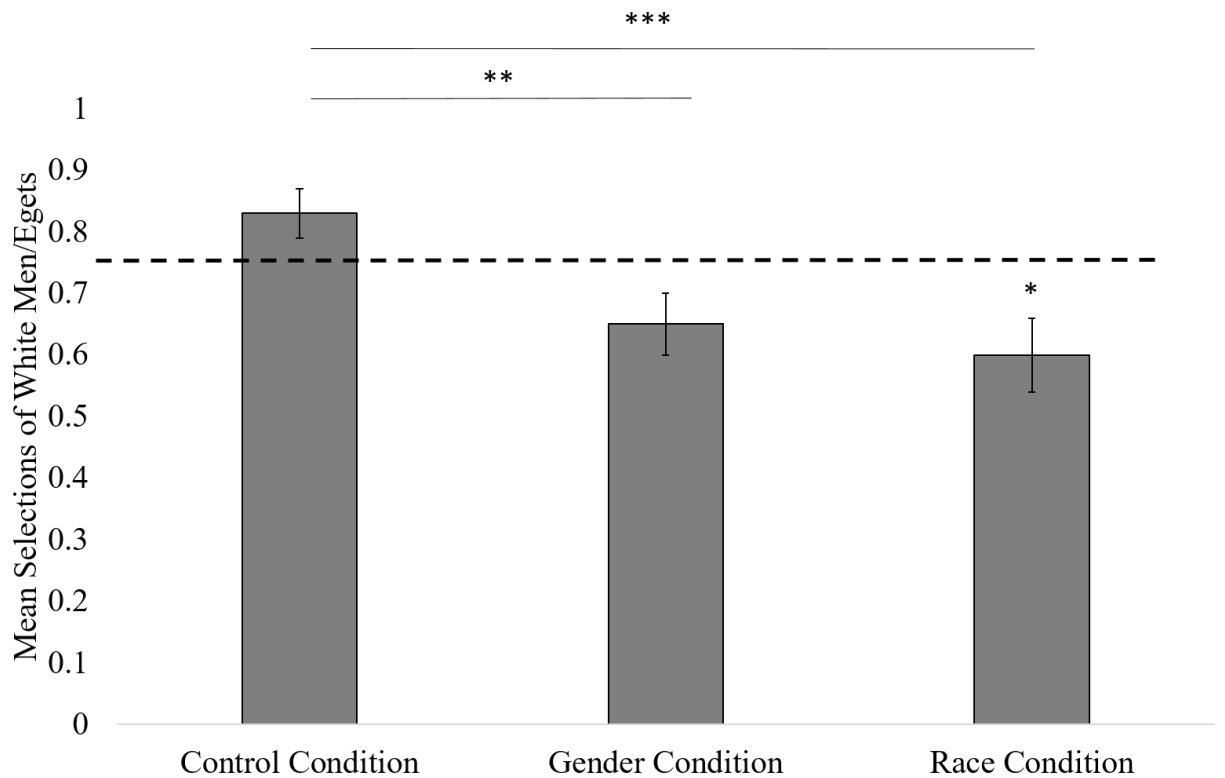


Figure 8. Children maintained the status quo in the Control Condition, but selected relatively fewer majoritized group members when presented with social categories. However, only the Race Condition reflected selection of minoritized individuals at rates that differed from chance. Horizontal lines with asterisks represent significant group differences ($<.05^*$, $<.01^{**}$, $<.001^{***}$) and asterisks above the bars represent significant differences from chance ($<.05^*$).

Little Boss and Worker Preliminary Analyses

We conducted a preliminary 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 3 (Condition: Triangle, Gender, and Race) X 2 (Tier: Little Boss and Worker) X 2 (Participant Gender: Boys and Girls) X 2 (Presentation Order: Gender First and Race

First) repeated measures factorial ANOVA on children's overall promotions of majoritized individuals to the Little Boss and Worker Tiers in trial 1. Condition and Tier were within-subjects variables and Age Group, Participant Gender, and Presentation Order were between-subjects variables. We found a significant main effect of Condition, $F(2, 144) = 11.41, p < .001, \text{partial } \eta^2 = .14$, and a main effect of Tier, $F(1, 72) = 10.04, p = .002, \text{partial } \eta^2 = .12$. These main effects were embedded in several two-way interactions, including a Condition X Gender interaction, $F(2, 144) = 5.20, p = .007, \text{partial } \eta^2 = .07$, a Condition X Tier interaction, $F(2, 144) = 3.26, p = .041, \text{partial } \eta^2 = .04$, and a Tier X Presentation Order interaction, $F(1, 72) = 4.03, p = .049, \text{partial } \eta^2 = .05$.

Because Tier significantly interacted with Presentation Order, we separated the sample by the Presentation Order and only analyzed the initial blocks of the Gender Condition and Race Conditions, including the preceding Control Condition for both in order to maintain non-social versus social comparisons. This resulted in a total sample of 41 children's responses comparing the Control and Gender Conditions including 20 4- to 6-year-olds ($M = 5.59, SD = 0.81$; 12 boys and 8 girls) and 21 7- to 9-year-olds ($M = 8.32, SD = 0.81$; 11 boys and 10 girls). When comparing the Control and Race Conditions, we sampled 39 children including 20 4- to 6-year-olds ($M = 5.65, SD = 0.67$; 10 boys and 10 girls) and 19 7- to 9-year-olds ($M = 8.31, SD = 0.68$; 11 boys and 8 girls).

Children's Selections of the Little Boss and Worker

Gender Condition. A 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 2 (Participant Gender: boys and girls) X 2 (Condition: Control Condition and Race Condition) X 2 (Tier: Little Boss and Worker) repeated measures factorial ANOVA, with

Condition and Tier as the within-subjects variables, was conducted on children's promotions. We found a significant main effect of Condition, $F(1, 37) = 9.90, p = .003$, $partial \eta^2 = 0.21$. However, this main effect was embedded in two significant interactions: a Condition X Participant Gender interaction, $F(1, 37) = 12.03, p = .001$, $partial \eta^2 = 0.25$, and a Condition X Tier interaction, $F(1, 37) = 6.26, p = .017, partial \eta^2 = 0.15$. There were no other significant main effects or interactions, $ps > .05$.

To further explore the significant Condition X Participant Gender interaction, we conducted Bonferroni-corrected post-hoc analyses on children's responses to the Control and Gender Conditions by Participant Gender. Girls ($M = 0.78, SD = .31$) promotions of the Egets (the majority group) in the Control Condition did not differ from boys' ($M = 0.65, SD = .38; p = .285$). However, boys ($M = 0.67, SD = .36$) selected significantly more White men in the Gender Condition than girls ($M = 0.31, SD = .25$), $p < .001$. Furthermore, girls selected less White men in the Gender Condition than they did Egets in the Control Condition, $p < .001$. Boys selections in the Gender and Control Conditions did not differ, $p = .810$. We also conducted single sample t -tests to compare children's selections to chance (.50) and further characterize the qualitative findings of the Condition X Participant Gender result. We found that in the Control Condition, girls selected Egets significantly more than chance, $t(17) = 3.83, p = .001, d = .90$, but boys' Eget selections did not differ from chance, $p = .069$. Interestingly, in the Gender Condition, girls selected significantly less White men than would be expected by chance, $t(17) = -3.29, p = .004, d = -.78$. However, boys selected significantly more White men than would be expected by chance, $t(22) = 2.34, p = .029, d = .49$, see Figure 9.

Figure 9. Little Boss and Worker Condition X Participant Gender Interaction

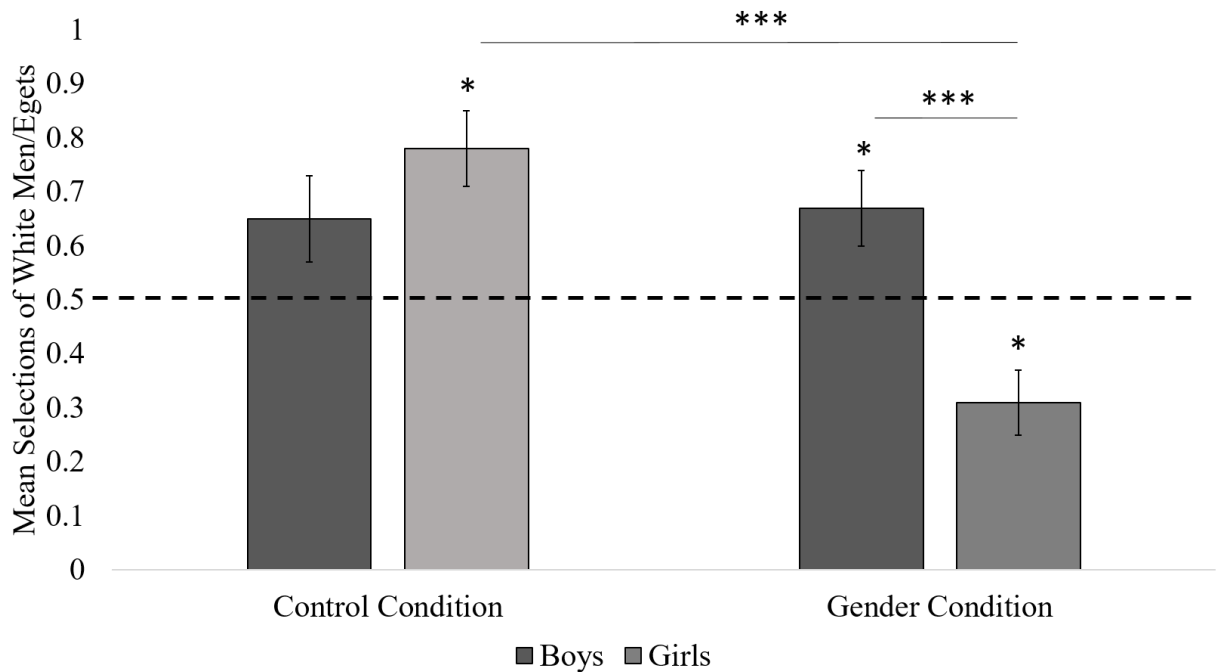


Figure 9. Boys selected social and non-social majoritized individuals for promotion at similar rates, but they selected White men at rates that were greater than chance. Girls selected majoritized individuals at rates significantly greater than chance in the Control Condition, but selected women more often than Boys selected them and at rates significantly greater than chance in the Gender Condition. Horizontal lines with asterisks represent group differences ($<.05^*$, $<.01^{**}$, $<.001^{***}$) and asterisks above the bars represent differences from chance ($<.05^*$).

We also conducted Bonferroni-corrected post-hoc analyses to further explore the Condition X Tier interaction. We found that children selected more Egets to be Little Bosses in the Control Condition ($M = .86$, $SD = .36$) than White men in the Gender Condition ($M = .44$, $SD = .51$; $p < .001$). The Gender ($M = .54$, $SD = .50$) and Control Conditions ($M = .57$, $SD = .50$) did not differ for the Worker Tier, $p = .798$. Additionally,

Children selected more Egets to be promoted to the Little Boss Tier ($M = .86, SD = .36$) than the Worker Tier ($M = .57, SD = .50$) in the Control Condition, $p = .001$, but did not select more White men to be promoted to the Little Boss Tier ($M = .44, SD = .51$) than the Worker Tier ($M = .54, SD = .50$) in the Gender Condition. We conducted single sample t -tests to compare children's selections to chance (.50). Only children's selections of Egets to the Little Boss Tier were significantly greater than chance, $t(40) = 6.33, p < .001, d = 0.99$. All other selections were no different than chance, $ps > .05$, see Figure 10. This pattern of results reveals a tendency to maintain or even exaggerate group differences in the Little Boss tier of the Control Condition, but not in the Worker tier or in the Gender Condition.

Figure 10. Little Boss and Worker Condition X Tier Interaction

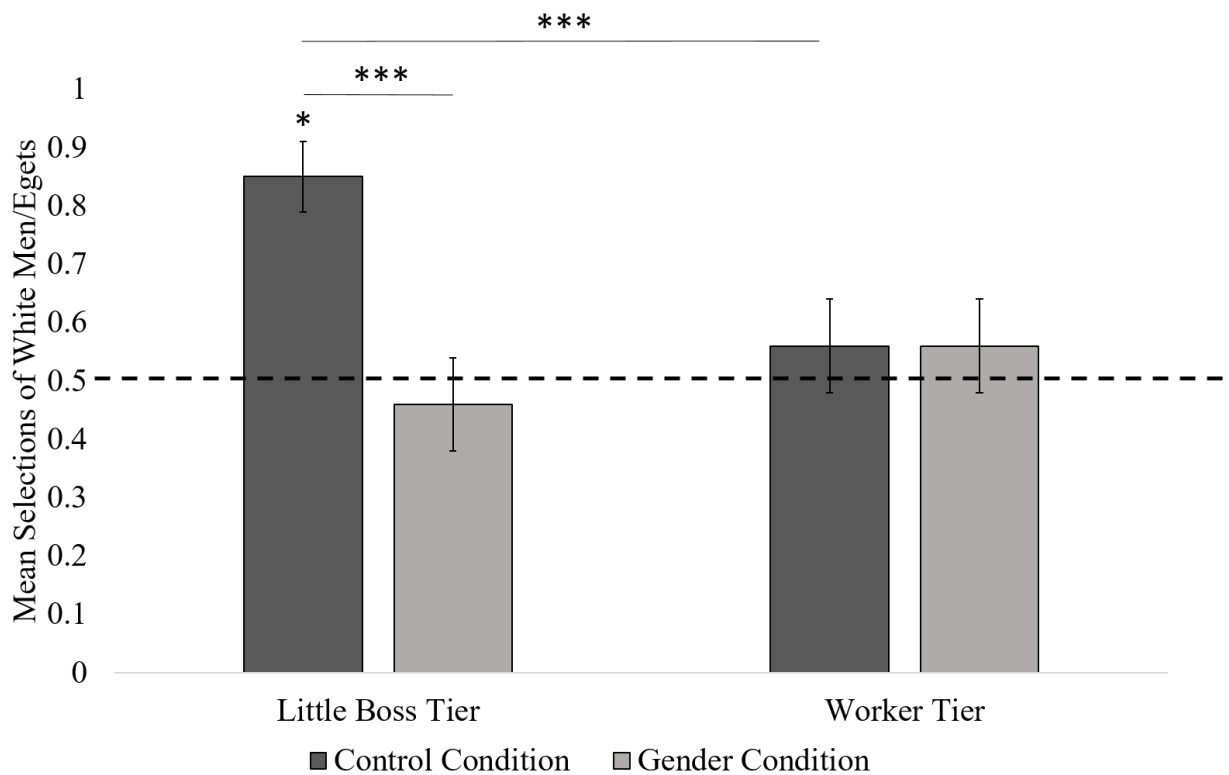


Figure 10. Children randomly promoted both social and non-social individuals to the Worker Tier, and they made random promotions of women to the Little Boss Tier. However, selections of majoritized non-social individuals was significantly higher than selections of social individuals in the Little Boss Tier. Horizontal lines with asterisks represent group differences ($<.05^$, $<.01^{**}$, $<.001^{***}$) and asterisks above the bars represent differences from chance ($<.05^*$).*

Race Condition. A 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 2 (Participant Gender: boys and girls) X 2 (Condition: Control Condition and Race Condition) X 2 (Tier: Little Boss and Worker) repeated measures factorial ANOVA, with Condition and Tier as the within-subjects variables, was conducted on children's responses when they saw the Race Condition before the Gender Condition. We found a main effect of Condition, $F(1, 35) = 4.46, p = .042, partial \eta^2 = .11$. Children selected significantly more Egets to be Little Bosses and Workers in the Control Condition ($M = .66, SD = .33$) than they selected White men to be Little Bosses and Workers in the Race Condition ($M = .50, SD = .38$). When compared to chance (.50) children selected Egets in the Control Condition at rates that were significantly above chance, $t(39) = 3.14, p = .003, d = 0.50$, but were at chance for selecting White men in the Race Condition, $t(39) = 0.00, p = 1.00, d = 0.00$, see Figure 11a. We also found a significant main effect of Tier, $F(1, 35) = 11.13, p = .002, partial \eta^2 = .24$. Children selected significantly more Egets and White men to the Little Boss Tier ($M = .69, SD = .29$) than to the Worker Tier ($M = .47, SD = .40$), see Figure 11b. Their selections of Egets and White men were significantly

above chance for the Little Boss Tier, $t(38) = 4.07, p < .001, d = 0.65$, but did not significantly differ from chance for the Worker Tier, $p = .689$.

Figure 11. Little Boss and Worker Main Effects of Condition and Tier

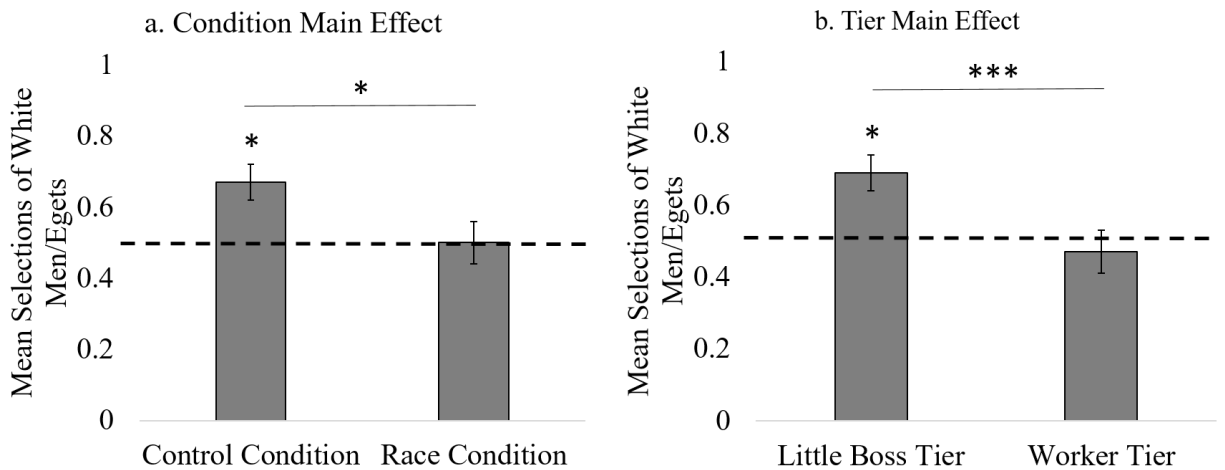


Figure 11. Children promoted more majoritized individuals in the Control Condition than in the Race Condition, and promoted more majoritized individuals to the Little Boss tier than the Worker tier. Horizontal lines with asterisks represent group differences ($<.05^*$, $<.01^{**}$, $<.001^{***}$) and asterisks above the bars represent differences from chance ($<.05^*$).

Discussion

In Study 2, we investigated whether 4- to 9-year-old children would make selections that rectified gender and racial inequality in social hierarchies. As in Study 1, the order in which children viewed different types of social inequality played a role in how they selected who to promote into positions of power. By separating the data by

children's responses to the first condition they saw, we were able to more examine children's responses absent the effects of Presentation Order.

Children's selections of who to promote to the big boss position was only affected by the condition that children were responding to and was uniquely not affected by the order in which the conditions were presented. Children selected more Egets to be big bosses than they did White men suggesting that they were perpetuating inequality when the hierarchy did not represent *social* inequality. However, their selections of Egets did not significantly differ from chance suggesting that children may have been randomly responding when they did not have any social information to glean from the structure. Interestingly, children also randomly responded when making their selections of men and women for the big boss position but they did promote significantly fewer White than Black men to big boss than would be expected. Children may have been more motivated to promote Black men, but not women, to the top of the hierarchy. This may reflect findings related to those reported by Roberts et al. (2020), wherein women are not thought to be boss-like, and therefore their selection for promotion was somewhat attenuated. We would need to run additional participants to confirm this effect, but these data suggest that children may be exhibiting a naïve "glass ceiling" wherein they are willing to promote women and enhance their positions, but not to the most powerful positions.

When selecting women or men to be little bosses or workers, children's responses varied by participant gender. Girls perpetuated inequality more when the groups were made up of arbitrary colors than when the hierarchy included men and women. Interestingly, when deciding whether to select men or women, boys selected more men

overall than girls did, suggesting that children may have been displaying in-group gender favoritism when making selections. Alternatively, it is possible that girls may be more aware of biases against women than boys, and they may feel obligated to correct these broader structural inequalities. However, we did not see participant gender effects when children were selecting White and Black men to be bosses, suggesting that the presence of gender contrasts may more powerfully engage children's in-group biases, or that messaging about racial inequality may influence children's responses to this task. Additionally, targeted studies would be necessary to distinguish among these possibilities.

In general, children were less likely to perpetuate racial inequality compared to inequality within arbitrary non-social groups. However, children still perpetuated inequality. They were fair in their selections, choosing a White man once and a Black man once which ultimately maintained the initial unequal social structure and perpetuated inequality, despite being equitable. Notably, efforts to be 'fair' in individual actions were insufficient to address existing structural inequalities, just as they are insufficient in real-world circumstances. Without the power to detect an interaction, we are unable to say whether these selections systematically put White men into the little boss position more often. However, we found that children's general responses to arbitrary and racial inequality were to put more overrepresented people into a position of power.

Interestingly, children's perpetuation of inequality within the social structure was most exaggerated when they were manipulating the arbitrary non-social entities. Girls selected more

Egrets to be big bosses than White men in the race condition and to be little bosses compared to men in the gender condition. Furthermore, when looking at boys and girls responses collapsed together, Egrets were selected to be little bosses significantly more than they were selected to be workers compared to men in the gender condition and were selected generally more than White men in the race condition. These findings support Roberts et al. (2020) theory that seeing a specific group in positions of power perpetuates putting members of that group into those positions, especially when viewers lack access to any real social group. However, this only held true when the group was novel, simple, and arbitrarily constructed, and non-social.

Children may be most likely to perpetuate inequality when they have not had any experience with a group and thus do not carry their own stereotypes or social justice orientations about the group's members, the boundaries around group membership (i.e., color) are simple, or do not seem to matter in the context in which they are in (e.g., non-social entities within a social structure). Roberts et al. (2020) found that Christian children who believed God was a White man believed White men were more boss-like and then replicated this effect with non-Christian children and an arbitrary god-like group member. Keeping these and the current study's results in mind, future work should be conducted to address how the meaningfulness and familiarity of groups influences how children perceive people in power and perpetuate inequality.

Study 3

Study 3 examines how children construct social hierarchies when they are allowed to control the composition of the people in positions of power and are no longer influenced by the representations of inequality built into the structure of our study

materials. Children are averse to inequality and judge structural inequality based on group membership to be unfair (Shaw & Olson, 2012; 2013). In Study 1, participants concluded that only hierarchies with blatant token minorities were unfair. Hierarchies with two or more women or Black men in elevated positions were judged to be fair, even though minoritized groups were still underrepresented. In the case of gendered hierarchies, participants believed that a distribution with a White man at the top and equal gender representation in the middle was most fair. Thus, we would expect to see a similar type of representation in the hierarchies that children create. However, Study 2 shows that children's selections may be motivated by in-group favoritism which may inflate girls' selections of women compared to boys' selection of women when they are allowed to construct their own, ostensibly fair, hierarchies.

Without an initial starting state that is biased in favor of White men in leadership positions, children may rely on their own gender- or race-based biases to guide their selections. Older children are more aware of stereotypes (e.g., gender brilliance stereotypes, White = wealthy, etc.) that exclude low-status groups from attaining high status positions (Bian et al., 2017; Mandalaywala et al., 2020). However, they also suppress their own racial biases and do not explicitly express racial stereotypes (Rutland, 2004). Considered together, this research suggests that older children and younger girls may generate equitable hierarchies. However, children may also generate hierarchies that reflect their own developing gender- and race-based stereotypes about who is and should be powerful.

Methods

Participants

We used the power analysis from Study 2 to determine the appropriate sample size for Study 3. We collected data from 83 participants and excluded data from 3 participants: 1 participant was excluded due to experimenter error, 1 participant was excluded because their birthdate was not collected, and 1 participant was excluded because they broke the pegboard before completing their experimental session. The final sample of participants included 40 4- to 6-year-olds ($M_{\text{age}} = 5.53$, $SD_{\text{age}} = 0.84$; 21 boys and 19 girls) and 40 7- to 9-year-olds ($M_{\text{age}} = 8.56$, $SD_{\text{age}} = 0.88$; 20 boys and 20 girls). Seventy-eight percent of child participants were White, 5% were Asian, 1.3% were Black, 1.3% were American Indian or Alaska Native, and 3.8% were mixed race (parents of the remaining 11.3% chose not to report demographic information or reported a non-race nationality). Children were recruited from a database of families in and around a large Southern city. As compensation, children received small prizes and a certificate.

Design and Materials

Study 3 consisted of two conditions, a Gender and Race Condition, with a single trial in each condition. The exact same pegboard was used in Study 3 as in Study 2 with the same hook placement and star clothespins. However, additional faces were added so that a total of 11 White women's faces, 11 Black men's faces, and 22 (11 for each condition) White men's faces were available to use as stimuli. This number of faces was used so that children had enough faces to – if they so desired – create perfectly homogenous hierarchies from each set of pictures (e.g., all women, all White men, or all Black men). The additional faces were selected to match the criteria used to select the

faces used in Studies 1 and 2. The same faces were presented as stimuli for each condition for each participant. The cards were presented to participants in an array that was organized using a random number generator with the restriction that the images were to be presented in two rows with faces distributed evenly across the rows and equal numbers of faces from each group in each row.

Procedure

Children sat in front of a pegboard in a quiet space. The pegboard was presented to children with empty hooks. In front of the pegboard were two rows of 11 cards each varied by gender or race, depending on the condition. First, the experimenter introduced the pegboard as a company with a Big Boss, Little Bosses, and Workers while pointing to the corresponding tier. Similar to the introductions in Study 1, the experimenter explained that the Big Boss was someone who “tells everyone what to do,” Little Bosses “tell the workers what to do,” and for Workers “Bosses tell them what to do.” Children were then told it was their “job to pick who is Big Boss, Little Bosses, and Workers in the company.”

Introductions to each of the conditions were similar to those used in Studies 1 and 2 with one key difference. The experimenter said, “We are going to talk about men/White people and women/Black people. Men/White and women/Black people all work together. Both men/White people and women/Black people can be bosses and workers.” In Study 3, we did not include any information about White men being bosses because we wanted participants to create the hierarchical structure using their own thoughts about hierarchy and social power without any prompting from the experimenter about societal inequality.

Once introduced to the task, children were told that they would first select the Big Boss and were asked to move a card from the array to the top tier and place the Big Star on them. Then children were asked to pick the four Little Bosses and place the Little Stars on them. Lastly, children were told to select the six workers to go onto the bottom tier. Once children finished constructing their first hierarchy, they were asked to help the experimenter take the cards down and put them in a pile as the experimenter laid out the new array of cards. Children then repeated the previous task with the new cards to construct a second hierarchy. The hierarchies varied by Condition (Race and Gender), and the Condition that participants experiences first was counterbalanced across participants.

Results

Children were given a score of 1 for every White man placed on the pegboard and a score of 0 for every Woman or Black Man placed on the pegboard. Using this scoring, children had a possible maximum score of 1 in the Big Boss Tier, 4 in the Little Boss Tier, and 6 in the Worker Tier for each Condition. Those scores were then converted into a percentage of number of selections of the White man out of the total spaces in each tier. Because each tier represented a different number of observations, and therefore different fixed intervals of responses (e.g., Big Bosses could either be 100% White men or 0% White men, while Little Bosses could be 0%, 25%, 50%, 75%, or 100%), each tier was analyzed separately.

Preliminary Analyses

Big Boss Selections. We conducted a 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 2 (Condition: Gender and Race) X 2 (Participant Gender: Boys and Girls) X

2 (Presentation Order: Gender first and Race first) Repeated Measures Factorial ANOVA on children's selections of the Big Boss with Condition included as a within-subjects variables and Age Group, Participant Gender, and Presentation Order as the between-subjects variables. We found a significant main effect of Condition, $F(1, 72) = 5.95, p = .017, partial \eta^2 = .08$, Age Group, $F(1, 72) = 4.36, p = .040, partial \eta^2 = .06$, and Gender, $F(1, 72) = 20.78, p < .001, partial \eta^2 = .22$. Main effects of Condition and Gender were embedded in two two-way interaction, including a significant Condition X Gender interaction, $F(1, 72) = 18.42, p < .001, partial \eta^2 = .20$, and a significant Condition X Presentation Order interaction, $F(1, 72) = 4.94, p = .029, partial \eta^2 = .06$. There were no other significant main effects or interactions, $ps > .05$.

Little Boss Selections. We conducted a 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 2 (Condition: Gender and Race) X 2 (Participant Gender: Boys and Girls) X 2 (Presentation Order: Gender first and Race first) Repeated Measures Factorial ANOVA on children's selections of the Little Bosses with Condition included as within-subjects variables and Age Group, Participant Gender, and Presentation Order as between-subjects variables. We found a significant two-way interaction of Condition X Gender, $F(1, 72) = 9.14, p = .003, partial \eta^2 = .11$, which was embedded in a significant three-way Condition X Presentation Order X Gender interaction, $F(1, 72) = 6.70, p = .012, partial \eta^2 = .09$. We found no other significant main effects or interactions, $ps > .05$.

Worker Selections. We conducted a 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 2 (Condition: Gender and Race) X 2 (Participant Gender: Boys and Girls) X 2 (Presentation Order: Gender first and Race first) Repeated Measures Factorial ANOVA on children's selections of Workers with Condition included as a within-subjects variable

and Age Group, Participant Gender, and Presentation Order as the between-subjects variables. We found a significant main effect of Condition, $F(1, 72) = 11.31, p = .001, partial \eta^2 = .14$. We also found two significant two-way interactions, including a Condition X Age Group interaction, $F(1, 72) = 4.86, p = .031, partial \eta^2 = .06$, and a Condition X Gender interaction, $F(1, 72) = 6.19, p = .015, partial \eta^2 = .08$. These main effects and interactions were embedded in a significant three-way Condition X Age Group X Gender interaction, $F(1, 72) = 7.42, p = .008, partial \eta^2 = .09$. There were no other significant main effects or interactions, $ps > .05$.

Primary Analyses

The preliminary analyses for children's selections of the Big Boss and Little Boss Tier detected an interaction which included Presentation Order thus, as in Studies 1 and 2, we separated the data by Presentation Order and only analyzed children's responses on the first Condition they saw. This resulted in a total sample of 40 children who made selections for the Gender Condition including 21 4-to 6-year-olds ($M_{age} = 5.54, SD_{age} = 0.86$; 11 boys and 10 girls) and 19 7- to 9-year-olds ($M_{age} = 8.66, SD_{age} = 0.81$; 9 boys and 10 girls). A sample of 40 children made selections for the Race Condition including 19 4- to 6-year-olds ($M_{age} = 5.53, SD_{age} = 0.84$; 10 boys and 9 girls) and 21 7- to 9-year-olds ($M_{age} = 8.47, SD_{age} = 0.95$; 11 boys and 10 girls).

Big Boss Selections. Preliminary analyses indicated that Participant Gender and Age Group influenced children's selections of the Big Boss for the Gender and Race Conditions. Thus, those variables were included in our primary analyses of each Condition.

Gender Condition. We conducted a 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 2 (Participant Gender: Boys and Girls) factorial ANOVA on children's selections of the Big Boss in the Gender Condition with Age Group and Participant Gender as between-subjects variables. We found a significant main effect of Gender, $F(1, 36) = 38.96, p < .001, \text{partial } \eta^2 = .52$. Boys ($M = .86, SD = .37$) selected men significantly more than girls ($M = .15, SD = .37$) did. There were no other significant main effects or interactions, $ps > .05$. Furthermore, boys selections of the Big Boss were significantly above chance (chance = .50), $t(19) = 4.27, p < .001, d = .96$, and girls selections were significantly below chance, $t(19) = -4.27, p < .001, d = -0.96$, see Figure 12a.

Race Condition. We conducted a 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 2 (Participant Gender: Boys and Girls) factorial ANOVA on children's selections of the Big Boss in the Race Condition with Age Group and Participant Gender as between-subjects variables. We found no significant main effects or interactions, $ps > .05$, and children's selections of Black men to be the Big Boss in the Race Condition ($M = .60, SD = .50$) did not significantly differ from chance (chance = .50), $t(39) = 1.28, p = .210, d = 0.20$.

Little Boss Selections. Preliminary analyses indicated that children's selections of the Little Bosses were affected by Participant Gender, but not Age Group. Thus, Age Group was excluded from our primary analysis of Little Boss selections and Participant Gender was included as a variable of interest.

Gender Condition. We conducted an independent samples t -test with Participant Gender as the between-subjects independent variable to assess children's selections for

the Little Boss Tier in the Gender Condition. We found a significant effect of Participant Gender, $t(38) = 2.35, p = .024, d = 0.74$. Boys ($M = .46, SD = .19$) selected more men to be Little Bosses than girls ($M = .33, SD = .18$). Furthermore, boys' selections of men were no different from chance responding (or equal selections of men and women), $t(19) = -0.90, p = .379, d = -0.20$, but girls selections favored women at rates that significantly differed from chance, $t(19) = -4.27, p < .001, d = -0.96$, see Figure 12b.

Figure 12. Big Boss and Little Boss Selections by Participant Gender

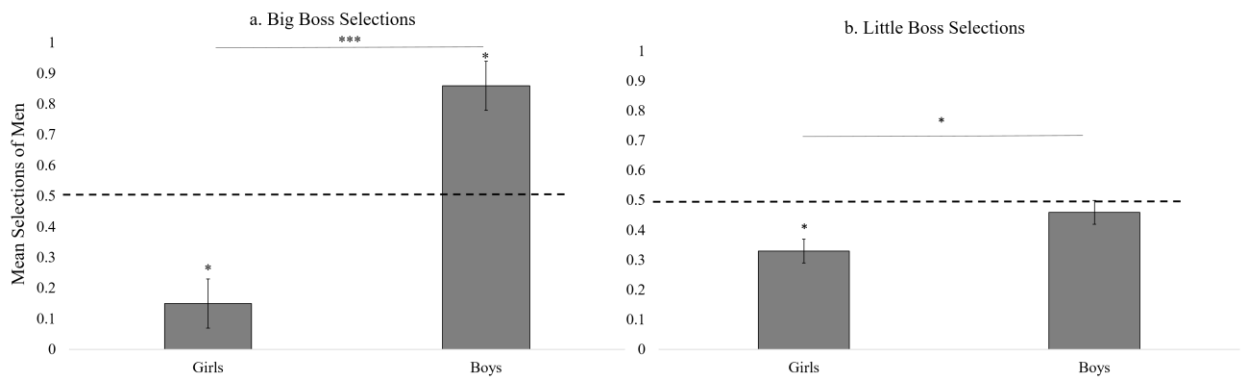


Figure 12. A) Boys selected the men to be Big Boss significantly more often than Girls, and both boys and girls preferred selecting same-gender Big Bosses at rates that significantly differed from chance. B) Boys selected Little Bosses randomly and equally, but girls exhibited a same-gender preference, selecting significantly fewer men than Boys and more women than would be predicted by chance selections. Horizontal lines with asterisks represent group differences ($<.05^$, $<.01^{**}$, $<.001^{***}$) and asterisks above the bars represent differences from chance ($<.05^*$).*

Race Condition. We conducted an independent samples t-test with Participant Gender as the between-subjects independent variable to assess children's selections for

the Little Boss Tier in the Race Condition. Boys ($M = .55$, $SD = .19$) and Girls ($M = .46$, $SD = .25$) selections of White men in the Race Condition did not significantly differ, $t(38) = 1.24$, $p = .221$, and children's overall selections did not significantly differ from chance, $t(39) = 0.18$, $p = .860$.

Worker Selections. Preliminary analyses indicated there were significant interactions involving Condition, Age Group, and Participant Gender. Surprisingly, Presentation Order was not a significant variable in children's selections of Workers. Thus, primary analyses of these selections were not separated by Presentation Order and Condition was directly compared. Furthermore, Age Group and Participant Gender were included as variables of interest.

We conducted a 2 (Condition: Gender and Race Condition) X 2 (Age Group: 4- to 6-year-olds and 7- to 9-year-olds) X 2 (Participant Gender: Boys and Girls) repeated measures factorial ANOVA on children's selections of White men to the Worker Tier with Condition as a within-subjects variable and Age Group and Participant Gender as between-subjects variables. We found a significant main effect of Condition, $F(1, 76) = 11.02$, $p = .001$, $partial \eta^2 = .13$, a significant Condition X Age Group interaction, $F(1, 76) = 4.67$, $p = .034$, $partial \eta^2 = .06$, and a significant Condition X Participant Gender interaction, $F(1, 76) = 6.32$, $p = .014$, $partial \eta^2 = .08$. These main effects and interactions were embedded in a significant three-way Condition X Age Group X Participant Gender interaction, $F(1, 76) = 7.53$, $p = .008$, $partial \eta^2 = .09$.

We conducted Bonferroni-corrected post-hoc analyses to further explore the significant 3-way interaction. Younger girls ($M = .25$, $SD = .24$) selected significantly fewer men in the Gender Condition than older girls ($M = .44$, $SD = .11$), $p = .004$.

Conversely, younger girls ($M = .63, SD = .29$) selected significantly more White men in the Race Condition than older girls ($M = .48, SD = .11$), $p = .036$. There were no Age Group differences for boys in either condition, $ps > .05$. We also saw significant gender differences between younger girls and boys in the Gender ($M_{\text{boys}} = .47, SD_{\text{boys}} = .26; M_{\text{girls}} = .25, SD_{\text{girls}} = .24$), $p < .001$, and Race ($M_{\text{boys}} = .48, SD_{\text{boys}} = .28; M_{\text{girls}} = .63, SD_{\text{girls}} = .29$), $p = .035$, Conditions, but no differences between older boys and girls in either condition, $ps > .05$. Lastly, younger girls selected significantly more White men in the Race Condition than in the Gender Condition, $p < .001$, but there were no differences in Condition for younger boys or older children, $ps > .05$, see Figure 13.

We conducted one-sample t -tests to compare children's selections of the Workers to chance (chance = .50) in each Condition by Age Group and Participant Gender. We found that, in the Gender Condition, girls in the 4- to 6-year-old Age Group, $t(18) = -4.54, p < .001, d = -1.04$, and the 7-to 9-year-old Age Group, $t(19) = -2.33, p = .031, d = -.52$, selected men at rates that were significantly below chance. No other response patterns differed significantly from chance, $ps > .05$.

Figure 13. Worker Selections by Participant Gender, Condition, and Age Group



Figure 13. In the Gender Condition, girls – but not boys – selected more women to be Workers than men. In the Race Condition, older children and younger boys selected majoritized and minoritized Workers equally, but younger girls selected more White men than the others. Horizontal lines with asterisks represent group differences (<.05, <.01**, <.001***) and asterisks above the bars represent differences from chance (<.05*).*

Discussion

In Study 3 children interacted with a social hierarchy without any information about social inequality. By allowing children to construct their own social structure without any highlighting of gender or racial inequality from the experimenter, we could assess children’s desired distribution of people in power without the confounds of an existing structure. Additionally, we tested whether their constructed hierarchies were influenced by their existing knowledge of social stereotypes. Unsurprisingly, presentation

order influenced how children constructed their hierarchies solidifying this variable's considerable influence on children's thinking about social groups and equality.

When constructing a hierarchy of White men and women, boys selected men and girls selected women to occupy the highest tier of the hierarchy. Girls, but not boys, continued to show in-group favoritism when selecting little bosses as well. These results may be spurred by children's beliefs that one should be loyal one's own group (Rhodes, 2012), increasing girls' selections of women to not only be the most powerful person in the hierarchy, but to be overrepresented in all tiers of the hierarchy. However, boys created more equitable distributions in the little boss and worker tiers, selecting men and women more equally. It is unclear why girls were particularly influenced by in-group bias when selecting who can be in any position of power, but boys were only measurably biased when selecting who should be at the top. Perhaps girls are more aware real-world structural inequalities, and made selections responding to the disadvantages experienced by their in-group.

When constructing hierarchies from racially diverse groups of men, children showed a desire to make equitable selections of White and Black men regardless of placement in the hierarchy or their own gender. These results are consistent with Shaw and Olson's (2012; 2013) work showing that children are averse to inequality. An interesting future direction of this research would be to ask a sample of Black children to create a racial hierarchy. Children from low status groups, particularly low status racial groups, do not show as much in-group favoritism as children from high status groups (Jordan & Hernandez-Reif, 2009). In contrast, girls overwhelmingly selected women to

be bosses suggesting that a matched sample of Black children might similarly create hierarchies that addressed real-life racial inequalities.

General Discussion

Across three studies, we investigated children's perceptions of gender and racial inequality in social hierarchies. In Study 1, we found that participants consider hierarchies that include more than one underrepresented class to be fair. Furthermore, when a token Black man was a boss, participants considered the hierarchy unfair but when a token woman was in a boss position participants rated the hierarchy as neutral. In Study 2, children's gender played a role in how they responded to gender and racial inequality. Girls promoted more women and Black men to boss positions than they did the underrepresented Zazzes (i.e., the non-social individuals presented in the control condition). Boys promoted more White men than girls did overall, an effect possibly driven by in-group favoritism by children of both genders. This trend was also present, and more prominent, in Study 3. When prompted to construct hierarchies from arrays of diverse individuals, girls and boys tended to select gender-matched big bosses. When selecting little bosses workers, boys distributed the positions equally between men and women, but girls continued to select women more often than men. When constructing hierarchies of Black and White men, children did not show a similar racial preference, instead constructing roughly fair hierarchies, with the notable exception of 4- to 6-year-old girls, who selected more White men than 4- to 6-year-old boys or older children of both genders.

A consistent but unexplored effect across all these data was the effect that seeing one type of inequality had on how participants approached inequality throughout the

studies. Although the current studies were too underpowered to characterize these effects, it was clear that making judgements about one dimension of identity (e.g., gender) affected later judgements on a different identity (e.g., race, and vice versa). There is some research that may explain this finding, which appeared in some manner across Studies 1 through 3. Intergroup contact early in development has been theorized to influence bias later in life (Allport, 1954; Pettigrew & Tropp, 2006). For example, Gaias et al. (2018) found that preschoolers who were in diverse classrooms and used diverse learning materials showed more cross-race friendships and lower racial bias in first and third grade. Intergroup contact has also been shown to effectively reduce racial prejudice in short term contexts with older children as well. Walker and Crogan (1998) found that fourth- through sixth-graders who took part in a Jigsaw classroom curriculum not only had greater academic performance but rated that they liked their outgroup peers more and their negative stereotypes about outgroup members decreased. Perhaps viewing diversity early in the study changed how participants interacted with it throughout the study, even from mere minimal contact. Nevertheless, these results exemplify the importance of the studying intersectionality, or the ways in which different dimensions of identity, including race and gender, interact. Race and gender do not exist separately. They interact to influence how children think about people and, perhaps, inequality as well. Future studies should more directly test the effects of seeing gender or racial inequality on how children recognize and address structural inequality.

We also found that children's gender, but not age, greatly influenced how they constructed social hierarchies and rectified unequal ones. The general absence of age effects across the reported studies was particularly surprising in the race condition, as the

youngest members of our age group are just beginning to develop race as a salient social category (Shutts, 2015). However, in Study 1 we did see some evidence of this when 4- to 6-year-olds rated racial inequality as generally neutral, but older children rated hierarchies featuring racial inequality as fair. This pattern of results may reflect emerging race biases in children. The gender differences in both studies were very interesting and showed either girls' in-group favoritism or general awareness of and motivation to correct gender-based social inequality.

Girls seemed especially motivated to rectify gender inequality and create gender hierarchies with women in positions of power. Boys, however, perpetuated gender inequality when they were presented with an unequal structure but were very fair in their selections when not prompted by seeing more men in power. Without more targeted research it is difficult to distinguish between young girls' and boys' in-group favoritism and social justice awareness. However, with the rise of 'Girl Power' culture in the 1990's (Gonick, 2006), and the more recent #MeToo movement and Women's march in the last decade, girls may be more attuned to gender injustice at younger ages. Girls may be interested in generally righting inequality which becomes exaggerated when their in-group is present. Of interest in future studies would be to include a more racially diverse sample to test whether Black children show in-group favoritism when manipulating racially unequal social hierarchies. Additionally, including Black women as targets would be of particular interest to further explore how intersecting identities influence children's judgments about inequality.

Both girls and boys perpetuated inequality when the hierarchy was constructed of meaningless or arbitrary social categories. Although previous research has suggested that

minimal group membership triggers strong in-group preferences (Dunham, 2018), children were more likely to perpetuate this type of inequality compared to racial or gender inequality. This may be due to the groups being non-social entities (colored triangles without faces) which did not trigger children to feel the need to be fair towards them. Sloane et al. (2012) found that infants only expected the experimenter to be fair when dividing resources between animated puppets and not inanimate ones. These findings have interesting implications for how children think about fairness being an innately social concept.

An overarching theme of these studies is that children, and even adults, believe only a small amount of fairness is ‘good enough.’ We found in Study 1 that children and adults rated gender and race hierarchies with more than one woman or Black man in power as fair, and hierarchies with women were judged to be neutral when only one woman was in power. Furthermore, children tended to make selections from both groups. It is possible that children were more motivated to demonstrate that *they* were fair, by selecting members of both groups, than they were motivated to actually make the hierarchies more equal. Certainly, the hierarchies generated in Study 3 were more fair than the hierarchies that resulted from children’s promotions of group members in established unequal hierarchies. Children may struggle with understanding the scope of actions necessary to rectify structural inequality, even if they are averse to it.

Furthermore, children did not seem to account much for the relative differences in power associated with the different tiers of each hierarchy. They seemed to care about the number of majoritized individuals, and not their relative position in the hierarchy (e.g., big vs little boss). This somewhat contradicts Rizzo et al.’s (2020) study which suggests

that children take into account the value of a resource when allocating it. Children do not seem to appreciate social power in the same manner that they appreciate differences in the value of resources. In Study 2, children's placement of women and Black men into the Big Boss position did not differ from chance. This was replicated in children's responses to making racial hierarchies in Study 3. The only place where we see exaggerated placement of underrepresented people into the top of the hierarchy was when girls placed women into the Big Boss position, but this tendency was attributable to gender-based favoritism, as boys similarly placed men in this position. Big Boss was a unique position in each hierarchy because children could not be equitable in their selections here. They were prompted to choose one person to go to the top. Under this constraint, children were especially motivated by in-group preference. However, this finding is especially relevant because in typical hiring situations only one position needs to be filled at a time, and real-world positions of power are typically held by men (Jones, 2017).

Because Studies 1 through 3 were run somewhat concurrently, and because we were unaware of the dramatic effect that presentation order would have on most aspects of these studies, our ability to interpret the findings of these studies is limited by our sample size, which we artificially reduced in order to isolate findings not confounded by presentation order. Although this approach salvaged a substantial amount of data, we were unable to compare children's responses to gender and race directly. We were also unable to further explore the effect of order on children's responses. In fact, a key finding in these studies is that children's responses to inequality are incredibly nuanced and are influenced by almost all of our variables of interest, and likely many variables that were

not measured or manipulated in these studies. Future research should include a much larger and more diverse sample to better support comparisons between children's responses to gender versus racial inequality, and to more directly investigate whether children view authority as valuable. Note that, although most participants reported that people want to be a boss, many participants did not themselves want to be a boss.

Humans live in a world that is hierarchically structured, and those structures privilege White people, White men in particular. These studies reveal that, even if they are motivated to be fair, children and adults alike have difficulty recognizing inequality. Ideas about fairness are often clouded by in-group favoritism and behaving fairly as an individual is often easier to accomplish than addressing structural inequality. These findings represent the first, important steps in creating a program of study aimed at decreasing children's gender and race biases, as well as better understanding children developing concepts of social justice and fairness.

CHAPTER IV

CONCLUSIONS

The purpose of this dissertation was to investigate how children think about social hierarchies. Specifically, these five studies investigate how 4- to 9-year-old children understand both relational and structural social hierarchies that include interpersonal interactions and that reference broader structural aspects of society. We are also interested in the use of labels and social categories in communicating social power in social hierarchies and how children react to inequality in social groups. Lastly, we are interested in approaching these topics from a developmental perspective in order to learn whether attitudes about social power in hierarchies emerge early or are encultured over time through experiences with different groups of people and social hierarchical structures in society.

Chapter 2 focuses on how children think about people who hold complementary social roles that communicate that one person is more dominant than the other. Over 2 studies, 4- to 6-year-olds were asked to identify whether a person with a dominant social role or a subordinate social role would be more likely to have social power and knowledge. We found that children as young as 4 years old attributed power to the person with the dominant role and this effect grew stronger with age. Our findings suggest that it takes time for children to recognize the traits that are communicated by a dominant social role, but by age 6, children are able to use those social role labels to infer who to listen to and trust for information. These studies represented a preliminary step in studying how

children think about social power in larger social structures, especially hierarchies. Discovering that preschool-aged children understand, even if in a rudimentary manner, the power dynamics in a two-person hierarchical relationship helped us to define the age groups that we would later focus on in exploring more complex hierarchies that included multiple tiers of individuals that varied in power and status.

The three studies in Chapter 3 expand upon the research in Chapter 2 by introducing 4- to 9-year-olds to larger, three-tiered hierarchies that included majoritized and minoritized social groups. We probed whether children recognized gender- and race-based inequality, if they would rectify unequal hierarchies when given the opportunity to change them, and whether they would create fair structures when they were given the chance to construct a hierarchy with any structure that they wished. We found that many factors influenced children's judgements and behaviors. Children responded differently to racial and gender inequality. The gender of the child influenced who they believed should have power, as well as the kinds of groups that they constructed. This tendency was relatively circumscribed in boys, who wanted Big Bosses to be men, but who otherwise seemed to favor equality. However, it was quite clear that girls were exhibiting gender favoritism. We believe that it is likely that girls were especially motivated to enhance the representation of women, because they have some awareness of gender bias and the fact that women are underrepresented in many domains. At the same time, it is possible that – if they are aware of their privileged status – boys may understand that behaving in an equitable manner costs them little.

We also discovered that children's exposures to social inequality profoundly affected their judgements. The approach we took in Chapter 3 was not situated to fully

characterize these effects directly, but it was clear that viewing and interacting with hierarchies reflecting inequality along one dimension of identity profoundly affected children's perceptions of and judgements about other dimensions of identity (e.g., making judgements about the fairness of hierarchies featuring gender inequality changed children's judgements about the fairness of subsequent hierarchies featuring racial inequality). This finding suggests that the dynamics of our experiences and the identities of the individuals that we encounter shift the ways that we think about representation and fairness.

Of note, across these two studies, there are the stark differences in how development influenced children's responses. In Chapter 2, we saw a clear step-wise developmental trajectory where children attributed more power to dominant individuals with age and older children even began to infer that individuals with dominant social roles were more knowledgeable. Conversely, we saw very few age differences in children's views on structural inequality in Chapter 3. The clear age differences in the studies from Chapter 2 and the lack of age differences in the studies in Chapter 3 show that merely understanding that power asymmetries exist in hierarchical relationships, which children can do at age 4, is not enough to support nuanced judgements about inequality in hierarchical structures. The way that children judged hierarchies changed relatively little between age 4 and 9. These results suggest that intuitions about social hierarchies and power dynamics of large groups emerge in preschool and change very little over time.

More broadly, there are differences in scale that are reflected in the methodological differences between the studies run for Chapter 2 and Chapter 3. The

results reported in Chapter 2 suggest that children have an early emerging sensitivity to interpersonal differences in power and authority that expands with age. In contrast, children's recognition of and response to unequal social hierarchies suggests that children have a relatively basic understanding of larger social groups that does not shift very much over the same approximately five year period. We propose that this difference in scale may underlie the differences between the two methodological approaches. Children may be tuned to understand and interact with small numbers of people with clear differences in power and status, but it may take time and experience to engage with more complex structures, such as a three-tiered workplace hierarchy.

It is also notable that children, who are so sensitive to resource inequality, appeared to be relatively insensitive to gender- and race-based social inequality. When asked to make fairness judgements, children only judged racial tokenism in the most extreme cases of underrepresentation to be 'unfair.' Gender tokenism was judged to be neutral, and other degrees of inequality were judged to be as fair as a hierarchy that was actually designed to be representative. Given children's focus on fairness in resource allocations to individuals, it seems likely that children were, for the most part, insensitive to inequalities between people organized into large structured groups.

People often struggle to decide when to begin talking to children about structural inequality. Racism and sexism are uncomfortable topics for many. Mistry et al. (2017) suggest that conversations about civic engagement and social stratification should begin in early elementary school, and our results certainly highlight the gaps in children's understanding of structural inequality. Educators and parents could talk to their children in a developmentally appropriate way about elements of social class, historic oppression,

and the uneven distribution of social power. This is of great importance especially in regards to educating young children about structural and systemic inequality as many politicians and voters believe that teaching children these about topics is not age appropriate and have moved to censor school curriculums and libraries for this kind of content.

In regards to how children approached interpersonal hierarchical differences compared to structural differences, we saw that young children were able to recognize power differentials in both structures. Children explicitly identified who had social power in Chapter 2 and even showed that by age 6 they could do this reliably across every trial. In Chapter 3, children did not show much sensitivity when reacting to differences in power at different tiers of the hierarchy. When recognizing inequalities in hierarchies, children only took into account the number of minoritized people in the hierarchy; judging any hierarchy with more than one woman or Black man as fair regardless of their position in the hierarchy. Furthermore, we saw few differences between the Little Boss and Worker tiers when rectifying social inequality, and only saw differences when manipulating arbitrary inequality. The only result we find that communicates that children are sensitive to power differences in large structures is when they can control the composition of the hierarchy completely. When creating hierarchies of their own, we saw that children exhibit an exaggerated in-group gender bias when placing someone into the Big Boss position that we did not see in the Little Boss tier. These study differences suggest that young children are adept at spotting simple differences in power and that social role labels communicate these differences clearly. We also found that children respond differently to race- and gender-based groups than they do to groups of triangles.

However, when children must take into account social category information and map it onto a large hierarchical structure, they do not appear to account for the relative value of different positions in a hierarchy. Ultimately, it is easier to judge simple hierarchies than complex ones, and more research should be done with older children and adolescents to better understand when children begin to think about the stratification of the hierarchy and the differences in the power embedded within them.

The current studies yielded results that are relevant to the Social Reasoning Developmental (SRD) model. This model states that social inequality reasoning encompasses three forms of knowledge: Morality, Group Identity, and Psychological Knowledge, and the model posits that research should explore how children recognize, explain, and behave towards social inequality (Elenbaas et al., 2020). The studies reported in this dissertation probed how children thought about perceptions of group status and dynamics (Group Identity Knowledge) as well as fairness (Moral Knowledge) by addressing how children *recognized* differences between people who exist within hierarchical structures (either relationally or structurally) and *act to rectify* group-level inequality. However, we did not address how children's Psychological Knowledge played a role in their reasoning about social inequality, nor did we probe the explanations for children's responses to social inequality. These elements of the SRD represent important areas for future research.

The results reported in Chapter 3 also connect to prior research on children's understanding of resource inequality. Most broadly, we can conclude that children find differences in social power and representation to be much less salient than differences in resource allocation. Comparing the results of Chapter 2 to Chapter 3, we propose that

scale is the source of divergence in how children think about resources and social power. Studies investigating resource inequality typically focus on allocations between individuals (Shaw & Olson, 2012) or small groups that stand in larger groups (e.g., DeJesus et al., 2014). A critical difference between the methods employed in Chapter 2 and Chapter 3 is that Chapter 2 depicted fewer individuals at any given time, and Chapter 3 involved at least eleven individuals that differed on highly salient dimensions of identity. It seems likely that issues of scale may powerfully contribute to children's intuitions about power and equality.

The studies reported in this dissertation highlight many important areas for future study. Most generally, future studies should investigate the effects of psychological phenomena such as theory of mind and attribution bias on how children think about hierarchical structures and the inequality within them. Theory of mind may be especially relevant for explaining shifts in children's likelihood to attribute power to people with dominant social roles between ages 4 and 6. Theory of mind develops across the preschool years (Wellman & Liu, 2004), and the development of theory of mind may account for age differences in Chapter 2. Children who understand the goals and minds of others may be better able to understand how someone with a dominant social role may interact with someone with a subordinate social role. Theory of mind may also play an important role in how children respond to social inequality. Mulvey et al. (2016) found that children who had understood the nature of false beliefs were more likely to say that inequality was unacceptable, suggesting that theory of mind may play a role in how children think about and explain social inequality.

Furthermore, understanding how children attribute traits to different groups may provide an explanation for why some children promoted majoritized individuals into positions of power. For example, children may have wrongfully attributed a group member's low status position as an indicator of the group's traits as was posited by Roberts et al. (2020) for how deities who are shown as one gender or race may perpetuate inequality. Further research should ask children to explain why they attributed power to a 'mother' or 'teacher' and why they made selections to promote certain group members. By asking 'why' questions, we can get a better sense of whether children are using personal experience or applying stereotypes to guide their reasoning or if other cognitions are motivating them.

Probing children's explanations may have been helpful in articulating what kinds of fairness matters to children. Although children made promotions in Chapter 3, Study 2, that largely perpetuated existing hierarchical inequalities, it is possible that children were focused on the fairness of the performance of making promotions (i.e., that *they*, the child, were being fair to the two groups by promoting members from both groups), rather than focusing on the overarching inequality of the hierarchy. Asking children to explain their thought process as they interact with unequal social hierarchies or create their own social structures should be a goal of future research. The influence of participant gender on children's selections of what food was healthy and who to promote when engaging with gender-based hierarchical structures could have been reflected in children's open-ended responses and could have distinguished whether, in Chapter 3, girls and boys were motivated by an in-group bias or awareness of gender inequality.

Gender differences were persistent across the studies in Chapter 3 and were detected in Chapter 2, Study 2. Six-year-old boys showed a slight preference for the information from the person with the dominant social role. This finding may reflect a developing social dominance orientation (SDO). SDO is more pronounced in men compared to women (Schmitt & Wirth, 2009; Wilson & Liu, 2003) and the beginnings of individual differences in SDO and its effects on approaches to inequality can be found in preschoolers (Reifen-Tagar et al., 2017; see Reifen-Tagar & Saguy, 2021, for review of SDO and the gender leadership gap). Although boys in Chapter 2 were not making judgments about inequality in a hierarchy, they may have been more attuned with the power asymmetries between the dominant and subordinate informant.

As mentioned previously, it is difficult to determine whether in-group bias alone influenced girls' selections when rectifying inequality and creating social hierarchies. Girls may have been motivated by general awareness of the lack of women in leadership positions. The fact that both girls and boys selected to put members of their own group in the top position of the hierarchy and only when interacting with gender, and not race, suggests that in-group bias rather than an awareness of social inequality or SDO influenced their selections. However, individual differences in children's responses to social hierarchies should be considered in any future studies including the influence of participant gender, race, social status (subjective and actual), and parent SDO.

A limitation of this dissertation was a lack of diversity in the sample and a sample size that was not large enough to fully explore the unexpected and complex interactions present in children's data. For example, a larger sample may have allowed us to further describe the gender effect in Chapter 2 and the order effects in Chapter 3. Without a

larger sample to detect the order effect appropriately, we cut our sample in half to be able to analyze the data without the effect of presentation order. This decision resulted in clearer findings that we felt justified in interpreting, but the related reduction in power also removed the ability to directly compare children's responses to gender-based hierarchies with their responses to race-based hierarchies. Furthermore, including a less WEIRD and more diverse sample, particularly a racially diverse sample, would allow us to better characterize the findings related to in-group favoritism that may be attenuated in low status group members (Jordan & Hernandez-Reif, 2009). We may also be able to explore the effects of intersectionality with a larger, racially diverse sample to better understand how, for example, Black girls respond to social inequality.

In addition to introducing targeted intersectional analyses with participant gender and race, it will be important to include hierarchies composed of people with intersectional identities in future research. We designed these experiments to only show White men compared to White women in gendered hierarchies and White men compared to Black men in racial hierarchies. However, the real world is composed of people with many intersecting identities that influence stereotypes in nuanced ways. For example, children believe that White men are more intelligent than White women, but Black women are more intelligent than Black men (Jaxon et al., 2019). Including Black women in these hierarchies should be the next step in understanding how children think about gender- and race-based structural inequality. Also, the influence of gender and race on how children think about hierarchical social roles should be explored. Contrasting a dominant character (e.g., a teacher) with a low status identity (e.g., a Black woman) with a subordinate high status character (e.g., a White male student) may yield interesting

results about how children reason about the intersection between hierarchical social roles and social status.

Overall, this dissertation shows that children can infer power from simple hierarchical structures and that they are motivated to rectify racial inequalities in more complex social structures. We also found that participant gender influenced children's tendencies to address gender-based inequalities, with girls being motivated to privilege women and boys leaning toward more equal representation, so long as a White man is at the top of the hierarchy. Understanding how children think about these social structures, the factors that influence their perspectives about social inequality, and the developmental differences in how they approach social justice can guide how researchers, teachers, policy-makers, and parents engage with children on these topics and make decisions for their future. By researching how children's reasoning about fairness and systemic inequality of racial and gender groups changes over time, we can better understand adult political behavior and how early experiences can serve as a mechanism for explaining why social injustice and systemic inequality persists in society.

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- Thomas, A. J., Mitchell, V., Sumner, E., Terrizzi, B. F., Piff, P. K., & Sarnecka, B. W. (n.d.). Intuitive Sociology: Children Recognize Decision-Making Structures and Prefer Groups With Less-Concentrated Power. *OPEN MIND*.
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- Watson, M. W. (1984). Development of social role understanding. *Developmental Review*, 4, 192-213. [https://doi.org/10.1016/0273-2297\(84\)90007-8](https://doi.org/10.1016/0273-2297(84)90007-8)
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CURRICULUM VITAE

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Education

May 2016 Bachelor of Science in Psychology-Magna Cum Laude
North Greenville University

May 2018 Master of Arts in Experimental Psychology
Appalachian State University
Thesis: Children's Use of Stereotypes in a Selective Trust Task; Chair: Robyn Kondrad; Committee: Doris Bazzini, Amy Galloway

May 2020 Master of Science in Experimental Psychology
University of Louisville

July 2018- Present Doctorate of Philosophy in Experimental Psychology
Concentration: Developmental Psychology
University of Louisville
Dissertation: Children's Understanding of Unequal Social Hierarchies; Chair: Nicholas Noles; Committee: Judith Danovitch, Marci DeCaro, Robyn Kondrad, Yara Mekawi

Honors and Awards

University of Louisville Graduate Dean's Citation	Spring 2023
Dissertation Completion Award	Fall 2022
Society for Teaching Psychology Travel Award	Fall 2022
American Psychological Association Dissertation Research Award	Fall 2021
Graduate Network in Arts and Sciences (GNAS) Research Award	Fall 2021
Graduate Student Council (GSC) Research Award	Fall 2021, Spring 2021
Graduate Student Council (GSC) Travel Award	Spring 2021, Fall 2018
MPA Best Graduate Student Led Oral Paper Presentation	Spring 2021
SECC Student and Early Career Poster Nomination	Spring 2021
Excellence in Research (Junior Level) Departmental Award	Spring 2020
Early Undergraduate Research Award for Mentorship	Summer 2019
Appalachian State University Outstanding Thesis Nomination	Spring 2019
Wiley F. Smith Endowment (WiSE) Travel Award	Fall 2017

Office of Student Research (OSR) Travel Grant	Fall 2017
Graduate Student Association Senate Research Presentation Travel Grant	Fall 2017
Student and Faculty Excellence (SAFE) Fund	Summer 2017
Office of Student Research (OSR) Research Grant	Spring 2017
Wiley F. Smith Endowment (WiSE) Research Award	Fall 2016
Outstanding Volunteer Award from Leukemia and Lymphoma Society	Fall 2015

Research Interests

Children's social cognitive development
 The development of concepts of social power
 Children's understanding of social categories and use of stereotypes
 Children's beliefs about inequality
 How children update their person judgments

Publications

- Norris, M. N.,** Noles, N. S., McDermott, C. H. (2023). Listen to your mother: Children use hierarchical social roles to guide their judgments about people. *Journal of Cognition and Development*. <https://doi.org/10.1080/15248372.2023.2176854>
- Norris, M. N. &** Noles, N. S. (2022). An ounce of loyalty: Children's expectations about loyalty and preference for in-group members and authority figures. *Proceedings of the Cognitive Science Society*, 44, 107-113.
- Norris, M. N. &** Noles, N. S. (2021). Can a leopard change its spots? Only some children use counterevidence to update their beliefs about people. *Cognitive Development*, 58, 1-12.
- Palmquist, C. M., Kondrad, R. L., & **Norris, M. N.** (2018). Follow my point? Preschoolers' expectations about veridicality disrupt their understanding of deceptive points. *Cognitive Development*, 48, 190-202.

Manuscripts Under Review

Girouard-Hallam, L. N. & **Norris, M. N.** (under review). Overheard and understood: A systematic review of children's learning from overhearing.

Conference Presentations

- Gayle, K., **Norris, M. N.,** Noles, N. (2023). *Are groups fair? Children's perceptions of opportunity distribution*. Poster presented at the Annual Meeting of the Society for Personality and Social Psychology, Atlanta, GA.
- Norris, M. N., &** Noles, N. (2022). *'An ounce of loyalty': Children's expectations about loyalty and preference for in-group members and authority figures*. Talk presented at the Annual Meeting of the Cognitive Science Society, Toronto, Canada.

- Norris, M.N.** & Noles, N.S. (2022). *Children's sensitivity to gender- and race-based inequality*. Talk presented at the biennial meeting of the Cognitive Development Society, Madison, WI.
- Noles, N.S., **Norris, M.N.**, & French, S. (2022). *Parent authoritarianism and children's beliefs*. Poster presented at the biennial meeting of the Cognitive Development Society, Madison, WI.
- Norris, M.N.** & Noles, N.S. (2021). *Children's concepts of fairness and social mobility*. Talk presented in the Anti-Racism symposium at Research!Louisville, Louisville, KY.
- Norris, M.N.** (2021). *Moving on up: Children recognize and intervene in unequal workplace hierarchies*. Talk presented at the meeting of the Midwestern Psychological Association, Virtual Conference.
- Norris, M.N.** & Noles, N.S. (2021). *Who's the boss: Children increase equality while limiting the upward social mobility of minorities*. Poster presented at the biennial meeting of the Society for Research in Child Development, Virtual Conference.
- Noles, N.S. & **Norris, M.N.** (2021). *Like a boss: Older children rectify unequal hierarchical structures more than younger children*. Poster presented at the biennial meeting of the Society for Research in Child Development, Virtual Conference.
- Norris, M.N.**, & Noles, N.S. (2021). *Where loyalties lie: Children's beliefs about loyalty to authorities*. Poster presented at the biennial meeting of the Society for Research in Child Development, Virtual Conference.
- Norris, M.N.**, Noles, N.S., & McDermott, C.H. (2019). *Listen to your mother: Children's understanding of power in hierarchical social roles*. Poster presented at the biennial meeting of the Cognitive Development Society, Louisville, KY.
- McDermott, C.H., Noles, N.S., & **Norris, M.N.** (2019). *The role of cross-classification in children's knowledge attributions and testimony evaluations*. Poster presented at the biennial meeting of the Cognitive Development Society, Louisville, KY.
- Norris, M.N.** & Kondrad, R.L. (2019). *Preschoolers are cautious about extending group traits to unfamiliar group members*. Poster presented at the biennial meeting of the Cognitive Development Society, Louisville, KY.
- Norris, M.N.** & Kondrad, R.L. (2018). *Preschoolers' stereotype epistemic traits more readily than social ones*. Poster presented at the annual meeting of the Psychonomic Society, New Orleans, LA.
- Norris, M.N.** & Kondrad, R.L. (2018). *Preschoolers' stereotype social traits more readily than epistemic ones*. Poster presented at the annual Southeastern Psychological Association conference, Charleston, SC.
- Norris, M.N.**, Sariol-Clough, M., & Kondrad, R.L. (2018). *Follow my point?: Preschoolers' expectations about veridicality disrupt their understanding of deceptive points*. Poster presented at the North Carolina Cognition Conference, Chapel Hill, NC.
- Norris, M.N.** & Kondrad, R.L. (2017). *Preschoolers' stereotype epistemic traits more readily than social ones*. Poster presented at the biennial meeting of the Cognitive Development Society, Portland, OR.

- Norris, M.N.** & Kondrad, R.L. (2017). *Staying connected: How America's young children use video chat*. Poster presented at the biennial meeting of the Cognitive Development Society, Portland, OR.
- Griffin, D., **Norris, M.N.**, Adamof, T., Kondrad, R.L., & Palmquist, C. (2017). *The role of context and cognitive ability in children's skepticism of deceptive information*. Poster presented at the biennial meeting of the Cognitive Development Society, Portland, OR.
- Norris, M.N.**, Kondrad, R.L., Mckercher, D.A., & Jaswal, V.K. (2017). *Of mice and mouses: Children's expectations about regularity can override strong cues to credibility*. Poster presented at the North Carolina Cognition Conference, Greensboro, NC.
- Norris, M.N.**, & Dobson, S.H. (2016). *The contributing factors of satisfaction and engagement in the workplace and their effect on general well-being*. Poster presented at the annual Association for Psychological Science conference, Chicago, IL.
- Dobson, S.H., & **Norris, M.N.** (2015). *It is not just math anxiety: expressive writing themes for statistics students reveal individual differences*. Poster presented at the annual Association for Psychological Science conference, New York, NY.

Departmental Presentations

- Norris, M.N.** & Noles, N.S. (2022). *Children's evaluations of helpers and hinderers as leaders*. Poster presented at the Graduate Student Regional Research conference, Louisville, KY.
- Norris, M. N.** (Spring 2021). *Children's beliefs about loyalty to authorities*. University of Louisville Department Brown Bag, Louisville, KY.
- Norris, M. N.** (Fall 2020). *Who can be a boss? Children think it is fair to rectify unequal hierarchical structures*. University of Louisville Department Brown Bag, Louisville, KY.
- Norris, M. N.** (Spring 2020). *Can a leopard change its spots? Some children change their beliefs about people based on their behavior while others do not*. University of Louisville Department Brown Bag, Louisville, KY.
- Norris, M. N.** (Spring 2019). *Hierarchical social roles and children's trust*. University of Louisville Department Brown Bag, Louisville, KY.
- Norris, M.N.** & Kondrad, R.L. (2017). *Staying connected: Young children's use of video chat*. Poster presented at the Celebration of Student Research and Creative Endeavors at Appalachian State University, Boone, NC.
- Norris, M.N.**, O'Reilly, N., & Hahn, E.R. (2016). *Plate or pal? Beliefs of animal characteristics among vegetarians and omnivores*. Poster presented at Furman Engaged at Furman University, Travelers Rest, SC.

Teaching Experience and Presentations

- Girouard-Hallam, L. N. & **Norris, M. N.** (2022). *Inclusive teaching through active learning for the graduate teaching assistant*. Poster presented at the Annual Conference on Teaching through the Society on Teaching Psychology, Pittsburg, PA.

Norris, M. N., & Girouard-Hallam, L. N. (2022). *Developing a series of professional development workshops for undergraduate research assistants.* Talk presented at the Annual Conference on Teaching through the Society on Teaching Psychology, Pittsburg, PA.

Fall 2018- Present	University of Louisville Graduate Teaching Assistant - <i>Instructor for PSYC 302 Research Methods Lab Section (x2)</i> - <i>Teaching Assistant for PSYC 205 Making Sense of Data</i> - <i>Teaching Assistant for PSYC 307 Cognitive Processes</i> - <i>Teaching Assistant for PSYC 201 Intro to Psychology</i> - <i>Teaching Assistant for PSYC 368 Infant & Child Development</i>
Fall 2021 – Present	Inclusive Teaching Workshop - <i>Presented workshops through graduate student development office to graduate teaching assistants</i>
Spring 2022	Guest Lecture - <i>Child Development: Moral Development</i>
Fall 2017- Spring 2018	Appalachian State University Graduate Teaching Assistant - <i>Instructor for Research Methods Lab (x2)</i>
Spring 2016	Statistics Tutor
Spring 2015- Spring 2016	North Greenville University Teaching Assistant

Mentoring Experience

Fall 2021-Spring 2022	Professional Development Workshop Series - <i>Co-created and presented workshops to research assistants on post-graduate opportunities (i.e., graduate school & Careers)</i>
Spring 2022	Mentoring student poster creation- <i>Poster awarded first place in undergraduate research showcase</i>
Fall 2021- Spring 2023	Mentor+ - <i>mentored less experienced experimental psychology graduate students through the department's mentoring program</i>
Summer 2021-Summer 2022	Transition Ambassador Program- <i>Co-founded program for students transitioning into graduate program and acted as ambassador</i>
Summer 2020	Summer Research Opportunity Program (SROP) - <i>Mentored an undergraduate student through a paid SROP research position that culminated as a poster presentation</i>
Fall 2020	Mentored an Undergraduate Honors Thesis
Summer 2019	Summer Undergraduate Research Mentor- <i>Mentored a sophomore undergraduate student through a research project which later culminated as a poster presentation and talk at the Kentucky Honors Symposium</i>
Spring 2019-2022	Mentored a Research Intern to complete a poster

Other Relevant Experience

Fall 2017- Spring 2018	Aging, Growth, and Experience Labs: Lab Manager
Fall 2016- Spring 2017	Appalachian State University Graduate Research Assistant
Spring 2016	Unpaid Internship at Furman University Learning Lab

Professional Development

- Chair of a Symposium at the 2022 Biennial Meeting of the Cognitive Development Society: How Children Think About Power, Social Status, and Inequality
- Attended Theory-Theory Turns 30 Something Preconference at the 2022 Cognitive Development Society Meeting
- Data Storytelling Workshop with Lisa Cantrell
- Inclusive STEM Teaching Workshop through the Inclusive STEM Teaching Project
- Open Developmental Science Preconference Workshop at the 2019 Cognitive Development Society
- R Programming Coursera Course offered by Johns Hopkins University
- Burning Questions for the Professoriate Luncheon at the 2017 Cognitive Development Society
- Testing Mediation and Moderation in SPSS workshop with Appalachian State University
- Multiple Regression: A Refresher workshop with Appalachian State University
- Advanced SPSS Data Preparation Techniques workshop with Appalachian State University
- Drupal operating system workshop

Research Application and Writing Skills

SPSS, SAS, and LIWC2007, some R
G Power
Certified in Ethics for Protecting Human Subject from the National Institute of Health
CITI certified for Human Subjects Research
Microsoft Office Products (Excel, PowerPoint, Word), APA Format

Organizations

Cognitive Development Society
Society for Research in Child Development
Cognitive Science Society
Society for Teaching Psychology

University Involvement and Service

Fall 2022-Spring 2023	Research Seminar Committee Member
Spring 2021	Poster Judge- UofL Undergraduate Poster Symposium

Summer 2021 & 2022	Transition Ambassador for new Experimental Psychology students
Summer 2019-Spring 2021 Winter 2019	Experimental Psychology Graduate Student Representative Abstract reviewer-National Conference of Undergraduate Research
Spring 2020	Judge for the Louisville Regional Science and Engineering Fair
Spring 2017	Poster reviewer- NC Psychological Association's Conference
Spring 2013 – Present Fall 2012 – Spring 2016	PSI CHI North Greenville University Psychology Club Secretary Fall 2014 – Spring 2015 President Fall 2015 – Spring 2016
Fall 2012 – Spring 2013	Campus Ambassador

References

Dr. Nicholas Noles

Assistant Professor
 Doctoral Mentor and Lab Director
 Dissertation Committee Chairperson
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